HEALTH INFORMATION SYSTEMS AND SERVICES IN THE MEDICAL LIBRARIES OF BANGLADESH: PROBLEMS AND PROSPECTS

DOCTOR OF PHILOSOPHY

MD. SHAFIUR RAHMAN

DEPARTMENT OF
INFORMATION SCIENCE AND LIBRARY MANAGEMENT
UNIVERSITY OF DHAKA
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Dedicated to

My Parents

My Wife Beauty, Son Fahmid, and Daughter Nabila - Sources of all my encouragement

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HEALTH INFORMATION SYSTEMS AND SERVICES IN THE MEDICAL LIBRARIES OF BANGLADESH: PROBLEMS AND PROSPECTS

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Health Information Systems and Services in the Medical Libraries of Bangladesh: Problems and Prospects

Thesis submitted to the University of Dhaka for the Degree of Doctor of Philosophy in Information Science and Library Management

BY
MD. SHAFIUR RAHMAN
REGISTRATION NO. 62
SESSION 2018-2019

Supervisor
Professor Dr. S.M. Mannan
Department of Information Science and Library Management
University of Dhaka
Bangladesh

June 2022

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Dr. S.M. Mannan
Professor

Department of Information Science and Library Management
University of Dhaka
Dhaka - 1000
Tel: +880-2-9661920-73 Ext.-6380
E-mail: smm@du.ac.bd

CERTIFICATE

Certified that the work incorporated in this thesis entitled ***Health Information Systems and Services in the Medical Libraries of Bangladesh: Problems and Prospects*** *was carried out by Md. Shafiur Rahman under my supervision.*

(Dr. S. M. Mannan)
Supervisor

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DECLARATION

The work reported in this thesis is original and has not been submitted by me to any university or institution for the award of any degree or diploma.

Information, as has been obtained from other sources is duly acknowledged and cited in the thesis.

Md. Shafiur Rahman

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ABSTRACT

In today's ICT-based environment, medical libraries throughout the world are practicing modern library systems and services in an attempt to meet the diversified needs of their users. Most of the medical libraries in Bangladesh are not fully equipped with modem ICT facilities, latest print and online collections, necessary budget for subscribing to print and e-resources, and a shortage of fully qualified and experienced staff members. In view of the above situation, it is very essential to ascertain the extent of library ICT facilities, automation, institutional repositories (IR), online and print resources, health information systems, and services that have so far been adopted by the medical libraries of Bangladesh. Hence, the researcher planned to evaluate health information systems and services provided in the selected medical libraries of the country.

The overall health information systems and services in Bangladesh are not at a satisfactory level so far. The medical libraries in Bangladesh have not made significant attempts till now in respect of Library Automation, developing Institutional Repositories, Integrated Library Systems, subscribing to e-journals and online databases, and networking through library consortiums. The medical libraries of Bangladesh are now facing new challenges and opportunities for the development of the health library system. The broad objective of the study is to identify the existing status of Health Information Systems and Services in twenty medical libraries of Bangladesh including infrastructural facilities, ICT facilities, and services, and to develop a model plan integrated with modern ICT tools and technologies. A clear picture of historical growth, current trends, and developments, availability of information resources, Health Information Systems, and services of the surveyed medical libraries are also explored in the study.

A mixed-method research design (i.e. combination of qualitative and quantitative methods) is being followed. Two main stakeholders, the library users, and the respective library heads were considered for the survey. In this research study, the researcher has taken a non-probability sampling approach and chosen the convenience sampling method. The investigator distributed a total of 500 questionnaires among the scientists, doctors, students, researchers, and staff members of six medical libraries selected for the study. Out of 500 questionnaires distributed a total of 412 filled questionnaires were received with a response rate of 82.4%.

The study design has been divided into eight chapters viz. Chapter 1: Introduction and Methodology; Chapter 2: Literature Review; Chapter 3: Health System and Medical Libraries: Bangladesh Scenario; Chapter 4: Medical Library Systems and Services: International Scenario; Chapter 5: Profile of Surveyed Medical Libraries; Chapter 6: Data Analysis and Interpretation: Chapter 7: Model Plan for designing modern library systems and services in the medical libraries of Bangladesh; and Chapter 8: Findings, Recommendations, and Conclusion. The study explores the core challenges for the medical libraries in Bangladesh like Budget Constraints, Poor ICT Infrastructure, Lack of Library Automation, Skilled Manpower, Lack of Professional Librarians, Lack of Sufficient Professional Library Personnel, Inadequate ICT Resources, Absence of Networking and Resource Sharing, and Lack of Online Resources. The study finally suggests twenty recommendations for the overall benefit of the medical libraries, the most notable are Proper Funds Allocation, Implementation of ILS, Strong ICT Infrastructure, Member of Library Consortium, Electronic Collection Development, Building Institutional Repository (IR), Digitizing Existing Materials, Advanced Training Programmes, and ICT-based Services.

Dhaka University Institutional Repository

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LIST OF ABBREVIATIONS

A2I	—	Access to Information
AACR-1	—	Anglo-American Cataloguing Rules-1
AACR-2	—	Anglo-American Cataloguing Rules-2
AAHSL	—	Association of Academic Health Science Libraries
AAHSLD	—	Association of Academic Health Sciences Library Directors
AAMC	—	Association of American Medical Colleges
AC	—	Air Conditioner/Cooler
ACM	—	Association for Computing Machinery
AFMC	—	Armed Forces Medical College
AFMCL	—	Armed Forces Medical College Library
AGORA	—	Access to Global Online Research in Agriculture
AHEAD	—	Asian Health, Environmental and Allied Databases
AHILA	—	Association for Health Information and Libraries in Africa
AI	—	Artificial Intelligence
AIC	—	Agricultural Information Center
AKMMC	—	Anwer Khan Modern Medical College
AKMCL	—	Anwar Khan Medical College Library
ALA	—	American Library Association
ALIA	—	Australian Library and Information Association
APA	—	American Psychological Association
API	—	Application Program Interface
ARDI	—	Access to Research for Development and Innovation
ARL/ACRL	—	Association of Research Libraries/ Association of College and Research Libraries
ASM	—	American Society for Microbiology
ATHENS	—	Advanced Thematic Navigation System
BALID	—	Bangladesh Association of Librarians, Information Scientists and Documentalists
BANBEIS	—	Bangladesh Bureau of Educational Information and Statistics
BanglaJOL	—	Bangladesh Journals On-Line
BANSDOC	—	Bangladesh National Scientific & Technical Documentation Centre
BANSLINK	—	Bangladesh National Scientific and Library Information Networks
BAS	—	Bangladesh Academy of Sciences
BBS	—	Bangladesh Bureau of Statistics

BCC	—	Bangladesh Computer Council
BCPS	—	Bangladesh College of Physicians and Surgeons
BCPSL	—	Bangladesh College of Physicians and Surgeons Library
BdREN	—	Bangladesh Research and Education Network
BDSLIBNET	—	Bangladesh Special Library Network
BDS	—	Bachelor of Dental Surgery
BICH	—	Bangladesh Institute of Child Health
BICHL	—	Bangladesh Institute of Child Health Library
BIDS	—	Bangladesh Institute of Development Studies
BIRDEM	—	Bangladesh Institute of Research and Rehabilitation for Diabetes, Endocrine and Metabolic Disorders
BIRDEML	—	Bangladesh Institute of Research and Rehabilitation for Diabetes, Endocrine and Metabolic Disorders Library
BMC	—	Bangladesh Medical College
BMCL	—	Bangladesh Medical College Library
BMDC	—	Bangladesh Medical and Dental Council
BMLNET	—	Bangladesh Medical Libraries Network
BNC	—	Bangladesh Nursing Council
BPC	—	Bangladesh Pharmacy Council
BRACUL	—	BRAC University Library
BSMMU	—	Bangabandhu Sheikh Mujib Medical University
BSMMUL	—	Bangabandhu Sheikh Mujib Medical University Library
BTCL	—	Bangladesh Telecommunications Company Limited
BTRC	—	Bangladesh Telecommunication Regulatory Commission
BUET	—	Bangladesh University of Engineering and Technology
BUETL	—	Bangladesh University of Engineering and Technology Library
BUHS	—	Bangladesh University of Health Sciences
BUHSL	—	Bangladesh University of Health Sciences Library
BUMS	—	Bachelor of Unani Medicine & Surgery
BUP	—	Bangladesh University of Professionals
CAS	—	Current Awareness Services
CCC	—	Close Circuit Camera
CCC	—	Classified Catalogue Code
CDROM	—	Compact Disc-Read Only Memory
CDS	—	Clinical Decision Support
CDS/ISIS	—	Computerized Documentation System/Integrated Set of Information

		System
CENTRAL	—	Cochrane Central Register of Controlled Trials
CFL	—	Central Focal Point
CHLA	—	Canadian Health Libraries Association
CINAHL	—	Cumulative Index to Nursing & Allied Health
CMS	—	Content Management Software
CRL	—	Cholera Research Laboratory
CMH	—	Combined Military Hospital
CMS	—	Content Management System
CMU	—	Chittagong Medical University
CMUL	—	Chittagong Medical University Library
COMSATS	—	Commission on Science and Technology for Sustainable Development in the South
COUNTER	—	Counting Online Usage of Networked Electronic Resources
CPD	—	Committee for Development Policy
DAB	—	Diabetic Association of Bangladesh
DAM	—	Digital Asset Management
DARPA	—	Defense Advanced Research Projects Agency
DC	—	Dublin Core
DCC	—	Distance Collaboration Centre
DCH	—	Diploma in Child Health
DGDA	—	Directorate General of Drug Administration
DGFP	—	Directorate General of Family Planning
DGHED	—	Directorate General of Health Engineering Department
DGHEU	—	Directorate General of Health Economics Unit
DGHS	—	Directorate General of Health Services
DGNM	—	Directorate General of Nursing and Midwifery
DISC	—	Dissemination of Information Service Centre
DIWG	—	Digital Initiatives Working Group
DL	—	Digital Library
DLF	—	Digital Library Foundation
DLMS	—	Digital Library Management System
DLNETSA	—	Digital Library Network South Asia
DLS	—	Digital Library Systems
DLIs	—	Digital Library Initiatives
DMC	—	Dhaka Medical College
DMCL	—	Dhaka Medical College Library

DNMC	—	Dhaka National Medical College
DNMCL	—	Dhaka National Medical College Library
DOAB	—	Directory of Open Access Books
DOAJ	—	Directory of Open Access Journals
DOAR	—	Directory of Open Access Repositories
DOI	—	Digital Object Identifier
DPC	—	Digital Preservation Coalition
DRIVER	—	Digital Repository Infrastructure Vision for European Research
DRM	—	Digital Rights Management
DSH	—	Dhaka Shishu Hospital
EAHIL	—	European Association for Health Information Libraries
E-Books	—	Electronic Books
EBM	—	Evidence-based medicine
EDD	—	Electronic Document Delivery
E-Journals	—	Electronic Journals
EBP	—	Evidence-based Practice
EDS	—	EBSCO Discovery Service
EHD	—	Evercare Hospitals Dhaka
EHDL	—	Evercare Hospital Dhaka's Library
EID	—	Electronic Information Display
EIN	—	Electronic Information Notification
EMR	—	Electronic Medical Record
ERM	—	Electronic Resource Management
ERMED	—	Electronic Resources in Medicine
ETD	—	Electronic Theses and Dissertations
EU	—	European Union
EWUL	—	East West University Library
FAO	—	Food and Agricultural Organization
FBI	—	Federal Bureau of Investigation
FCPS	—	Fellowship of College Physician and Surgeon
FHSLA	—	Federation of Health Science Library Associations
FOSS	—	Free and Open Source Software
GCC	—	GNU Compiler Collection
GDP	—	Gross Domestic Product
GIDEON	—	Global Infectious Diseases & Epidemiology of Network Online
GIM	—	Global Index Medicus
GLAS	—	Graphical Library Automation Software/System

GLMC	—	Green Life Medical College
GLMC	—	Green Life Medical College Library
GOALI	—	Research for Global Justice
GPA	—	Grade Point Average
GPS	—	Global Positioning System
GSDL	—	Greenstone Digital Library
HBS	—	Health and Biosciences Libraries Section
HELINET	—	Health Science Library and Information Network
HELLIS	—	Health Literature, Library and Information Services
HEQEP	—	Higher Education Quality Enhancement Project
HFRCMC	—	Holy Family Red Crescent Medical College
HFRCMCL	—	Holy Family Red Crescent Medical College Library
Hinari	—	Hinari Access to Research for Health Programme
HIS	—	Health Information System
HL	—	Hybrid Library
HLA	—	Health Libraries Australia
HPNSDP	—	Health, Population and Nutrition Sector Development Program
HPNSP	—	Health, Population and Nutrition Sector Program
HSL	—	Health Sciences Libraries
HSLS	—	Health Sciences Library System
HSLNKC	—	Health Sciences Library Network of Kansas City
HTML	—	Hyper Text Markup Language
IBM	—	International Business Machines
icddr,b	—	International Centre for Diarrhoeal Disease Research, Bangladesh
IC	—	Information Control
ICL	—	International Copyright Law
ICMC		Ibn Sina Medical College
ICMCL		Ibn Sina Medical College Library
ICMR	—	Indian Council of Medical Research
ICOLC	—	International Coalition of Library Consortia
ICT	—	Information and Communication Technology
ICTs	—	Information and Communication Technologies
IDI	—	ICT Development Index
IDLs	—	Integrated Digital Libraries
IEEE	—	Institute of Electrical and Electronics Engineers
IFLA	—	International Federation of Library Associations and Institutions
IIDL	—	International Islamic Digital Library

IIS	—	Integrated Information Systems
IKR	—	Institutional Knowledge Repository
ILL	—	Inter Library Loan
ILS	—	Integrated Library Systems
ILMS	—	Integrated Library Management Systems
IM	—	Instant Messaging
IMED	—	International Medical Education Directory
IMLS	—	Institute of Museum and Library Services
INASP	—	International Network for Availability of Scientific Publications
INFLIBNET	—	INFormation and LIBrary NETwork
IoT	—	Internet of Things
IPs	—	Information Professionals
IPR	—	Intellectual Property Rights
IR	—	Institutional Repository
IRIS	—	Institutional Repository for Information Sharing
IS	—	Information System
ISP	—	Internet Service Provider
ITR	—	Information Technology Research
ISBD	—	International Standard Bibliographic Description
ISLM	—	Information Science and Library Management
ISO	—	International Organization for Standardization
ISRT	—	Institute of Statistical Research and Training
IT	—	Information Technology
ITU	—	International Telecommunication Union
IUB	—	Independent University, Bangladesh
IUT	—	Islamic University of Technology
IUMS	—	Iran University of Medical Science
JAIRO	—	Japanese Institutional Repositories Online
JIF	—	Journal Impact Factor
JKKNIU	—	Jatiya Kabi Kazi Nazarul Islam University
JNMC	—	Jawaharlal Nehru Medical College
KIMS	—	Kalinga Institute of Medical Sciences
KMS	—	Knowledge Management System
KMSIL	—	KM for Service Innovation in Libraries
LAB	—	Library Association of Bangladesh
LAMP	—	Linux, Apache, MySQL, PHP/Perl/Python
LAN	—	Local Area Network

LC	—	Library of Congress
LC/NAF	—	Library of Congress Name Authority File
LCSH	—	Library of Congress Subject Headings
LDC	—	Least Developed Countries
LIC	—	Library & Information Centre
LiCOB	—	Library Consortium of Bangladesh
LISA	—	Library and Information Science Abstracts
LISS	—	Library & Information Services Section
LISTA	—	Library, Information Science & Technology Abstracts
LMS	—	Library Management Systems
LOM	—	Learning Object Metadata
MacOS		Macintosh Operating System
MAHSLIN	—	Massachusetts Health Sciences Libraries Network
MAN	—	Metropolitan Area Network
MCI	—	Medical Council of India
MEDLARS	—	Medical Literature Analysis & Retrieval System
MEDLINE	—	MEDlars onLINE
ME&HMD	—	Medical Education and Health Manpower Development
MeSH	—	Medical Subject Headings
MEU	—	Medical Education Unit
MIS	—	Management Information System
MPhil	—	Master of Philosophy
MARC	—	Machine Readable Cataloguing
MARC 21	—	Machine Readable Catalog 21
MBBS	—	Bachelor of Medicine/Bachelor of Surgery
MD	—	Doctor of Medicine
MeSH	—	Medical Subject Headings
MEFWD	—	Medical Education and Family Welfare Division
MHSLA	—	Michigan Health Sciences Libraries Association
MLA	—	Medical Library Association
MIT	—	Massachusetts Institute of Technology
MOHFW	—	Ministry of Health and Family Welfare
MS	—	Master of Science
NA	—	Not Available
NASA	—	National Aeronautics and Space Administration
NCBI	—	National Center for Biotechnology Information
NDLTD	—	Networked Digital Library of Theses and Dissertations

NDRS	—	National Digital Repository System
NEMEW	—	National Electro-medical & Engineering Workshop
NFC	—	Near Field Communication
NGO	—	Non-Government Organization
NHLDC	—	National Health Library and Documentation Centre
NIC	—	National Informatics Centre
NIH	—	National Institutes of Health
NIPORT	—	National Institute of Population Research &Training
NIPSOM	—	National Institute of Preventive & Social Medicine
NIPSOML	—	National Institute of Preventive & Social Medicine Library
NISO	—	National Information Standards Organization
NLM	—	National Library of Medicine
NMC	—	Nepal Medical Council
NML	—	National Medical Library
NNLM	—	Network of the National Library of Medicine
NORA	—	Norwegian Open Research Repository
NYUHSL	—	NYU Health Sciences Libraries
OA	—	Open Access
OAI	—	Open Archives Initiative
OAI-PMH	—	Open Archives Initiative Protocol for Metadata Harvesting
OARE	—	Online Access to Research in the Environment
OCLC	—	Online Computer Library Center
OCR	—	Optical Character Recognition
ONOS	—	Open Network Operating System
OPAC	—	Online Public Access Catalog
ORCID	—	Open Researcher and Contributor ID
OSS	—	Open Source Software
OUP	—	Oxford University Press
PAHI	—	Partnership in Health Information
PCI	—	Peripheral Component Interconnect
PDF	—	Portable Document Format
PEDro	—	Physiotherapy Evidence Database
PERI	—	Program for the Enhancement of Research Information
PGCB	—	Power Grid Company of Bangladesh
Ph.D.	—	Doctor of Philosophy
PHP	—	PHP: Hypertext Preprocessor
PICO	—	Population Intervention Comparison Outcomes

PMUSE	—	Project MUSE
POPLINE	—	Population Literature Online
POPIN	—	Population Information Network
PPP	—	Purchasing Power Parity
PQDT	—	ProQuest Dissertations and Theses
PRISMA	—	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PUHSL	—	Peking University Health Science Library
RDA	—	Resource Description and Access
RDS	—	Research Data Services
RFID	—	Radio Frequency Identification
RMC	—	Rajshahi Medical College
RML	—	Regional Medical Library
RMU	—	Rajshahi Medical University
RMUL	—	Rajshahi Medical University Library
ROAR	—	Registry of Open Access Repositories
RQ	—	Research Questions
RS	—	Resource Libraries
RSS	—	Really Simple Syndication
SBMU	—	Shahid Beheshti Medical University
SDGs	—	Sustainable Development Goals
SDI	—	Selective Dissemination of Information
SHERPA	—	Securing a Hybrid Environment for Research Preservation and Access
ShSMC	—	Shaheed Suhrawardy Medical College
ShSMCL	—	Shaheed Suhrawardy Medical College Library
SLiMS	—	SENAYAN Library Management System
SMCL	—	Sir Salimullah Medical College Library
SMF	—	State Medical Faculty
SMH	—	Supporting Medical Health
SMS	—	Short Message Service
SOAP	—	Simple Object Access Protocol
SOPAC	—	Social Online Public Access Catalog
SPSS	—	Statistical Package for the Social Sciences
SRW	—	Search/Retrieve Webservice
SSMC	—	Sir Salimullah Medical College
S-TOFHLA	—	Short Test of Functional Health Literacy Ability
SWOT	—	Strengths, Weaknesses, Opportunities, and Threats

SUSHI	—	Standardized Usage Statistics Harvesting Initiative
TCP/IP	—	Transmission Control Protocol / Internet Protocol
TCP/UDP	—	Transmission Control Protocol / User Datagram Protocol
TEMO	—	Transport & Equipment Maintenance Organization
TL	—	Traditional Library
TLA	—	Transactional Log Analysis
TOPSIS	—	Technique for Order Preference by Similarity to Ideal Situation
TOXLINE	—	TOXicology Information OnLINE
TRIP	—	Turning Research Into Practice
TUMS	—	Tehran University of Medical Science
UCSF	—	University of California San Francisco
UDC	—	Universal Decimal Classification
UDL	—	University Grants Commission Digital Library
ULs	—	University Libraries
UGC	—	University Grants Commission
UGAWD	—	Usability Guidelines for Accessible Web Design
UHCs	—	Upazila Health Complexes
UHFWCs	—	Union Health And Family Welfare Centers
UMLS	—	Unified Medical Language System
UN	—	United Nations
UNDP	—	United Nations Development Programme
UNESCO	—	United Nations Educational, Scientific and Cultural Organization
US	—	United States
USA	—	United States of America
USC	—	University of Southern California
URL	—	Uniform Resource Locator
UT	—	University of Tennessee
VHSL	—	Virtual Health Sciences Library
VOIP	—	Voice Over Internet Protocol
VPN	—	Virtual Private Network
VRS	—	Virtual Reference Services
VSAT	—	Very Small Aperture Terminal
WAN	—	Wide Area Network
WB	—	World Bank
WDS	—	Web-Scale Discovery Services
Web OPAC	—	Web Online Public Access Catalogue
WDL	—	World Digital Library

WHO	—	World Health Organization
WHO,BL	—	WHO Bangladesh Library
WIA	—	Windows Image Acquisition
WLAN	—	Wireless Local Area Network
WSDS	—	Web-Scale Discovery Services
WSIS	—	World Summit on Information Society
WWW	—	World Wide Web
XML	—	Extensible Markup Language

CHAPTER 1

INTRODUCTION AND METHODOLOGY

Chapter 1

Introduction and Methodology

Access to Information (A2I) is treated as a driver of the progress of a knowledge-based society around the world. The economic growth of a nation largely depends on the availability of reliable and updated information for effective operation and decision-making processes (IFLA, 2017). In the present "Information Explosion" era, accurate and specialized information plays a significant role in the socio-economic progress of a country like Bangladesh. Universal access to information and knowledge is an essential indicator for bridging the digital divide between developed and underdeveloped countries in order to become a proactive player in the evolving knowledge society. Information is of utmost importance in sustainable development both for developed and developing countries. Bangladesh, like a developing country, with an estimated 160 million people (of whom 85% live in 85,650 villages), is one of the most densely populated countries in the world. The Government of Bangladesh is taking many initiatives to create Digital Bangladesh by adopting the use of a wide range of technologies. In recent times, the Information and Communication Technology (ICT) infrastructure of Bangladesh has improved significantly to build a "Digital Bangladesh". Bangladesh is now experiencing a digital environment in various development areas like the health sector, banking sector, telecommunication sector, agriculture sector, education sector, and many more. Medical libraries are treated as the backbone and knowledge hub of any health organization for meeting the health information needs of physicians and health scientists. In this respect, modern health information systems and services would play a leading role in accessing a rich collection of health information to medical professionals and for the ultimate development of the health sector in Bangladesh.

The new United Nations 2030 Agenda is a comprehensive, combined strategies of 17 Sustainable Development Goals (SDGs) with a total of 169 Targets scaling up economic, environmental, and health development (United Nations, 2015). In the UN 2030 Agenda, Access to health information has been recognized as a target under SDG 3: *"Ensure healthy lives and promote well-being for all at all ages"* which will ensure universal access to health information and deliver high-quality health services covering health security, infectious diseases, nutrition, and clinical sciences, maternal health, health systems, and population studies, universal health coverage, child and adolescent health and the integration of reproductive health into sustainable health

strategies and programs for converting the world into a healthier place by the Year 2030. The International Federation of Library Associations and Institutions (IFLA) stated that (IFLA, 2018):

"Medical libraries and hospital libraries provide access to medical research that supports improved clinical and public health outcomes. Public access to health information in all libraries help people to make better lifestyle choices and to stay healthy. Public libraries have a key role in providing health information to vulnerable groups such as new immigrants and people experiencing homelessness. Services include: accessing reliable health information, developing health literacy skills, providing help in researching and acquiring appropriate health insurance, and organising and participating in first aid training."

Bangladesh has recently passed the eligibility from Least Developed Country to Developing Country as declared by the UN Committee for Development Policy (CPD). Bangladesh fulfilled all the requirements for being a developing country in March 2018 and hopefully would get the official Developing Country status by 2024. For planning, organizing, and managing health services, the Directorate General of Health Services (DGHS) and the Directorate General of Family Planning (DGFP) in collaboration with the WHO (World Health Organization) health program for Bangladesh look after the overall activities of the Management Information System for the administration, management and dissemination of health information (WHO, 2021). WHO office of Bangladesh has given the focus on medical libraries to support with adequate financial capacity and required logistics to bring them to the standard of developed countries. Medical library professionals should be trained effectively in the management of health libraries in Bangladesh with ICT applications (WHO Bangladesh, 2018). So it is an urgent need to give more attention to the overall development of medical libraries in Bangladesh to successfully improve health information systems and services.

Medical specialists require up-to-date knowledge not only to sustain themselves but also to maintain the quality of their practices. The knowledge explosion in medicine places heavy responsibilities on medical specialists to be aware of the new advances in medicine for improved diagnosis and patient care. The expansion of medical knowledge, and the greater awareness, and consciousness towards medical information among health professionals lead to a demand for continuing access to health information. It is generally recognized that knowledge in medicine is expanding rapidly and this rate of expansion has been estimated in terms of what is

known as the 'doubling period' which is defined as the number of years in which the total amount of knowledge doubles itself. Information is increasing exponentially with a doubling time of 10-15 years. The doubling period in medicine is said to be ten years. Due to the changing scenario in ICT, and the requirements of medical professionals for valuable, up-to-date, and authentic information, medical libraries have been the foremost adopters of electronic or online access to health resources to provide reliable and rapid information.

In the present information age, a dependable health information system in the country is much required to keep track of the latest health sciences activities across the world. For supporting academic and research activities of medical education, a workable information system is an essential prerequisite. Health professionals should have access to reliable and updated health information for better decision-making and clinical care. Health information systems and services thus play an extremely crucial role in helping the medical libraries, in order to confront the emerging challenges and compete more effectively in the current global information society and the information overload with ease.

Bangladesh: Country Profile

Bangladesh, officially the People's Republic of Bangladesh, is located in the South Asia region with a large population. A large number of people live in rural villages wherein in 2019, 38.3% of the population were active in the agricultural sector. Bangladesh faces several major challenges, including poverty, corruption, overpopulation, and vulnerability to climate change. The GDP per capita (PPP) of this country is $4,200 (2017 est.). Bangladesh has a population of 162,650,853 (July 2020 est.), and holds 8th position compared to the world, occupying 147,570 square kilometers. The population density of Bangladesh is 1,161 people per square kilometer is too high compared to other developing countries. It is one of the Muslim countries in the world in which about 90% of the population are Muslims. The current health expenditure is 2.3% (2017) and physicians' density is 0.54 physicians/1,000 population (2017) (The World Fact Book, 2020). Administratively, the country is divided into 8 divisions, 12 City corporations, 64 districts (Zila), and 492 subdistricts (Upazila) (Directorate General of Health Services, 2020).

ICT Journey of Bangladesh

Atomic Energy Center started the first "second generation" computer (IBM 1620) usage in 1964 for the first time in Bangladesh. Subsequently, other organizations like Bangladesh University of Engineering and Technology (BUET), Adamjee Jute Mills Ltd, Institute of Statistical Research and Training (ISRT), and the Bureau of Statistics are the pioneers of introducing computers in Bangladesh.

Figure 1.1: Information Technology Sections of BTRC, Source: (BTRC, 2020a)

The spread of science and technology has made a significant impact in almost all domains of human life. Especially, the sectors of education, health, communication, business, academic, and research organizations have made remarkable enhancements with the application of the Information and Communication Technology (ICT) revolution. ICT ensures desirable and more effective user-centered services in a timely and speedy manner. The term "ICT" covers the use of computers associated with communication technology and the Internet for processing, storing, and sharing information. Ministry of Information and Communication Technology, Government of Bangladesh, is the apex body for promoting Information and Communication Technology to positively change the society and for balanced socio-economic upliftment and national well-being.

Table 1.1: Growth of Telecommunications in Bangladesh (2002-2003 and 2018-2019)

No.	Subject	2002-2003	2018-201 9
1.	Density of Telephone	0.54%	97.46%
2.	Density of Internet	0.1%	57.44%
3.	Mobile Subscribers of 3 G Network	50.50 Lac	61.663 million
4.	Mobile Subscribers of 4 G Network	N/A	19.131 million
5.	Subscribers of Internet	1 Lac	96.199 million
9.	Network Coverage	50/64 Districts	64/64 Districts
11.	Frequency Allocation (Organization)	35	1024

Adapted from: (BTRC, 2020a)

It is revealed in Table 1.1 that Bangladesh has made significant development in the ICT sector over the last 10 years. was by The International Telecommunication Union (ITU) developed the latest ICT Development Index (IDI). The progress of ICT developments in 175 countries worldwide has been measured by the ITU and compared to the progress for the last 2 years in the indicators like ICT access, use, and skills. Bangladesh has secured the 147th position with a point of 2.53 in the global ICT Developments Index. Iceland ranked in the 1st position with 8.98 points among the 175 countries. There are a total of 178.61 Million users of Mobile Phones at the end of August 2021 in Bangladesh.

Table 1.2: Mobile Phone subscribers of Bangladesh

Operator	Subscriber (In Millions)
Grameen Phone	83.18
Robi	52.26
Banglalink	36.90
Teletalk	6.27
Total	**178.61**

Adapted from: (BTRC, 2020b)

As of December 2021. A total of 123.82 million Internet subscribers are in Bangladesh.

Table 1.3: Internet subscribers of Bangladesh

Operator	Subscriber (Million)
Mobile Internet	113.73
ISP + PSTN	10.09
Total	**123.82**

Adapted from: (BTRC, 2020b)

Bangladesh has given special emphasis on the application of digital technologies to realize Vision 2021 for creating a Digital Bangladesh. National ICT Policy-2009 has been formed with a view to achieving the middle-income status of the country by 2021 and developed status by 2041. The core achievements of digital services of Bangladesh cover online banking systems, hotline numbers for getting the basic help services, e-ticketing service of Bangladesh Railway, online registration of pilgrimage, registration for admission to schools/colleges/universities, online job applications, online examination results, online birth and death registration, online download of govt. official forms, online tax submission, online tendering, etc. Online bill payments for utility services, complaints to police through SMS services, high broadband service, and e-passports are some more examples. Video conferencing for administrative activities, telemedicine services, and videoconferencing for the treatment of diseases are also available in Bangladesh.

The country started the journey of mobile Internet in the 2000s with the support of local mobile operators. In February 2018, the '4G' Internet was introduced in Bangladesh. On 12th December 2021, the '5G' mobile network started its journey with coordination from the BTRC (Bangladesh Telecommunication Regulatory Commission) and the Govt. owned mobile operator Teletalk. Bangabandhu Satellite - 1, a unique milestone of digital Bangladesh, started its journey from the USA on May 12, 2018.

Health Information for Development

The government of Bangladesh is providing necessary financial support and setting overall policies and services for the health system. In terms of national resource allocation, the health system is receiving little attention. World Health Organization stated that (WHO, 2010), approximately 3% of the Gross Domestic Product (GDP) is allocated for health services in Bangladesh. The overall development of the health sector is largely dependent on free-flow access to health information. The country needs faster clinical services which depend on the implementation of health information systems and services. Quality health information along with the adoption of ICT tools and technologies in the medical libraries of Bangladesh should get top priority for the overall development of Bangladesh. Equal access to health information can eliminate the barrier of the digital divide between Bangladesh and other nations. The country dearly needs a strong health information system for the successful implementation of Digital Bangladesh.

Theoretical Consideration of the Subject

Health: The term 'health' is viewed differently by different people and authorities all over the world. India's First Five Year Plan stated health as a "positive state of well-being in which harmonious development of mental and physical capacities of the individuals leads to the enjoyment of a rich and full life. The words of Berthet, Secretary-General of the International Union for Health Education defined health as "flexible state of body and mind which may be described in terms of a range within which a person sway from the condition wherein he is at the peak of enjoyment of physical, mental and emotional experiences"(Rodrigues, 2009). Oxford dictionary lays the definition of health as the "state of being free from sickness, injury or disease, bodily conditions, sometimes to give a direction towards the achievement of a robust, happy, active bodily and mental condition capable of continuous productive ability" (Oxford Reference, 2021). The WHO defined health as "a state of complete physical, mental and social well-being and not merely an absence of disease or infirmity and the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition (World Health Organization, 2021)." This definition is well accepted. Good health is a synthesis of physical, mental, and social well-being, the definition of health has to extend not only to physical fitness but also to simultaneous psychological and spiritual well-being.

Medical Library: A health or medical library is designed to assist physicians, health professionals, students, patients, consumers, medical researchers, and information specialists in finding health and scientific information to improve, update, assess, or evaluate health care (Wikipedia, 2016). With ongoing changes in health care as a result of information technology, health sciences libraries and librarians can play an important role in bringing high-quality, evidence-based medical information to the bedside, helping to make patient care both efficient and effective. Health care libraries and librarians are adapting to the changing information needs of physicians, other health care professions, researchers, and patients (Sollenberger & Holloway, 2013). A medical library maintained in a medical school/college or hospital premises contains a collection of print and online resources on medicine and allied health issues to serve the information and research needs of doctors, nurses, patients, and staff. The primary purpose of such a library is to provide scholarly information to support health care, education, and research conducted at these institutions. The mission of medical libraries is to acquire information, organize them to make it available, and preserve it.

Health Science Library: The term "health science library" comprises a variety of libraries such as libraries of medical colleges, research institutes, dental colleges, hospitals, nursing institutions, pharmaceutical companies, government health departments, etc. Among these libraries, a medical library has an explicit function as a real center of intellectual effort and an active educational instrument in modem teaching and research Information:

Health Information: All types of health data, news, videos, audios, documents, reports, online databases, print and e-resources based on health sciences used by health professionals (physicians, nurses, medical students), decision-makers within the health system, health organizations, public health providers, health schools, and academic medical institutions – for providing health care services and carry on academic and research activities.

Library Information System: A successful Library Information System consists of four core systems like Integrated Library System, Library RFID System, Knowledge Management Systems, and Digital Library System presented in the following figure:

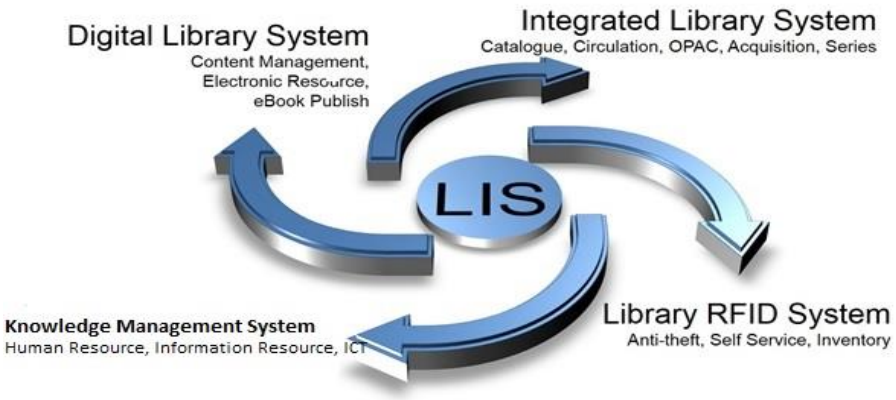


Figure 1.2: Major parts of Library Information Systems

Information System (IS): An information system (IS) can be viewed as a system in which data are entered as input and processed into information products as output. It may be defined as an organised flow of information to users. IS, in the words of O'Brien, is a "set of people, procedures and resources that collects, transfers and disseminates information in an organization (O'brien & Marakas, 2009)." Gray defined IS as “An automated or manual collection of people, machines, and/or

methods to gather, process, transmit and disseminate data. Information systems are used to acquire, store, manipulate, manage, display, transmit, or receive data. It includes both hardware and software (Gray, 2006)" Today's organization depends on different types of information systems which "include simple manual (Paper and pencil) information system and informal (word of mouth) information system." Encyclopaedia of Computer Science defines IS as "a collection of people, procedures and equipment designed, built, operated and maintained to collect, record, process, store, retrieve and display information (Ralston et al., 2003)." In a broader sense, an IS is considered as a system for accepting data as raw material and through one or more transmutation processes and decision making (in relation to its own existence) are among the functions performed by an IS. Thus, IS generally may be defined as a system that collects, processes, stores, retrieves, disseminates, and transmits information to fulfill the information needs of a variety of users. The information system also includes Library Website. There is a massive increase of digital resources around the world, medical libraries must develop library websites for seamless access to online resources and provide web-based services. DeLone and McLean have developed Information System (IS) Success Model that covers six variables: "System Quality," "Information Quality," "Service Quality," "Use," "User Satisfaction," and "Net Impacts (DeLone & McLean, 2016)."

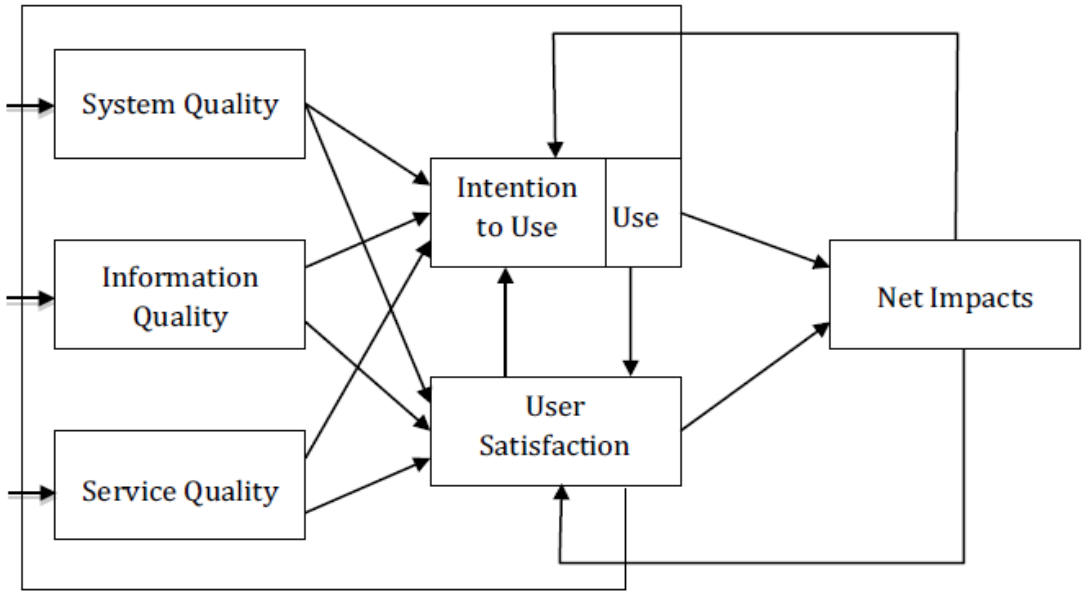


Figure 1.3: Updated DeLone and McLean 2003 IS Success Model, Source: (DeLone & McLean, 2016)

The 6 core components of a successful IS model shown in Figure 1.3 are defined below:

- System Quality —ease of use, system flexibility, and system reliability.
- Information Quality — understandability, currency, timeliness, relevance, accuracy, conciseness, completeness, and usability.
- Service Quality — the degree of receiving quality services.
- Use — utilization of information system.
- User Satisfaction – the level of satisfaction.
- Net Impacts — Measurable impacts for the successful system.

Health Information System: Health Information System (HIS) is interpreted in most countries as consisting of health statistical, epidemiological, and other health-related information useful for health planning and management. It is generally recognized as necessary, fundamental, and an integral element for the development of health services. A health system is a combination of people, institutions, and resources for delivering health information and health care services to meet the health needs of physicians, nurses, students, and patients. World Health Organization defines Health Information System (HIS) as (Management Association, 2019):
"A mechanism for the collection, processing, analysis, and transmission of information required for organising and operating health services and also for research and training."

Information Services: A group of services that are provided to library users for completing academic and research activities. In this study, both traditional information services and ICT-based services are covered.

Information and Communication Technologies (ICTs): ICTs are a combination of telecommunications devices, all computing devices, systems, artificial intelligence, robotics, networks, and other applications used to perform all sorts of modern activities electronically (World Bank 2003). ICT is an umbrella term that includes telecommunication devices, encompassing radio, television, cell phones, computers and network, satellite systems, video conferencing, and distance learning (Kondra, 2020). The term ICT facilities in this study cover the computer facilities available, automation, and provision of ICT-based infrastructure such as Internet connectivity, library website, e-resources, online databases, RFID, OPAC, library network, etc., in the medical libraries of Bangladesh.

Institutional Repository (IR): IR is an online repository for free access to research outputs and other scientific and academic works of scientists, doctors, researchers, students, faculties, and staff members of a specific organization/institute. The various works like scientific publications, books, book chapters, journal articles, news, audio and videos, and reports including unpublished materials are stored in digital format for a long time in an institutional repository. It maximizes access to research outputs for researchers worldwide and ultimately increases the visibility and academic prestige of both the institution and the authors (Nwachi & Idoko, 2021).

Library Automation: The application of modem information technology in library management functions is known as library automation. Library management functions include all types of housekeeping operations such as acquisition, cataloging, circulation, serial control, budget management, etc.

Health Sciences Information Network

Health sciences library networks have been formed considerably for sharing information resources among different medical institutions around the world. A good number of health sciences networks have been developed worldwide, most notably are listed below:

Network of the National Library of Medicine (NNLM): The main aim of the Network of the National Library of Medicine (NNLM) is to monitor the advancement of medicine and expand public health activities for all the U.S. healthcare specialists providing the needed health information. It started its journey on May 01, 2016, and at present, there are 9147 members. The core benefits of this network are management of project funding, provision of training, information services, planning for network activities, and proper communications with other NNLM members (National Library of Medicine, 2020a).

Virtual Health Sciences Library: The Regional Office, in association with the Member States of the World Health Organization has developed the Virtual Health Sciences Library (VHSL), an online health sciences library network. E-resources based on health and biomedical sciences are available by this network for doctors and medical students (World Health Organization, 2020).

National Network of Libraries of Medicine, Southeastern/Atlantic Region: The University of Maryland Health Sciences and Human Services Library in collaboration with the National Library of Medicine (NLM) established the National Network of Libraries of Medicine, Southeastern/Atlantic Region on May 1, 2011, that acts as the Regional Medical Library (RML) for the Atlantic region. The Network aims to expand the health sciences activities and improve the public health by:

- Offering biomedical information services;
- Improving the public health awareness program (University of Maryland, 2020).

Health Sciences Library Network of Kansas City (HSLNKC): This network facilitates improved health education and health well-being in the larger Kansas City area, USA for the professional medical librarians and healthcare specialists. The main mission is to build up strong communication between the health librarians and the physicians (HSLNKC, 2021).

Massachusetts Health Sciences Libraries Network (MAHSLIN): MAHSLIN, developed in 1983, serves as the leading library network in the Massachusetts area for the professional health science librarians promoting the professional development of health care service providers (Massachusetts Health Sciences Libraries Network, 2020).

Health Science Library and Information Network (HELINET): HELINET, is an electronic resource-sharing consortium that connects all health science libraries in Karnataka, India. Rajiv Gandhi Institute of Health Sciences, Karnataka (RGUHS) is the creator of this network in 2001. HELINET has grown as one of the leading library consortia in the country for accessing medical e-journals and is run by membership fees. At present, there are 666 medical colleges in the state under HELINET (Rajiv Gandhi University of Health Sciences, 2012).

Health Literature, Library and Information Services (HELLIS) Network: In 1979, the Health Literature, Library and Information Services (HELLIS) network in the South-East Asian Region of the World Health Organization was formed in New Delhi to connect the medical libraries of the South Asia region treated as a well-standard network. The main motto was to share health resources and services among health science libraries at national, regional, and global levels. In brief, HELLIS network established in 1980, has grown over the years for sharing health information

through its portal www.hellis.org which was launched in September 2003. The network has made significant progress in sharing resources and harvesting metadata. National Medical Library (NML), New Delhi acts as the National Focal Point for this network in India (Siddamallaiah & Butdisuwan, 2009).

BdREN (Bangladesh Research and Education Network): Bangladesh Research and Education Network (BdREN) started its journey in 2009 developed by the University Grants Commission (UGC) of Bangladesh, on behalf of the Ministry of Education (MoE) with collaboration from the World Bank. It offers high bandwidth data connectivity among research and education institutions in both the public and private sectors. BdREN aims to connect all colleges, universities, health institutions, Govt. offices, research institutions, libraries, and all agricultural and business institutions across the country with reliable access to high-end computing, simulation tools, and datasets (BdREN, 2020).

Health Sciences/Medical Library Associations

The Health Sciences Library Association plays a pivotal role to accelerate health information, scholarly communication, and knowledge management. The notable health associations are listed below:

Medical Library Association (MLA): It is a global and nonprofit medical association in which more than 400 medical institutions around the world and 3,000 professionals working in the health sciences are involved, established in 1898. MLA is well known for its professional practice excellence and leadership of medical libraries and health sciences librarians to enhance health education, and research activities throughout the world. The core values cover *"Lifelong learning and professional development; Use of scientific evidence in making clinical care decisions; Public awareness of, access to, and use of high-quality health information; Advancement of health information research and evidence-based practice; An open, inclusive, and collaborative environment within and outside the profession"* (Medical Library Association, 2020).

Association of Academic Health Science Libraries (AAHSL): The association was developed in 1977 for the professional development of the US and Canadian health science librarians. This association offers various technical training programs and develops leadership skills and communication activities for the health

sciences librarians engaged in the USA and Canadian medical schools (Association of Academic Health Science Libraries, 2020).

IFLA Health and Biosciences Libraries Section: The Section of Health and Biosciences Libraries is the medical library forum for medical librarians and offers information dissemination of health sciences and services (IFLA, 2020).

Michigan Health Sciences Libraries Association (MHSLA): MHSLA is the association of health librarians of Michigan aiming excellence in medical librarianship by watching over communication among the members, providing its members with opportunities for professional growth, , offering resource sharing, developing awareness of new health sciences trends, and investigating research in health sciences information services (MHSLA, 2010).

ALIA Health Libraries Australia: The medical librarians and information professionals working in the medical libraries are members of Health Libraries Australia (HLA). Providing evidence-based health care to all Australians is the ultimate aim of HLA (ALIA, 2020).

Canadian Health Libraries Association (CHLA): The Canadian Group of the Medical Library Association in collaboration with the Canadian Association of Special Libraries and Information Services formed this association in 1976. So far there are approximately 300 members working in the health sciences library field in CHLA (Canadian Health Libraries Association, 2020).

Federation of Health Science Library Associations (FHSLA): FHSLA develops high standards of medical librarianship and library & information services in India and aims to: arrange modern training programs for Health Science librarians in India and support research activities in Health Science library operations (FHSLA, 2018).

Medical Library Association of Bangladesh (MedLAB): It is the only medical library association in Bangladesh, but it has no developmental activities for the betterment of health library professionals of Bangladesh.

Rationale of the Study

The steady growth of ICT in health science education for providing high-quality information services has significant implications for medical libraries. All modern library activities and services depend critically on the right information at the right time to the right user. The success of health information systems largely depends on developing a technology-centered medical library i.e. a library for the 21st century for scaling up the flow of health information. The medical libraries today are offering great opportunities as well as challenges for delivering innovative information services. The collection of online and Internet-based health information resources as well as access through the network by medical libraries are increasing day by day. Medical libraries for the developing countries especially in Bangladesh should develop a roadmap for ensuring maximum online access to health information, alongside offering user-centered information services to healthcare professionals. The achievement of a medical library depends upon a sufficient library budget, Library Automation Systems, strong ICT infrastructure, an efficient Knowledge Management System (KMS), medical online resources, and skilled professional librarians. Developing an effective health information system is broadly recognized as a key component for medical libraries - a means of providing advanced health information and services to doctors, researchers, and other health information professionals. But it is not clear to what extent the medical libraries in Bangladesh have adopted these new technologies to realize efficient access to various web-based health information resources. The medical libraries in Bangladesh are yet to exploit the full potential of ICT integrated information systems and services and are lagging in the effective use of modern technologies as the libraries are suffering from problems like weak ICT infrastructure and lack of necessary budget. They are also struggling to ensure the following facilities (a) proper utilization of modern ICT devices, (b) online resources, (c) transformation of the traditional library services into modern services, (d)development of Institutional Repository, (e) modern library building, (f) recruitment of professional staff, (g) high configured PCs and other ICT resources, (h) library marketing, (i) establishment of library networking, (j) participation to library consortium, (k) standard library software, etc. (Rahman, 2013). Particularly the public medical college libraries in Bangladesh are also struggling to maintain such types of facilities in providing medical library services to health professionals.

The government has passed the plan to establish four state-run new medical colleges in Magura, Netrokona, Naogaon, and Nilphamari. At present, there are 36

government medical colleges and 70 private medical colleges in Bangladesh. Separately, Bangladesh Army runs six medical colleges. The Government has also laid the foundation stone for three new medical universities in Chattogram, Rajshahi, and Sylhet (BD News24, 2018). Among these, most of the medical libraries are providing services to students, teachers, researchers, and clinicians through traditional library systems. The services rendered have remained for the most part outdated, obsolete and unattractive, and this is why the modern library systems in the medical libraries are inadequate and poor. But the success of quality Medical Education in the Knowledge Management System is fully dependent on the modern health library systems and services. So, there is a bright future for the effective development of medical libraries of Bangladesh. This momentum gives way to conducting an exclusive study on the current scenario and prospects of Health Information Systems and Services in the libraries of medical colleges, universities, and health research institutions of Bangladesh.

Reshaping the medical libraries is now the necessity for fulfilling the mission of medical education, i.e. to be competitive and compatible in international health science. Medical libraries have always played a vital role in accessing online resources and providing standard library services in supporting the academic, clinical, and research needs of the doctors, faculties, and students of a particular medical institute. However, in recent years, health professionals are approaching a diversified information-seeking behavior. Consequently, the medical libraries must address to fulfill the special demands of health information and services to carry on their clinical practice and research activities. In spite of several bottlenecks and limitations, necessary initiatives should be taken for the development of full-fledged medical libraries in Bangladesh.

New technologies have carried out significant changes in health sciences education. Due to recent technological advancements, Medical education has been changing a lot over time. Medical libraries in developed countries have invested a large portion of the budget aiming to improve the quality of library facilities and services for health professionals. In developing countries like Bangladesh, the govt. should give more emphasis to the development of ICT-based medical library systems and services for quality medical education and clinical care services. Traditional library systems and services, the reluctance of higher authorities for sanctioning sufficient library budgets, and poor ICT infrastructure are the core challenges to be addressed by the medical institutions to improve the quality of medical education in Bangladesh. The

application of ICTs in the medical libraries in Bangladesh is an urgent need at this moment. International organizations such as the United Nations (UN) and the IFLA have acknowledged ICT as a useful tool to modernize medical libraries in developing countries. However, ICT-based library services and facilities are not optimally used by medical academics in Bangladesh.

Most of the medical libraries in Bangladesh render traditional library services to the users according to their needs. The physicians, students, faculties, researchers, and clinical staff require information from the library to keep them up-to-date and abreast of new developments in their specialized areas of interest. Effective information services only can support these needs of the users. Hence, the researcher planned to evaluate health information systems and services provided in medical college libraries. The implementation of modern medical libraries of Bangladesh is of utmost importance for ensuring greater accessibility of medical information resources and supporting the academic activities of the medical students. The main aim of the research study is to investigate the current scenario in terms of health information systems and services of the medical libraries of Bangladesh; formulate a model plan for a standard medical library system in an ICT environment and suggest necessary recommendations for the modern library system and services of the medical libraries of Bangladesh.

Based on the above factors, the present study has been investigated to assess the present library systems and services of medical libraries in Bangladesh. The study covers:

- The real scenario of current practices regarding Health Information Systems and Services of the surveyed medical libraries;
- The present state of library facilities and services in the medical libraries in Bangladesh under this study;
- The availability of present ICT and infrastructural facilities, human resources, traditional and web-based library services, print resources, library software, Integrated Library System, Library Website, Institutional Repository, and online medical resources are also explored.

The findings of the study highlight the present practices of Health Information Systems and Services in the medical libraries of Bangladesh. And finally, the study provides a model plan for the overall development of the medical libraries in Bangladesh.

Statement of the Problem

The medical libraries are service institutions entrusted with the task of providing high-quality information services to the clinicians to the utmost level of satisfaction. For this purpose, medical libraries should have access to both print and online information resources and offer a range of services for optimum utilization of these resources and the satisfaction of users. Most of the medical libraries in Bangladesh provide basic traditional services like circulation and reading room services in which ICT-based services are totally absent and most of the libraries have traditional information resources like books, magazines, journals, manuscripts, etc. However, at present, the concept of modern libraries came into vogue with the use of technology in library activities and services. With the passing of time and the application of ICT in different aspects of life, new interests, needs, and curiosity among the users emerged. With the emergence of Artificial Intelligence, Library 2.0, Internet of Things, Knowledge Management System, Integrated Library System, RFIS System, institutional repositories and cloud computing, digitizatization of library resources, Web-based library platform, readiness of e-resources, Open Access (OA) databases and e-resources etc., libraries worldwide have been moving to the shift from the print era to the digital era. Now, the information resources, library activities and services, and users' expectations have entirely changed. Today's medical libraries have a collection of information resources in various formats like e-journals, e-books, e-newspapers, e-magazines, e-pamphlets, e-newsletters, Institutional Repositories, and online databases. But the medical libraries in Bangladesh have to work under many constraints such as insufficient staff, inadequate finances, traditional library services, low configured PCs, non-professional staff, low bandwidth, absence of library networking and library consortium, standard library software, limited access to online databases, unavailability of the library website, etc.

Most of the medical libraries in Bangladesh are not fully equipped with modern ICT tools and technologies, access to medical e-books and e-journals platforms, library strategic plans for providing modern library services, and professional staff members with IT experiences. Considering the mentioned factors, it was crucial to ascertain the present scenario through this study in order to explore the extent of library manpower, library resources, library ICT facilities, library automation, Institutional Repositories (IR) and online resources, that had so far been carried out by medical libraries in Bangladesh along with the potential problems of facing by the medical librarians. There are not a good number of research studies to measure the health information systems and services for the development of medical libraries in

Bangladesh. In view of the above, the researcher is interested to conduct the study titled "Health Information Systems and Services in the Medical Libraries of Bangladesh: Problems and Prospects".

Scope of the Study

A lot of research activities have been carried out to explore the library activities and services of modern medical libraries that are now in operation in developed countries. These include a hybrid library environment through which health professionals can access e-resources alongside traditional print-based information resources. A very few studies were conducted to find out the present state of information systems and services of medical libraries in Bangladesh. The current study is trying to gauge the existing practices of information systems and services in the selected 20 medical libraries in Bangladesh. This would be the first original Ph.D. research highlighting Health Information Systems and Services of selected medical libraries in Bangladesh.

Health care libraries are special libraries that exist to serve their parent institutions and further fulfill the objectives of the institutions to promote health. In order to deal with biomedical information, data, and their storage, retrieval, and optimal use for solving the problem and making a decision, the adoption of technology in libraries is inevitable. Librarians are the intermediary in service provision to the medical professionals for the fulfillment of their needs. The past decades have witnessed an enormous change in the library, the rapid transformations occurred as a result of technological advances applicable to the library settings. A society is well served by its doctors when they are well informed and well educated. The responsibility goes to the hands of state education policy, procedures, and curricular activities through these medical colleges. Information store housekeepers and providers are thus helping the doctors to carry out their duties towards the community. Librarians through their services are helping both society and the medical professionals. The entire role played by these librarians is to be evaluated in this study, as it is necessary for future developments and that logically justifies this research work.

Under this study, an attempt has been made to find out a comprehensive picture of the existing scenario of medical libraries and review various dimensions that are facing the studied libraries from the management perspectives. In this age of information technology, the medical libraries of Bangladesh are lagging behind because of poor financial constraints, the absence of modern ICT tools and

technologies, non-professional staff, and little attention from higher authorities regarding the importance of ICT-based services. The scenario of medical library systems and services in Bangladesh is not much appreciable. It is assumed that the ICT and total information systems are at a very elementary level in most of the medical libraries of Bangladesh.

The study covers the following issues for identifying the present status of library systems and services of the medical libraries in the country:

- A clear picture of historical growth, current trends, and developments, availability of information resources, Health Information Systems, and Services of the surveyed medical libraries;
- The readiness of medical libraries' existing information system through the extent of library automation, Institutional Repository, availability of print and e-resources, the status of library consortium, library networking and resource sharing, and rendered library services;
- The present scenario of ICT usage in various library areas in the surveyed libraries in Bangladesh;
- The readiness of infrastructural facilities, manpower, and library budget, for smooth library functioning;
- Based on the findings, suggest a model plan for establishing effective health information systems and services in Bangladesh;
- The current challenges of the surveyed medical libraries for providing efficient library services in Bangladesh;
- Finally, recommendations have been proposed based on the current challenges encountered by the studied libraries.

Objectives of the Study

The core objective of the study is to explore the present state of library information systems and services in 20 selected medical libraries of Bangladesh. The broad objective of the study is:

> To identify the existing status of Health Information Systems and Services in the selected medical libraries of Bangladesh including infrastructural facilities, ICT facilities, and services, and to make a model plan which will be compatible with the need of the users of the medical libraries of Bangladesh.

The other objectives are listed below:

1. To discover the modern library systems and services available in the health science libraries around the world;

2. To identify the health professionals' information needs for providing clinical care and evidence-based decisions along with the preferred information sources available in the medical libraries;
3. To investigate the barriers faced by the doctors and students while taking library services and accessing e-journals and online medical databases;
4. To highlight the challenges facing the library heads in relation to the development of Health Information Systems and Services in the medical libraries of the country;
5. To formulate a model plan to strengthen health information systems and services towards the health science development of Bangladesh; and
6. To make appropriate recommendations for the improvements in the existing health science libraries of the country.

Research Questions (RQ)

The researcher has framed the following research questions to achieve the aforementioned objectives of this research:

1. What types of library systems and services are available in the investigated medical libraries?
2. What is the current state of ICT application for managing library activities and services in the sample medical libraries of Bangladesh?
3. What types of print information resources, e-resources, and online databases are available in the surveyed medical libraries?
4. What is the current status in terms of Integrated Library Systems (ILS), RFID management, library website, library consortia, digitization of library resources and Institutional Repository (IR), and the extent of library traditional and web-based services?
5. What types of library software are used in the surveyed libraries regarding library automation, digitization of library print resources, Institutional Repository, user matrix for e-resource usage, checking plagiarism, and reference management?
6. How do frequently students, doctors, and scientists use the library print and e-resources?
7. What are the most preferred health information sources as identified by the clinicians?
8. What are the problems that the health professionals in Bangladesh experiencing in accessing health information resources?

9. What are the key challenges encountered by the medical librarians for successfully running the medical libraries?
10. What are the recommendations given by the library heads of studied libraries for effective library systems and services in the medical libraries of Bangladesh?

Research Methodology

An appropriate research methodology is vital for conducting a successful research study. The study aims to focus on the current state of health information systems and services in the medical libraries. A comprehensive literature review and survey method through questionnaire have been conducted. The details of the research methodology are explained in the following sections:

01. **Research Design:** Mixed Method (MM) research design (i.e. qualitative and quantitative) has been applied to explore the existing library practices in 20 leading medical libraries in Bangladesh and to collect the relevant data for better data analysis and interpretation. The research study is mainly descriptive in nature since it incorporates all the possible factors for health library systems and services in Bangladesh and the population and phenomenon have been described accurately and systematically.

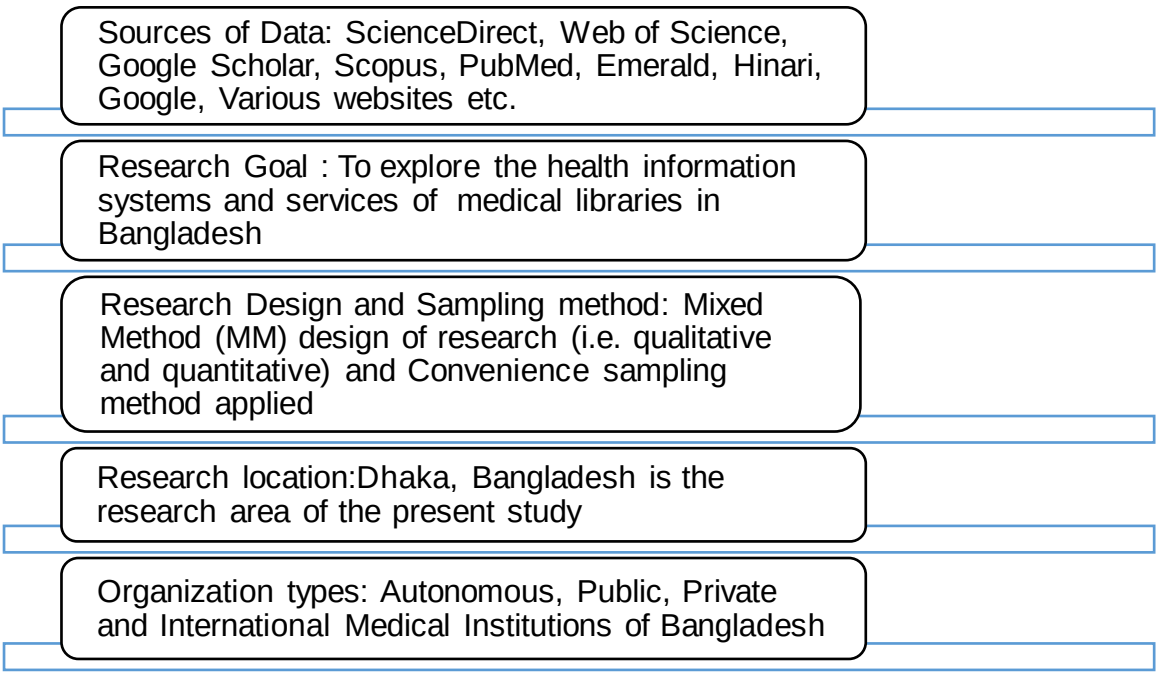


Figure 1.4: Research Design applied for this research

A large number of variables have been identified and included in the study. The characteristics, frequencies, trends, and categories in terms of users, systems, and services have been covered. Descriptive research methods like surveys, interviews, E-mail, and observations have been followed to get the necessary data for this study. The graphical view of the research design is presented in Figure 1.4.

02. Study Design: As stated earlier, both the qualitative and quantitative approaches have been incorporated into the research design of this study. A good number of theoretical literature from print and online sources has been explored to present the status of Health Information Systems and Services in the medical libraries worldwide. Consequently, the qualitative and quantitative data have been collected following the survey method directly from librarians and users of the surveyed medical libraries with the help of structured questionnaires, interviews, E-mail, and observations. The present study can be visualized in Figure-1.5.

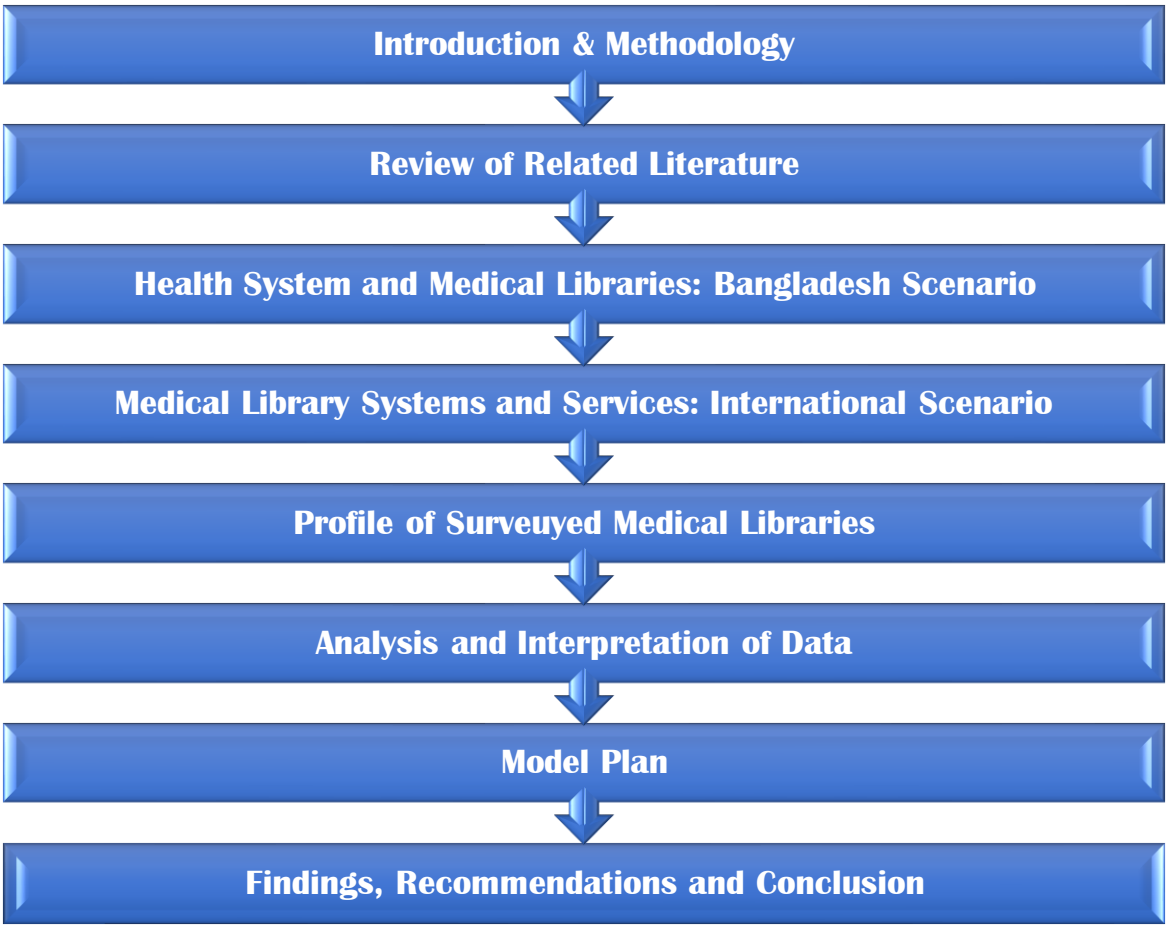


Figure 1.5: Schematic view of the study

03. Survey of Literature: A comprehensive literature review was conducted to identify the relevant concepts, studies, and variables for an in-depth understanding of the phenomena. A large body of literature covers different aspects of health information systems and services that are currently being practiced globally. Literature on information systems and services in medical libraries and its implications at home and abroad during the time frame 2007-2020 in the form of e-books, e-journals, e-dissertations, in addition of Library Websites of the reputed libraries and various health organizations' websites have been searched and covered in the study.

Sources of Literature: The major online sources of literature for this study cover: Google Scholar as well as General Google, ScienceDirect, Emerald Database, Springer, Scopus, Web of Science, PubMed, Hinari, Shodhganga Repository of e-thesis.

04. Population and Sample Design: The population for this study was all the teachers, students, doctors, scientists, researchers, and staff members of surveyed medical libraries. Sampling methods can be classified as probability and non-probability. In this research study, the researcher has taken a non-probability sampling approach and chosen the convenience sampling method. In this study, Non-probability sampling is treated as a method "*in which not all members of the population have an equal chance of participating in the study, unlike probability sampling. Each member of the population has a known chance of being selected*" (OuestionPro, 2020). Convenience sampling (also known as grab sampling, accidental sampling, or opportunity sampling) is a type of non-probability sampling that involves the sample being drawn from that part of the population that is close to hand (Wikipedia, 2022b).

05. Sample Size: The sample size is an important feature of any research study for gaining insights from the target audiences of the whole population. The samples have been selected based on the types of the organization, the richness of the library in terms of library resources and users, research time, and the convenience of collecting the data. The sample size for this study is mainly of two types as stated below:

A. For ensuring representativeness from medical libraries in the divisional cities of Bangladesh considering the medical library systems, 22 medical libraries have been primarily selected (2 libraries i.e. RUML and CMUL have been excluded while analyzing data due to unavailability of data), and finally, 20 medical libraries brought under the investigation. As a result, the necessary library data have been provided by

the 20 librarians/library heads of the below-mentioned twenty libraries through a structured questionnaire The researcher frequently sent gentle reminders to library heads over phone or E-mail to complete the survey duly and also visited the selected libraries several times to discuss with the librarians about the ICT-based questions and to get more practical insights of the library systems and services not covered in the questionnaire. The studied library names, establishment year, and address are listed in Table 1.4-Table 1.7.

Table 1.4: List of Surveyed Public Medical University Libraries

SL No.	Name of the Library	Year of Establishment	Location
1.	Bangabandhu Sheikh Mujib Medical University Library (BSMMUL)	1965	Dhaka
2.	Chittagong Medical University Library (CMUL)*	2016	Chattagram
3.	Rajshahi Medical University Library (RMUL)*	2018	Rajshahi

**CMUL and RMUL have been excluded in the analysis and interpreting of data section since the two universities have recently been established and library activities and services of these two libraries have not been started yet while conducting the survey. In the future, these two libraries will be turned into leading medical libraries, so the researcher has included these two libraries in all other sections of the study.*

Table 1.5: List of Surveyed Public/Army Medical College Libraries

SL No.	Name of the Library	Year of Establishment	Location
1.	Dhaka Medical College (DMC) Library (DMCL)	1946	Dhaka
2.	Shaheed Suhrawardy Medical College Library (SSMCL)	2006	Dhaka
3.	Sir Salimullah Medical College Library (SMCL)	1963	Dhaka
4.	Armed Forces Medical College Library (AFMCL)	1999	Dhaka

Table 1.6: List of Surveyed Private Medical University/College/Hospital Libraries

SL No.	Name of the Library	Year of Establishment	Location
1.	Bangladesh Medical College Library (BMCL)	1986	Dhaka
2.	Holy Family Red Crescent Medical College Library (HFRCMCL)	1953	Dhaka

Contd. Table 1.6

3.	Green Life Medical College Library (GLMCL)	2010	Dhaka
4.	Anwar Khan Medical College Library (AKMCL)	2008	Dhaka
5.	Ibn Sina Medical College Library (ISMCL)	2004	Dhaka
6.	Dhaka National Medical College Library (DNMCL)	1994	Dhaka
7.	Bangladesh University of Health Sciences Library (BUHSL)	2012	Dhaka
8.	Evercare Hospital Dhaka's Library (EHDL)	2020	Dhaka

Table 1.7: List of Surveyed Specialized Medical College Libraries

SL No.	Name of the Library	Year of Establishment	Location
1.	International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) Library (IL)	1962	Dhaka
2.	Bangladesh Institute of Research Rehabilitation for Diabetes, Endocrine Metabolic Disorders Library (BIRDEML)	1986	Dhaka
3.	Bangladesh College of Physicians and Surgeons (BCPS) Library (BCPSL)	1972	Dhaka
4.	National Health Library and Documentation Centre (NHLDC) Library (NHLDCL)	1974	Dhaka
5.	WHO Bangladesh Library (WBL)	2005	Dhaka
6.	National Institute of Preventive & Social Medicine (NIPSOM) Library (NIPSOML)	1974	Dhaka
7.	Bangladesh Institute of Child Health Library (BICHL)	1983	Dhaka

B. The necessary data have been accumulated from a total of four hundred and twelve (412) library users such as faculties, students, doctors, researchers, and staff who use libraries either frequently or occasionally of the aforementioned twenty libraries through a structured questionnaire.

06. Survey: Two sets of questionnaires were administered One set, was based on health information systems and services focusing on the present status of selected medical libraries; and another one was based on expectations and opinions of the library users to reveal their feedback concerning library systems and services of the selected libraries. The assessment of the users may be necessary for detecting the usage of e-resources and finding out library usage behavior as well as exploring the barriers facing the library users for accessing e-resources. Both the questionnaires were duly pre-tested and finally structured keeping in view the objectives of the study. Based on

the analysis of the general and specific objectives of this study, information on 23 categories of variables for medical libraries and 24 categories of variables for users were identified. The variable(s) and indicators emerging out of the questionnaires for medical libraries and users are shown in Table 1.8 and 1.9 respectively:

Table 1.8: Variables and indicators (Medical Libraries)

SL. NO.	Type of variables	Indicators
01	Profile of the organization	Library name, Establishment year, Organization name, Type of the organization, Present Address, Telephone no, Email, Fax, Website, Library Area, Library Working Hours, Weekdays, Holidays, Seating capacity, Average number of users, Library members, Name and Designation of the Library Head
02	Library Users	Teacher, Student, Doctor, Scientist, Researcher, Staff
03	Staff Strength	Designation, Academic Qualification, IT knowledge, Chief librarian, Librarian, Deputy Librarian, Senior Assistant Librarian, Junior Librarian, IT specialist, Library assistant, Attendant, and others
04	Library Advisory Committee	Formulating a development plan, Framing rules and regulations, Examining the proper implementation of library policy, Allotment of funds, and checking library expenditure
05	Library Space	Adequate space, Number of seats, Research Carrels, Own building
06	Library Divisions	Circulation/Lending Section, Acquisition, Periodical, Administration section, Reference, Audio Visual, Processing/ Technical, Textbook Section, Reprographic, E-resources Section, IT Division, Others
07	Collection Development	Written policy, User survey, Users' request through e-mail, Through the meeting of the selection board, By the librarian from the list supplied by the book vendors, Request of the administration of the parent body, Direct purchase from Publishers, Vendors, Direct purchase, Online purchase, Consortium, Purchase, Donation, Exchange, Gift, Accession Register
08	Technical Processing	National Library of Medicine Classification, Universal Decimal Classification, Dewey Decimal Classification, Colon Classification, Library of Congress Classification, AACR-1, AACR-2, RDA, ALA, CCC, MARC-21, Sear's List of Subject Headings, Medical Subject Headings, Library of Congress Subject Headings, Card form, Book form, Computerized OPAC, Open Access, Partially Open access, Closed access

(Contd. Table) 1.8

09	Library Public Relation & Marketing	Public Relation Policy, Library website, Automatic E-mail Alert, Library Display board, E-mail, Web Portal, Mobile short message, Using Telephone, Printed Documents, Using Social Networking, Mailing Group, Mailing Group
10	Library Collections	Journals, Bound Journals/ Magazines, Books, Theses/Dissertations, Microfilms, Online Databases (Subscribed and registered), Reports, Magazines, Audio-Visual materials, Atlases, Maps, Microfiches, News Clippings, E-Theses/E-dissertations, E-Journals, E-books, E-Reports, E-Encyclopedias, E-Dictionaries, E-Newspapers, MyAthens, RemoteXs, EBSCO Discovery Library Search, VuFind, Joomla, Blogging, Listservs, RSS Feeds, Wikis, Social Networking, Ulrichsweb: Global Serials Directory, Library News, Library Catalogues, Library Annual Report, Library Manual, List of Additions, Indexing and Abstracting Journals, Specialized Databases, ASM Journals, Springer e-journals, ScienceDirect e-journals, JSTOR, Emerald, Oxford University Press, ISI Web of Science, Indian Journals, Cochrane Library, Hinari-Health, AGORA-Agriculture OARE-Environment, ProQuest e-journals, EBSCOhost, Cambridge University Press, Embase, ARDI- Innovation & Technology, GOALI-Law, ClinalKey, Scival, Scopus, Ulrichsweb, UptoDate, Wiley e-Books, ScienceDirect e-Books, Springer e-Books, EBSCO e-Books, SAGE e-Books, ProQuest ebrary
11	Library Services	Reading Room Service, Circulation service, Current Awareness Service, Referral Service, Indexing and Abstracting Services, Bibliographical service, CD-ROM Searching, On-line database searching, Reference service, Online literature searching, Translation service, Selective Dissemination of Information (SDI), Photocopying and printing services, E-alert services, Internet browsing, Article Indexing, News-clipping service, Inter-library loan service, Citation analysis service, Information literacy service, E-mail service, software using for providing reference management services, software using for detecting plagiarism
12	ICT (Information and Communication Technologies) and Automation Facilities	Year of ICT inception, Availability of ICT and automation facilities, Automation status, Automation software ypes, Library functions perform through ICT, Software used for Integrated Library System

(Contd. Table)1.8

13	Internet Facilities and Library Website	Year Internet inception, Internet connected computers, Browsing charges, Browser software, Search engines, Internet users, Internet connection types, Library website, URL of the website, Contents of the library website, Bandwidth of library network, Library Intranet access, Electronic security system
14	Digitization activities	Digital initiatives, ICT equipment, Digitized collections, Usage of e-resources, Digital library software, Status of digital library software, Digital Library Software name
15	Institutional Repository (IR)	Name of IR, Name of IR, Inception year, Web address, Number of items, Enlisted with OpenDOAR, IR software
16	Web-based Library services	Web 2.0, Electronic document delivery, Institutional Repository (IR)/Digital Repository (DR) service, Online reference query, OPAC, Web OPAC, Internet service, Intranet service, Remote access service, Online renewal service, Online SDI service, Online reservation, Mobile-based services, RFID based services, Wifi service, Virtual reference service, Distance learning service, Electronic Thesis and Dissertations (ETD) service, CD-ROM/DVD read/search service, E-CAS (Current Awareness Service), Electronic Conferencing Services, Research Data Services, Systematic Review service, Webometric Analysis service, Online Literature Searching service, Evidence-Based Practice (EBP) service, Plagiarism detection service, E-indexing and abstracting service, Ask-A-Librarian service, Online e-Journal Service, Online e-Book Service, Online Database Service, Library performance
17	Library consortium	Member of e-resource consortium, name of consortium, Plan for a consortium
18	Library Budget & Expenditure	Source of funding, Amount of budget
19	Impact of ICT	Creates the awareness about the library, Improve the quality of library services, Increases the usage of the library, Enhance the knowledge and skills of library professionals, Reduce the workload of library staff, Increased job satisfaction of Library staff, ICT eliminate duplication of efforts, Introduce a wide range of new services, Perform tasks that can't be done in a manual system, ICT facilitates resource sharing library networks, Increased job satisfaction of Library staff, ICT eliminate duplication of efforts, Introduce a wide range of new services, Perform tasks that can't be done in the manual system, ICT facilitates resource sharing library networks, ICT improve easy access to local library resources, ICT provides a gateway to global information resources, Meet the tech-savvy users in complex information needs, the Best tool for usage statistics of online resources

(Contd. Table) 1.8

20	Skills/ Competencies of Library Staff	Online medical databases, Licensing, Electronic Resource Management (ERM) Web page design, ILS management, Communication with Vendors/publishers/aggregators, Installation and customization of software, System Administration & Maintenance, Maintenance of Library Website Development of Institutional Repository (IR)
21	Future Library Plans	Plan for library modernization, plans for providing better library services
22	Model for Integrated Library and Information System	Integrated library information system, ICT infrastructure, trained manpower, library automation, modern library tools and technologies, digital literacy of online databases, RFID system, Institutional Repository, library automation software, web OPAC, web-based library services, library website, Online medical databases, need-based information services, Digital Library System, sound library environment, library digitization, Knowledge Management System, online access to e-resources, library marketing, library networking and resource sharing, Z39.50
23	Library problems	Inadequate library budget, Limited IT experienced staff, Lack of professional staff, Absence of modern library training, Reluctant to use modern library software, Lack of National Policy for medical libraries in Bangladesh, Ignorance of the authorities about the library and its services, Lack of ICT infrastructural facilities, Low speed of internet connections, Lack of knowledge about latest tools and technologies in the library field, Lack of library separate building and architectural plan, Lack of ICT resources to modernize library services, Inadequacy of ICT facilities, Complexity of administrative bureaucracy, Limited salaries of library personnel, Lack of government concentration

Table 1.9: Variables and indicators (Users)

SL. No.	Types of variables	Indicators
01	Organization	Name of organization
02	Sex	Male, Female
03	Category of Users	Student, Teacher, Doctor, Scientist, Researcher, staff
04	Age group	Five age groups
05	Educational qualification	MBBS, MPhil, MPH, MS, MD, FCPS, MRCP, PhD
06	Library Use	Borrowing books, reading journals, Consulting Reference books, Reading general books, Reading subject books, Improving subject knowledge, Internet use, Preparing assignments, Consulting research materials, Accessing online resources, Writing research papers, Keeping abreast with the latest developments

(Contd. Table) 1.9

07	Frequency of library visit	Every day, Once in a week, Once in a month, More than once in a week, Once in a fortnight, Occasionally, Never
08	Average time spent	Less than one hour, One hour, Two hours, Three hours, More than three hours
09	Library space	Location of the library is very convenient, Building exterior view is excellent, Library internal environment is pleasant, other facilities, Sufficient reading space, Sufficient safekeeping area, CC camera, Silent reading facilities, Group study facilities, Washroom facility, Pure drinking facility
10	Preferred information formats	Printed journals, Printed textbooks, Discussion with faculty / other experts, Theses / Research reports, Online Medical Databases, Seminar / Workshop / Conference proceedings, Medical Library Websites, E-books / E-journals/ E-Theses
11	Level of satisfaction	Excellent, Good, Fair, Poor, Very Poor
12	Library services	Reading Room Service, Book Circulation Service, Online Public Access Catalogue/ Web OPAC, Internet Access, E-Resources Access, Audio-Visual Service, Reference Service, Current Awareness Service, Photocopying Service, Subject Bibliography Service, Abstracting/ Indexing, Newspaper Clippings, Inter-Library Loan, Institutional Repository (IR)/Digital Repository (DR) service, Electronic document delivery service
13	Satisfaction with the library services	Excellent, Good, Fair, Poor, Very Poor
14	ICT enabled library facilities	Strongly Agree, Agree, Neutral, Mildly Disagree, Strongly Disagree
15	ICT enabled library services	Fully, Partially, In progress, Not yet started, Don't Know
16	Library portal	Yes, No, Don't know
17	Usage of web-based resources	Yes, No
18	Usage of e-resources	Online databases, Internet/Web resources, Online Public Access Catalogue (OPAC), E-books, E-journals, E-newspapers, E-maps, E-thesis, E-research reports, CD- ROM bibliographic databases, Institutional Repository (IR), Professional Association Websites, International / Regional Institution Websites
19	Opinion on ICT usage in the library	ICT facilities, Traditional library services, Web-based library services, Library collections, Online library resources, Library timing, Library reading environment, Internet/WiFi services

(Contd. Table) 1.9

20	ICT based library service	Internet Service, Intranet Service, RFID based Services, OPAC, Electronic Thesis and Dissertations (ETD) service, Web OPAC, Web 2.0, Electronic document delivery, Systematic Review Service, Mobile-based services, Online SDI service, Online reservation, Online reference query, Remote access service, Wifi service, Virtual reference service, Distance learning service, CD-ROM/DVD read/search service, Online Renewal Service, E-CAS (Current Awareness Service), Electronic Conferencing Services, Research Data Services, Webometric Analysis Services, Institutional Repository (IR)/Digital Repository (DR) service, Online Literature Searching Service, Evidence-Based Practice (EBP) Service, Plagiarism Detection Service, Predatory Journal Selection Service
21	Usage of online databases	PubMed, JSTOR, Emerald, Oxford e-journals, PubMed e-journals, Springer Link, Indian Journals, Cochrane Library, Hinari e-journals, ScienceDirect, ClinicalKey, Embase, CINAHL, Web of Science, Scopus, PLoS Journals, EBSCO, ProQuest, Google Scholar, ResearchGate, JSTOR, PubMed e-books, Free Medical Journals, J-Stage, WHO Medicines Bookshelf, FreeBooks4Doctors, DOAJ, DOAB, ARDI, UpToDate, BanglaJOL, POPLINE, Cambridge e-journals, MeSH
22	Search Engines	Google, Yahoo, Bing, Baidu, AOL, Ask.com, Excite, Lycos
23	Library problems	Lack of adequate learning resources, Absence of modern technologies in the library, Low bandwidth, Information overload, High cost of access, Lack of Knowledge of online information sources, No Internet access, Poor database searching skills, No training of the use of library resources, Retrieval of irrelevant information, Inconvenient working hours of library
24	Comments	Suggestions

07. Techniques of Data Collection: As stated earlier, mix method research approach for both quantitative and qualitative data gathering techniques are followed. Two sets of structured questionnaires have been used as the main instrument for collecting the necessary data for this study. Techniques of data collection can be classified as follows:

1. Interview: In-person or phone survey method through structured conversations.
2. Questionnaire: Collecting necessary information from a respondent that consists of a set of predefined questions.
3. Observation: Collecting supplementary data from direct observation without asking the respondents.

4. E-mail: Due to this pandemic situation, E-mail communication has also been used for collecting data through the soft version of the structured questionnaire from both the library heads and library users in some cases where physical interaction was prohibited.

All the above techniques have been widely used for gathering the necessary data for this study as and when required. Survey data was thus obtained through a predetermined questionnaire supplemented by informal interviews with the heads of libraries and library users so that they can easily absorb the questions and provide the right and accurate information. So, the necessary data have been collected from the following two groups:

(A) Librarians/Library Heads/In-Charge

Necessary data were collected for the study from the Librarians/Library Heads/In-Charge of the selected 20 medical libraries through interview, e-mail, phone, and face-to-face contact along with the structured questionnaire.

The types of surveyed medical libraries are presented in Table 1.10:

Table 1.10: Types of surveyed medical libraries

Types of Library	Number
Public University Medical Libraries	01
Public/Army Medical College Libraries	04
Private Medical University/College/Hospital	08
National Health Library	01
Specialized Medical College Libraries	06
Total	20

(B) Users

Based on convenience sampling, a total of 500 structured questionnaires were administered among the different categories of library users of the 20 studied libraries. There are different types of library users like doctors, students, teachers, researchers, scientists, staff, and others from the designated twenty public, private and specialized medical libraries of Dhaka City. A total of 412 duly completed questionnaires by the users were received which have been analyzed and interpreted with a response rate of 82.4% (both the questionnaires are presented in Appendix -1 & 2). The frequency of respondent types for this study is shown in table 1.11.

Table 1.11: Questionnaire received by respondents types

Category of users		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Teacher	23	5.6	5.6	5.6
	Doctor	185	44.9	44.9	50.5
	Researcher	40	9.7	9.7	60.2
	Student	125	30.3	30.3	90.5
	Scientist	3	.7	.7	91.3
	Staff	33	8.0	8.0	99.3
	Others	3	.7	.7	100.0
	Total	412	100.0	100.0	

08. Conduct of Interviews

It is a type of survey research where face-to-face conversations through personal visits and contact over the phone are made by the 20 librarians for collecting data based on library systems and services. Through this method, the researcher has explored additional data that is helpful for his study.

09. Questionnaire

Designing a standard questionnaire is very much important for the survey study. It is composed of several questions to collect the necessary data from the sample population under the study. The researcher has designed the questionnaire based on the objectives and the research questions of the study. The questionnaire for the present study was designed to collect reliable data to a set of relevant questions on the current practices of library systems and services in the studied 20 medical libraries. The following three types of questions have been designed for the study:

1. Dichotomous: It includes options like "Yes" or "No".
2. Multiple Choice Questions: Select the right ones from multiple answers.
3. Scaled questions/ Likert type answers of five choices: Scaled/ Likert questions to the range from 1-5.

10. Pilot study

The pilot study or often termed a feasibility study has been carried out earlier while conducting the final study. This helps researchers predict an appropriate sample size, and necessary budget accordingly, and improve upon the study design before performing the final study. A pilot study for the present study was conducted to get respondents' opinions on the questionnaire and to identify the ambiguities and confusion to get reliable and accurate insights from the samples. The pilot study was conducted among the researchers through the predesigned questionnaire by e-mail and personal visits for getting opinions from the library heads and users of the selected libraries from 01 July to 30 July 2020.

11. Research Visit

The researcher visited all of the 20 medical libraries covered in the study. The researcher distributed the questionnaires to the library users with the help of the studied medical librarians. Close contact with the library users is also performed for getting the relevant data from the users since they maintain a very busy schedule. The data from the librarians have also been collected through the personal visit to the respective library through face-to-face conversations and structured questionnaires. The duration of data collection was from 01 September to 30 December 2020.

11. Data Processing and Analysis

Necessary data have been collected from the two sets of questionnaires of this study from 20 library heads and 412 library users. Data has been coded accurately for computer processing. The data analysis software i.e. SPSS (Statistical Package for the Social Sciences) (20th edition) and MS Office - Excel 2019 have been used for data analysis and interpretation. The data analysis has been presented in textual forms, Tables, and Figures (Graphs, Charts, etc) using bivariate and descriptive analysis.

13. Style and Software Used for Managing References

American Psychological Association (APA) Formatting and Style Guide for APA 7th edition has been followed to provide the bibliographic references. The reference management software named *EndNote 20* version has been used for managing references in the study.

14. Implementation: The implementation plans of the study cover:

Step-1: Study Objectives and Review of Literature;

Step-2: Questionnaires design, research design, data collection, data analysis, data interpretation, key findings, recommendations; and

Step-3: Development and implementation of Model Plan for medical libraries.

Study Design

The study design has been divided into the following eight chapters including preliminaries and appendices:

Chapter 1: Introduction & Methodology, which explores a general introduction of the study including objectives, research questions, rationale of the study, scope of the study, research methodology, study design, and outline of the thesis.

Chapter 2: Literature Review, deals with the review of related literature on Health Information Systems and Services of the medical libraries around the world.

Chapter 3: Health System and Medical Libraries: Bangladesh Scenario, which highlights the genesis, history, and growth of the health system and health education in Bangladesh along with medical library services of Bangladesh.

Chapter 4: Medical Library Systems and Services: International Scenario, is devoted to describing mainly the existing scenario of medical library facilities, services, challenges for the library system, etc. of world-leading health libraries.

Chapter 5: Profile of Surveyed Medical Libraries: Chapter 5 highlights the general information regarding library facilities, services, collections, personnel, and information resources of surveyed medical libraries have been described.

Chapter 6: Data Analysis and Interpretation: This chapter is associated with the analysis and interpretation of the collected data that are divided into two major sections (Librarians and Users) and presentation of data in various Tables and Figures.

Chapter 7: Model Plan: Chapter 7 elucidates a model plan for designing modern library systems and services in the medical libraries of Bangladesh.

Chapter 8: Findings, Recommendations, and Conclusion, this chapter reveals the key findings, challenges of the medical libraries, and recommendations for the overall development of the medical libraries in Bangladesh including limitations of the study and future areas of research.

Outline of the thesis: The study outline is presented in Figure 1.6.

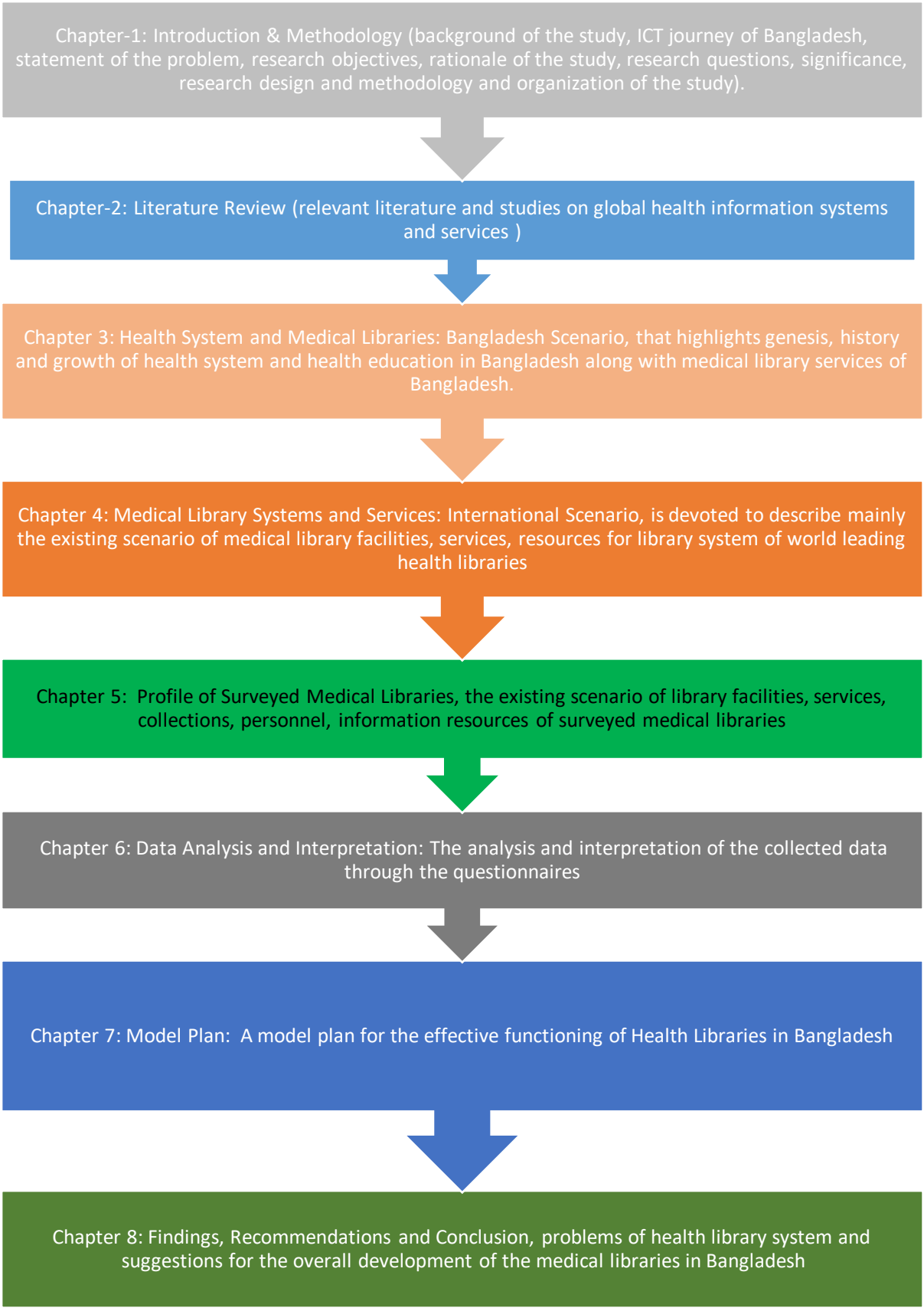


Figure 1.6: Outline of the thesis

Conclusion

The prosperity of every nation lies in the well-maintained health information systems for providing effective health care services to the citizens. In view of the importance of access to health information, medical libraries have a vital role to play as a part of the overall healthcare environment. The health information is being effectively and efficiently collected, analyzed, interpreted, disseminated, and transmitted to the right users at the right time for managing the evidence-based clinical decision-making process. In order to achieve *"Health for All"*, an effective health information system and service is an urgent need for the medical libraries of Bangladesh. An effective health information system that can be designed at various levels such as global, international, national, regional, and local has to play a crucial role in this regard.

In today's ever-changing health environment, the medical library plays an important role in the progress of developing the health information knowledge economy. Proper initiatives must be undertaken for delivering the right information to the right user at right time by designing an effective model plan for the effective functioning of the medical libraries in Bangladesh. The demand, publication, and dissemination of health information have provided a new impetus to medical library functions and operations. Medical library systems and services have been influenced greatly by rapid technological innovations over the years. The medical libraries in Bangladesh should take proper initiatives to develop modern library systems and services for the maximum academic and clinical support of health education in the country. The health sector is one of the key areas for the well-being of a developing nation like Bangladesh. The Constitution of the People's Republic of Bangladesh ensured that *"Health is the basic right of every citizen of the Republic"* as health is the core indicator of human development. Bangladesh is taking necessary initiatives to gain the Sustainable Development Goals (SDGs) by 2030, but it would be quite difficult until and unless to develop a roadmap of modern information systems and services in the medical libraries of Bangladesh. The higher authorities of the medical organizations should give more emphasis to the development of a modern medical library for providing innovative library services effectively and efficiently by advancing the health information systems of Bangladesh through applications of ICTs in all library functions and operations, a rich collection of library e-resources, internet connection, and strong network and resource sharing.

CHAPTER 2

LITERATURE REVIEW

Chapter 2

Literature Review

Introduction

A review of literature is a vigorous step in any social research for exploring the relevant studies that have already been undertaken on a particular subject that enables the researchers to define his/her research problem in a meaningful context. The researcher can get a solid foundation to frame for her/his research study on the chosen topic by reviewing the related literature. It also explores the previously completed studies of a defined problem (Taylor & Procter, 2006), and explains the intellectual progression of the field. In a nutshell, the literature review is a thorough review of studies on a specific subject or related to a particular research problem or an in-depth review of core publications for a particular research topic.

This chapter consists of a literature review related to information systems and services in the medical/academic libraries globally along with Bangladesh. The relevant literature were searched from both print and online resources. There are not too many research works that have been investigated the Health Information Systems of Bangladesh, but a good number of research studies have been conducted and the relevant studies are covered in this study.

A review of existing literature is a vital and useful component in research in order to identify whether the work has already been done or if there is a scope to conduct research from different viewpoints. This study has covered all the relevant literature on health information systems and services practiced in medical libraries all over the world. The present study covers all the relevant published and unpublished literature in English within the timeframe of 2007-2020.

The researcher has reviewed web sources, journal articles, and workshop outputs, and has also taken recourse to direct observations for assessing the current situation. Databases searched included Library, Information Science & Technology Abstracts (LISTA), Summon search through Hinari, and advanced searches using Google, Google Scholar, ScienceDirect, Scopus, PubMed, Taylor & Francis, Wiley Online Library, and Emerald databases. The full-text articles and chapters were retrieved from the renowned the online databases, e-books, e-dissertations, and e-journals such as Hinari, Emerald, EBSCO Host, Journal of Medical Library Association

(JMLA), Health Information and Libraries Journal, various medical journals of SAGE and Ovid e-publishers, published and unpublished theses and dissertations from Shodhganga as well as the websites/homepages of many foreign medical libraries.

While reviewing and evaluating the literature some major keywords were chosen for the sake of convenience and organization of the material. The selected keywords were: Medical Library, Medical Library Systems, Medical Library Services, Health Sciences Library, Information Systems, Health Information Systems, Health Information Systems - trends, Health Information Systems - organization & administration, Information Services, Information Systems - organization & administration, Information Systems - trends, resource sharing, Online Medical Databases, e-resources/digital Medical Information Resources, Medical Library Automation, Information Services - standards, Medical Librarian, Institutional/Digital Repositories, Medical Informatics - trends, Information Technology – medical libraries, Medical - organization & administration, Online health care information services, Web-based library services, Library Consortium, Academic health sciences libraries, Hospital Libraries, Medical Library AND Institutional Repository, Health Sciences Library AND Knowledge Management System, Medical Library AND Digital Library System, Medical Library AND Cloud Computing, Medical Library AND Integrated Library System, Medical Library AND RFID, Medical Library AND Library Website, Medical Library AND e-books, Medical Library AND Library 2.0, Medical Library AND Web Scale Discovery Services, Library Discovery System, Health Sciences Library and Technical Services - organization & administration, Biomedical Libraries etc.

This study aims at covering a descriptive review of related studies on Health Information Systems in medical libraries in a global phenomenon, which in turn helped the investigator to explore the extent to which Information Systems and Services have been applied in myriad library operations and their consequences and impact for the development of medical libraries in Bangladesh. The most notable studies on the above fields are enlisted in the next sections in chronological order.

2020

E-resources are very important in today's online environment for conducting teaching and research efficiently. Devi & Keshava (2020) investigated the present state of e-resources usage by the health professionals of 23 Ayurvedic Medical College libraries in North Karnataka, India. The study was conducted through the survey by

distributing questionnaires among 1150 faculty members, UG students, and PG students of 23 Ayurvedic Medical College Libraries of North Karnataka to get the required data, out of which 1101 questionnaires were returned with a response rate of 95.74%. The study tried to find out the satisfaction level of the respondents regarding the availability of e-resources; awareness of e-resources among the library users; infrastructure facility of the library; and the impact of training to increase the utilization of e-resources. The authors finally recommended some measures for the improvement of the usage of available e-resources. Information literacy training programs should be organized regularly for the effective utilization of e-resources (Devi & Keshava, 2020).

Knüttel et al. (2020) presented an overview of the current state of and selected developments of the German medical libraries through a web-based survey. LimeSurvey (Version 3.17.17 + 190918) and MS Excel were used for calculating descriptive statistics from 75 full responses. Results showed that the medical libraries are offering various services such as Advanced searches for knowledge synthesis; Guidelines for search strategy development; Lectures within the curriculum of the medical/nursing faculty; Optional training sessions; Consultations for Master students; Consultations for Ph.D. students; Support for post-docs; Clinical librarian service; Support for critical appraisal of clinical evidence; Open Access support; Consultations on/ support for Research Data Management (RDM); Research support resulted in (co-)authorship in peer-reviewed publications etc. German Medical Library Association (AGMB) is responsible for promoting medical librarianship and supporting professional development for health librarians in Germany. Digital literacy for students and researchers, building up advanced searches for systematic reviews, and providing guidelines for open access and RDM are some of the innovative services rendered by German Health Sciences Libraries (Knuttel et al., 2020).

Jadhav & Shenoy (2020) wrote a paper titled “Measuring the smartness of a library” which was published in the Library & Information Science Research journal. It was reported by them that more advanced technologies such as the Internet of Things, data mining, artificial intelligence, and voice-based searches have transformed traditional libraries into smart libraries. The study identified five elements and fifteen sub-elements that make a library smarter. A fuzzy-based model was developed for measuring the smartness index for an academic library around these elements/sub-elements. Smart technologies, smart buildings, smart services, smart people, and

smart governance are treated as the core elements of a smart library (Jadhav & Shenoy, 2020).

Alam & Mezbah-ul-Islam (2020) assessed the level of user satisfaction of Koha in the private university libraries of Bangladesh. It is found that Koha has been widely used in all the studied 13 university libraries in Bangladesh. The study was based on a questionnaire method in which a total of 372 completed responses were received out of 486 resulting in a response rate of 76.5%. The study showed that 87.6 percent borrowed books through Koha while 78% used OPAC using Koha. It has been found that Koha had three exclusive features recognized by the users: *round-the-clock* access facility to OPAC, book check-out, and book check-in systems (Alam & Mezbah-ul-Islam, 2020).

Rahman (2020) presented an article on "*Challenges and initiatives of digital library system and institutional repository: Bangladesh scenario*". The study explored the core challenges and initiatives taken by the leading libraries in Bangladesh for setting up digital library/institutional repositories. It is found that Islamic University of Technology Library, BRAC University Library, icddr,b library, Daffodil International University Library Sher-e-Bangla Agricultural University Library, East-West University Library, and the Eastern University Library have been developed Institutional Repository (IR) so far using DSpace and GreenStone software. Budget constraints and Intellectual Property Rights are the core challenges in developing a digital library system in Bangladesh (Rahman, 2020).

Islam et al. (2020) in their article titled "*Digital preservation activities of institutional repositories in some selected public university libraries of Bangladesh: an analytical study*" revealed that a digital preservations system should be developed with free open source software namely DSpace. The study suggested that public university libraries in Bangladesh should choose DSpace for developing IR because of its user-friendly and effective modules. The authors finally identified some key challenges for establishing IR and recommended suggestions to overcome the problems (Islam et al., 2020).

Sakib & Uddin (2020) delineated ICT-based activities in Jatiya Kabi Kazi Nazrul Islam University (JKKNIU) central library, Bangladesh. Data revealed that ICTs are used in various activities of the library such as serial control, data processing, cataloguing, communication, circulation, bibliography, and preparing in-house

databases. It is also found that Koha and DSpace are widely used for performing library activities and services at JKKNIU Central Library (Sakib & Uddin, 2020).

Chowdhury (2020) provided a complete picture of the present extent of Institutional Repositories (IRs) of Bangladesh. The study examined the Directory of Open Access Repositories which is known as OpenDOAR and the Registry of Open Access Repositories (ROAR) for comparing the IRs of Bangladesh globally. According to ROAR website data, there are 3972 IRs available worldwide. SHERPA (Securing a Hybrid Environment for Research Preservation and Access) developed a website called OpenDOAR and data of OpenDOAR confirmed a total of 3519 IRs are available globally as of 14 May 2018. The study also confirmed that International Registries, such as OpenDOAR and ROAR listed 14 and 10 repositories of Bangladesh respectively (Chowdhury, 2020).

Akter & Akter (2020) emphasized on adopting proper marketing strategies in university libraries of Bangladesh. The study has been taken 100 users and 4 universities as a sample. Data revealed that all the studied universities have taken initiatives for library marketing orientation. Findings also confirmed that library websites (26%), advertisements (18%), social media (17%), and exhibitions/displays are more powerful tools for promoting marketing awareness (Akter & Akter, 2020).

Khan (2020) explained the benefits of RFID technology in academic libraries of Bangladesh saying that RFID (Radio Frequency of Identification) technology is more convenient, efficient, and cost-effective -in library security. The study identified the merits and demerits as well as the application of the RFID technology in the library management cycle. The paper also explored the core areas of the RFID system cycle that covers Shelf management, Tagging, Counter Station, Shelf Check –out Station, Anti-theft Detection, and Book Drops. The study identified the benefits of RFID systems in the library like Rapid charging/discharging; High-speed inventorying; Patron self-charging/ discharging; Automated materials handling; Long tag life and Fast track circulation System (Khan, 2020).

Khandaker et al. (2020) presented a snapshot of ICT usage in six renowned medical libraries of Bangladesh aiming to focus on the availability of ICT facilities and library websites based on the Intranet and Internet in organizing library resources and services. A well-structured questionnaire was distributed among 380 respondents out of which 296 questionnaires were returned with a response rate of 77.89%. It has

been found that icddr,b library is the only medical library in Bangladesh that has developed an Intranet-based library website to access online library resources. Data also revealed that Dhaka Medical College Library is in the worst condition in terms of ICT facilities for users (Khandaker et al., 2020).

2019

Alipour Hafezi et al. (2019) proposed a new approach to the modeling of networks of an integrating model virtual library in Iranian universities of medical sciences. An analytic survey method and researcher-made checklist were applied for gathering the necessary data. A total of 59 Iranian libraries of universities of medical sciences have been taken as samples in this study. It is revealed that most of the studied libraries applied various standards in terms of metadata and its standards, found that MARC and Dublin Core Standards were the most frequently used ones in the studied libraries. The study explored that the medical professionals need the most up-to-date information in the shortest time possible and to fulfill this purpose there is an urgent need for collaboration with other institutions and the integration of integrated information services. Information harvesting and federated search are integrated approaches used in the proposed model designed by the authors. The cloud technology at the software and hardware level was applied for the proposed model comprising of the server and client of SOAP (Simple Object Access Protocol) protocols; OAI (Open Archives Initiative) and SRW (Search/Retrieve Webservice), supporting MARC 21 and Dublin Core metadata standards based on the XML markup language in order to create Medical Virtual Library. The study also depicted that MARC 21 descriptive metadata and ISO output exist in about 75 percent of the studied libraries and Z39.50 server protocol exists in 30 percent of the studied libraries. The top five experts and stakeholders of the Digital Library Federation and OCLC's (Online Computer Library Center) WorldCat project examined the appropriateness of the proposed model and recommend that all the medical schools of Iranian universities should connect to and exploit this network as all the main components are integrated with this model (Alipour-Hafezi et al., 2019).

Islam, et. al. (2019), in the research article " Status of Koha-ILS in Medical libraries of Bangladesh" has reviewed the current scenario of Koha-ILS in the medical and health libraries of Bangladesh in managing library activities. A structured questionnaire was designed to collect data from 24 Medical and Health institutional libraries in Bangladesh. The research suggests that Koha and SLiMS (SENAYAN

Library Management System) OSS (Open Source Software) software were found popular in 5 libraries out of 24 medical libraries in Bangladesh (Islam et al., 2019).

An overview of "Smart Library" presented by Gul & Bano (2019) in which the authors treated the new generation libraries as Smart Libraries that work with the incorporation of smart technologies, smart services, and smart users. Aittola, Ryhanen, and Ojala coined the term "smart library" in 2003. The authors discussed the core technologies that may be used in modern libraries viz. Electronic Resource Management (ERM), Artificial Intelligence (AI), Internet of Things (IoT), Blockchain Technology, Data Mining, Ambient Intelligence, Data Mining, and Augmented Reality. These technologies inspire the proficiency of libraries in terms of users, services, and technology integration and bridge the gap between the services offered by the libraries and the rapidly changing and diversified needs of the users. According to (Zimmerman & Chang, 2018), the Smart Library as:

> *"The smart library is the integration of books and related data, as well as digital and space resources, based on the realization of comprehensive information of the library. Use of large data intelligent analysis platform, the library management and services are intelligent and personalized, and the reader needs are oriented to improve their experience."*

The paper traced out the basic requirements for building a smart library such as the creation of smart environments, Mobile Access, Library 3.0, Smart detection of knowledge, and Smart and innovative services. The study also recommended that Digital Asset Management (DAM), Electronic Resource Management (ERM), and Institutional Repository (IR) systems would be developed in the new generation libraries. The emerging technologies in smart libraries can range from electronic resource management, smart bookmarking apps, cloud computing, artificial intelligence, library website, IoT, mobile internet, digitization, and mobile internet to drones and robots in libraries (Gul & Bano, 2019).

Rahman and Islam (2019) discussed the existing situation of implementing the RFID (Radio Frequency Identification) System in university libraries of Bangladesh in a paper entitled "Implementation of RFID in university libraries of Bangladesh". The authors mainly found out the major challenges of adopting the RFID system in university libraries along with possible ways to overcome these challenges. This study followed both qualitative and quantitative methods along with a review of related literature and took a survey through a structured questionnaire. Questionnaires were distributed to 144 university librarians through email from April 1, 2018, to 20 April

2018 and among them, 80 respondents responded through e-mail. The work revealed that the situation of RFID application in university libraries in Bangladesh is not very encouraging. However, the study reveals that only 8 public university libraries are using RFID technology out of 40 public universities and the scenario for private university libraries is only 2 libraries are adapting this technology among 101 private university libraries. The study also depicted that 'Staff work station and "RFID tags for books" are the highest used (100 percent) devices in the university libraries of Bangladesh, followed by "RFID theft detection gate (80 percent)" and "Self-check-in/out station (80 percent)". The authors explored the main challenges for implementing RFID such as lack of skilled and experienced manpower, the unchanging mentality of information professionals, lack of sufficient funds and budget, unavailability of RFID technology in the local market, erratic power supply, etc. The research paper recommended some ways for overcoming the challenges of the RFID system for instance positive impression of the concerned authority towards radio frequency identification, the appointment of technical persons, allocation of sufficient budget, arrangement of adequate training, and constant power supply since the RFID technology has become an inherent part of all modern libraries (Rahman & Islam, 2019).

Kalavani, Mohebbifar & Rafiei (2019) assessed the importance of skills and knowledge in Evidence-based Practice (EBP) among healthcare providers in Qazvin hospitals in 2016. It was a descriptive study in which a questionnaire method was applied to gather data from 254 out of 300 (84.6 percent response rate) health professionals of Qazvin University of Medical Sciences, Iran. Study results indicated that the physicians compared with other occupational groups had a more positive attitude toward EBP terminology. The result also depicted that the level of knowledge and skills regarding EBP is considerably low, especially for nurses. The major problems that were identified related to EBP are skill and knowledge about the necessity of implementing EBP, skill inadequacy, inaccessibility to information resources, negative attitude toward EBP, overlooking the priority of EBP, and lack of awareness among health professionals about the available clinical evidence. Thus, the study proposed that a systematic, responsive, and transparent research and educational system for EBP is crucial for taking clinical decision-making process. The study results confirmed that access to information sources on EBP is a main requisite for physicians, nurses, midwives, radiology technicians, and medical laboratories in order to implement EBP based research system. The study emphasized an important point that EBP is relatively getting a positive view among health care professionals

but their skills and knowledge in the area were quite limited. Finally, the study proposed educational courses on EBP at the college level, encouraging the continuous application of its principles for clinical decisions as evidence (Kalavani et al., 2019).

Uddin, Mamun & Rahman (2019) evaluated the present state of web-based library resources and services of icddr,b Library in Bangladesh. A well-structured online questionnaire link was administered by e-mail to the most potential 557 researchers of icddr,b to collect the primary data through "Google Forms". A total of 317 filled-in questionnaires were received from the invited respondents showing an overall response rate of 56.91% and finally, a total of 213 complete surveys were found suitable for analysis. Some of the main objectives of the study were to ascertain the extent of availability of web-based library services and resources, to explore the purposes for using e-resources, to trace out the hindrances of using e-resources, and finally to recommend appropriate measures for the effective management of web-based resources and services. The study revealed that "Research Activities" is the main purpose for visiting the library to 55.9% of respondents and a good number of respondents 46.5% opined that the library environment is "Excellent" at a first look. The findings also indicated that 31.9% of respondents evaluated web-based library services as "Excellent" and Hinari and PubMed are the most popular and frequently used online resources for icddr,b. The study traced the key challenges for using e-resources i.e. inadequate online databases and lack of skills in searching the databases, lack of awareness of the databases, and low-speed Internet connectivity. The authors recommended some key measures in order the improve the existing status of web-based resources and services of icddr.b Library such as easy subscription process of library e-resources; additional library timing; high-speed Internet connectivity; high configured user PCs; more subscription of online databases for e-books, e-journals, and e-theses; library marketing and Information Literacy training program for effective usage of e-resources (Uddin et al., 2019).

Shashikala & Srinivasaragavan (2019) reported on the findings of a study that investigated the present status of the usage of E-resources (e-books, e-journals, e-databases) subscribed by ERMED (Electronic Resources in Medicine) Consortium and Health Science Library and Information Network, HELINET Consortium. The teachers, doctors, and medical students of Kempegowda Institute of Medical Sciences and Information Centre, Bangalore, India were the main library users who use the resources of the said consortium. The study focused on the extent of the available e-resources and e-services in KIMS (Kalinga Institute of Medical Sciences) Medical

College, the challenges faced by the respondents while accessing e-resources, and the rational measures for effective utilization of the e-resources among the medical professionals. A survey research method, comprising a self-completed questionnaire was administered randomly to gather data from the respondents who comprised of 150 Faculty and Postgraduates students (MD / MS, PG Diploma) and 135 questionnaires were received comprising of 82.66% response rate. This was supplemented by observation and interview methods. It is found that, in total, the highest percentage 36 (26.66%) of respondents consulted e-resources for finding quick information, and 37.77% of respondents accessed web resources from Central Library. The results of the study revealed that a majority of the respondents 37.03% used e-resources daily. A good number of respondents, i.e.63.70% were satisfied with the collection of library e-resources, and Google and Yahoo are the most popular search engines for searching e-resources. The findings also depicted that ScieneDirect, MD Consult (an online medical database), and PubMed are the most popular databases for accessing e-books and e-journals. The main barriers to utilizing e-resources were slow Internet speed and limited access to computers. The authors finally concluded that web resources have a tremendous impact on accelerating the academic and research performance of medical colleges (Shashikala & Srinivasaragavan, 2019).

Akpovire et al. (2019) conducted a study on the relationship between medical students' information literacy skills on the use of information resources in two medical universities in Lagos State, Nigeria. It was a descriptive study in which a questionnaire method was applied to gather data from 376 out of 387 (98 per cent response rate) medical students following the enumeration sampling technique. The findings revealed that both print and e-resources (e-journals, online databases like Medline and PubMed, Audiobooks, and e-books) were available in the sampled universities. The majority of the medical students used library resources for research and academic activities. The study also discovered that there was a significant relationship between information literacy skills and the use of information resources by medical students ($r = .600$, $p < .05$) (Akpovire et al., 2019).

Chande-Mallya (2019) discussed various initiatives to enhance health library services in Tanzania. It is found that three initiatives were having a beneficial impact on medical libraries: support for Doctoral studies for library staff, development of a Health Information Science (HIS) curriculum, and integration of library training into the university curriculum. Tanzanian librarians had kept in touch with regional and

international associations, such as The European Association for Health Information Libraries (EAHIL) scholarship program, Partnership in Health Information (PAHI), Association for Health Information and Libraries in Africa (AHILA), The Norwegian Supporting Medical Health (SMH) Project, etc. There were several challenges for medical libraries in Tanzania, most notably limited funds and budgets, limited staff, poor Internet connectivity, lack of ICT skills, and limited use of Institutional Repositories (Chande-Mallya, 2019).

Padmaja & Kishore (2019) explored the extent of usage patterns of health e-resources in six Govt. Medical college library users and ten private medical college library users in Andhra Pradesh. Medical students, doctors, and faculty members are the main types of library users in these libraries. The study was conducted through the survey by distributing questionnaires among 1242 users and 986 responded, thus resulting in a response rate of 79.4%. Results showed that 'using the Internet' was the main purpose for visiting the library whereas Pvt. Medical college users for 'personal books reading'. It is found that open-access databases, Scopus, and medIND were the leading e-resources used by the respondents. Data also confirmed that 96.6 per cent were aware of NTRMEDNET Consortium electronic resources. The study also identified some key barriers while accessing e-resources such as poor Internet connectivity, limited access to computer terminals, the problem with back issues, lack of awareness, too much information retrieved, and so on (Padmaja & Kishore, 2019).

Kinengyere (2019) highlighted the key initiatives and challenges of Ugandan health libraries in the 21st century. It is found that a total of 15 health libraries were available in Uganda. The study showed that the Research4Life program is freely available in Uganda providing zero-cost access to online e-resources and updated reference sources to clinicians. The paper discovered the core challenge facing Ugandan health libraries i.e. inadequate funding (Kinengyere, 2019).

2018

The first study using LibQUAL model through the meta-analysis and systematic overview method in Iranian university libraries assessing service quality based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines was conducted by Ramezani et al. in 2018. LibQUAL is the most widely used method for assessing the quality of library services that enables libraries to have a solid understanding of their users' expectations and library managers to evaluate users' feedback. Therefore, it is easy for the library to specify the best measures for

upgrading library services. LibQUAL includes three dimensions i.e. library as a place (LP), affect of service (AS), and Information Control (IC) covering five, nine, and eight questions respectively. The study found a significant correlation exists between three dimensions of service quality and the service superiority gap of LibQUAL and geographical regions of Iran ($p < 0.01$). The study concluded that the library users are moderately satisfied with the existing library services provided by Iranian University Libraries. Moreover, the scientific level of universities can be promoted more through the improvement of library services. The study finally put forwarded three recommendations including the formation of a rich collection of e-resources, proper utilization of library space for forming scientific groups, and finally the assessment of users' expectations of online tools such as The "LibQUAL+® Lite and TechQual+" be provided in order to reduce the gap between users' expectations and services (Ramezani et al., 2018).

Kumar, S., & Singh, N. (2018) conducted a study to investigate the availability of E-Consortia (EResources@N-LIST, E-Resources@UGCInfonet digital library, ICMR Consortia, ERMED, HELINET) in the Private Medical colleges' libraries of Uttar Pradesh, India. A well-structured questionnaire was sent to the 14 library heads of Private Medical Colleges of Uttar Pradesh to find out the available electronic consortia and the status of library budged of the studied 14 medical libraries. The analysis revealed that although the 8(57.14%) Private Medical Colleges of Uttar Pradesh joined the E-Consortia and the rest 6(42.86%) Private Medical Colleges of Uttar Pradesh were not the members of this E-Consortia due to insufficient library budget. ICT-based resources and services were not reaching the users of these 6 medical libraries to the expected extent. The surveyed medical libraries were established during the period 1996 to 2012. E-Resources @N-List consortium was used more in the libraries (35.71%) than any other consortium. It is observed that the majority of libraries 7(50%) have 10001-15000 printed books and 57.14% of libraries hold 101-200 printed journal titles. More than 25001 e-journals are accessible to only 14.27% of libraries. The extent of library automation by the largest percentage of the libraries (57.14%) was partially automated. Most of the libraries had a good collection of e-journals apart from 2 libraries. A good number of libraries (35.71%) had a 10-20 lac budget. They evaluated that e-journals have a massive impact on medical education to become more effective health professionals (Kumar & Singh, 2018).

Galter Health Sciences Library has developed a scholarly repository 'DigitalHub' for sharing and preserving digital outputs for the Feinberg School of Medicine and the

greater Northwestern Medicine community. Ilik V (2018) traced out a study on DigitalHub development and engagement activities by highlighting various challenges and innovations behind this project. DigitalHub has a forward-looking vision aiming to transform the library into an information hub through integration with academic, research, and clinical enterprises. Digital Initiatives Working Group (DIWG) has been formed to successfully implement the project. Galter Library has placed a strong emphasis on system security, platform, interoperability, stability, functionality, scalability, system support, and strength of technology for selecting the most appropriate open source repository platform which was taken from the National Library of Medicine. DigitalHub had various strong features, most notably citation generation, DOI minting, usage metrics, rich metadata, and content sharing and reusability. The noteworthy point is that Fedora Commons was selected as an excellent Application Program Interface (API) and Sufia was chosen as a frontend. For creating the descriptive metadata of DigitalHub, the Dublin Core metadata schema was chosen in which there are a total of 26 metadata descriptive fields. Various vocabularies were used, most notably: National Library of Medicine Medical Subject Headings (MeSH), Library of Congress Subject Headings (LCSH), Library of Congress Name Authority File (LC/NAF), ISO639–2, etc. An automatic Digital Object Identifier (DOI) was generated for all the resources deposited to DigitalHub. In 2015, DigitalHub successfully launched with a strong commitment to preserving and disseminating scholarly outputs at Feinberg and Northwestern worldwide (Ilik et al., 2018).

Siddiqui (2018) completed her doctoral study at Integral University, India on *"Impact of Information Technology on Government Medical College Libraries of Northern India: A Survey"* aiming to measure the impact of Information Technology and evaluate the present extent of library resources and services of six Govt. medical college libraries. A close-ended structured questionnaire was distributed among 1988 faculty members and students and finally, 1193 responses were analyzed. Data revealed that users of all the surveyed libraries agreed that IT has a significant impact on carrying out academic and research activities (Siddiqui, 2018).

Sikarwar (2018) conducted a Ph.D. study at Jiwaji University, India aiming to ascertain the impact of ICT on Medical College Libraries of M.P, identify the challenges and suggest remedial majors. The researcher distributed a total of 600 questionnaires to the users of 6 Government medical college libraries and finally received 399 adequately filled questionnaires. It is interesting to note that only 14%

of surveyed medical libraries were automated, and the others did not take any initiatives for automation (Sikarwar, 2018).

Swedish health science libraries are facing several challenges in meeting the information needs of library users. Haglund, Roos, & Wallgren-Björk (2018) explored the new directions and expanding roles in health science libraries in Sweden. This study looked at four key areas: involvement of clinical librarians in the systematic review process; coping with open science/open access initiatives; understanding of information needs of users in Swedish health science libraries; and the consequences of expanding roles for health science librarians. Most of the medical university libraries in Sweden fall into the category of multi-faculty universities; only the Karolinska University Library is a single-faculty medical university. No dedicated health library association is found in Sweden and National Strategy for Libraries has been established by the Swedish government. It is found that publishing costs and the lack of transparency of licensing and has been identified as major challenges to the OA (Open Access) movement in Sweden. It is found that the quality of systematic reviews can be improved immensely with the engagement of clinical librarians. Medical libraries in Sweden emphasized the importance of evidence-based research through systematic reviews. The study suggested that Swedish libraries should use different methods for evaluating users' expectations. Modern library science syllabi are available in Swedish LIS institutions such as 'Library and information ethics II', 'Scientific communication and bibliometry'; 'Digital handling of registers'; including digital integrity, copyright issues, and espionage. Expert medical librarians and the reluctance of newly trained health professionals to work at the university level are major challenges for Swedish health science libraries (Haglund et al., 2018).

Cao, Liang, & Li (2018) presented a theoretical contribution to the Smart Library concept and explored the smart library's core components in multiple dimensions (i.e. technology, service, and human). It is found that advanced technologies, such as the Internet of Things (IoT), cloud computing, data mining, and artificial intelligence are the driving forces behind developing a smart library. The IoT, Artificial Intelligence (AI), and RFID technologies are widely used to meet the growing information needs of the users. The study retrieved the best definition of smart library stated below as taken from (Li & Dong, 2016):
"A smart library is a more advanced development of the hybrid library and digital library. Within the environment of the IoT, the smart library relies on cloud computing technology and intelligent equipment; realizes the book-book, book-

people and people-people associations; and provides intelligent services for users. Smart library refers to the smartness of the library building, through the integration of library building equipment, computer networks, communications technology and sensor monitoring."

Finally, the authors proposed that the smart library is mainly based on three layers: perceptual, computing, and communication. The perceptual layer includes intelligent mobile terminal technology, cameras, wearable devices, sensors, RFID, and audio recognition technology. Artificial Intelligence (AI), data mining, cloud computing, intelligence filters, and intelligence processing are included in the computing layer. The technologies under the communication layer are virtual reality technology, information push technology, and mobile internet technology. The smart library services and components may be 'Smart Learning Space', 'Smart Users', 'Leisure services through cafés and cultural activities rooms', and 'Build up community relations through workshops, book festivals, and lectures' (Cao et al., 2018).

Ahmed, Sheikh & Akram (2018) emphasized the importance of implementing knowledge management in university libraries of Punjab, Pakistan aiming to identify the potential areas of academic libraries where knowledge management can be applied. A survey research method, comprising a self-structured closed-ended questionnaire measured on a five-point Likert scale was used to gather data from the respondents who comprised 75 librarians and 60 filled and returned comprising of 80% response rate. It is found that Knowledge Management (KM) has a significant impact on the library that improves the efficacy and raises the functional efficiency of library activities. Results indicated that the majority of the respondents became familiar with KM and they opined that KM is not a new discipline but rather than it is a re-branding of information management. The study also asserted that KM can be applied in all sections of libraries, especially in digital & online services, resource sharing & networking, reference services, digital literacy programs, e-resources management, decision making, and planning and policymaking. Results also disclosed a lot of challenges for implementing KM in academic libraries of Pakistan, such as inadequate staff training, low expertise in KM, absence of knowledge capturing and sharing culture, low KM skills, and poor IT infrastructure. Finally, the investigators recommended some skills and competencies for librarians to implement KN including information management skills, communication skills, IT skills, leadership skills, and decision-making skills (Ahmed et al., 2018).

In a study undertaken by Patterson in 2018, the authors opined that "Library as the Technology Hub for the Health Sciences". The study was conducted at the Spencer S. Eccles Health Sciences Library (Eccles Library), University of Utah. It is found that the Eccles Library is in an advantageous position in promoting the technology usage in health science curricula in the College of Health, School of Dentistry, School of Medicine, College of Pharmacy, College of Nursing, and University Hospital and Clinics. The study also disclosed that Eccles Health Sciences Library serves as a technology hub and eventually provides technology expertise services to many faculty and students such as virtual anatomy, virtual reality, Do-It-Yourself multimedia tools, and 3D printing (Patterson et al., 2018).

Trivedi, R. H. (2018) submitted a doctoral thesis to the Madhav University, India titled "*Evaluation of Library Services Rendered by Medical Colleges Library in Gujarat: a study*" aiming to evaluate library Services rendered by medical colleges libraries in Gujarat. Data were collected from the library heads of 23 medical college libraries. It has been found that various types of ICT based services were rendered by medical libraries such as EDD (Electronic Document Delivery), EIN (Electronic Information Notification), Group mail service facility, EID (Electronic Information Display), Online Public Access Catalog, Web Online Public Access Catalog, Access online resources/database, Photocopy / Printing / Scanning / Mail Service, Online Training and so on (Trivedi, 2018).

Xie & Zhang (2018) briefly described the Chinese health science library activities and services. It is found that the demand for quality health care services in China has increased due to rapid socio-economic development in China. The Library of the Chinese Academy of Medical Sciences and the Peking University Health Science Library are two leading medical libraries in China. The study identified the key developmental activities of Chinese health science libraries such as the development of institutional repositories, systematic reviews, research impact assessment, evidence-based medicine, support for data management, and the promotion of health information literacy. The medical libraries in China also facing some challenges covering the pressure to provide enhanced services with limited staff, coping with technological innovations, and underfunding (Xie & Zhang, 2018).

Baothman et al. (2018) conducted a study under the title "Study Habits of Health Science Students at King Saud bin Abdulaziz University for Health Sciences, Jeddah, Saudi Arabia". A cross-sectional survey was conducted in the college of medicine of

King Saud bin Abdulaziz University of Health Sciences (KSAU-HS). Data were collected from 121 out of 150 undergraduate male students comprising a response rate of 80%. The study confirmed that information discrimination, motivation, and metacognition were associated significantly with the GPA (Grade Point Average) of medical students (Baothman et al., 2018).

Rahman (2018) completed his MPhil study at the University of Dhaka, Bangladesh on *"Digital Library Initiatives in Medical Libraries of Bangladesh"* aiming to explore the digital library initiatives in the six leading medical libraries of Bangladesh. A total of 380 questionnaires were administered amongst the doctors, students, scientists, researchers, and staff members of six investigated medical libraries, and finally, 296 completed fill-up questionnaires were received with a response rate of 77.89%. The key finding of the study is that only the icddr,b, and BSMMU libraries are in an advanced position to set up digital library activities and the rest of the 4 libraries should take proper initiatives for the development of digital library systems and services in Bangladesh (Rahman, 2018).

2017

In today's digital world, the need for developing a library website should be of utmost importance when accessing online resources and delivering web-based library services to users. The library website has emerged as a core component of the online information resources and services. Library users may seamlessly access online resources from their desktops by visiting the library website. Keeping in mind the importance of the library website, Sheikh in 2017 evaluated the usability of the library website of the COMSATS (Commission on Science and Technology for Sustainable Development in the South) Institute of Information Technology from the users' perspective and explored the various reasons behind using the library website. In order to track and assess CIIT's library website resources by national and international users, an online questionnaire survey using e-mail and Google Analytics Reports are administered. An online survey of the questionnaire link using Google Docs was sent to 550 students and faculty members and finally, a total of 235 valid responses were found suitable for analysis with a response ratio of 42.7 per cent. Results demonstrated that the majority of the users 69 (29.3 per cent) visited the library website occasionally whereas only 18.7% of users daily. From the Google Analytics report, the results revealed that the website was frequently accessed by international users from 125 countries. The study observed that 45% of the users agreed that the library website plays a great role in scaling up their academic

performance while 50% of the respondents agreed that the website provides useful information. A majority of users (115, 50.4 per cent) confirmed that the website was easily accessible. Results also disclosed that a large number of users (59.5 per cent) gave a positive remark on the graphics and text used on the library website and 55.4% agreed that information on the library website is easily understandable as well as 51.2% reported library website interface was attractive. The majority of the users (174, 74.0 per cent) accessed the website for retrieving research articles from the HEC Digital Library. So the study provided deep insight into the performance of the CIIT library website and proved that the website is of utmost importance for the pedagogical and research activities of the students and faculties (Sheikh, 2017).

Anyaoku & Nwosu (2017) conducted a study for accessing to health information for chronic disease patients in two Federal teaching hospitals in South East Nigeria in an attempt to find out the role of medical libraries in accessing health information. A total of 1,080 questionnaires were distributed to chronic patients physically and finally, the investigators received 784 properly completed questionnaires comprised of a 73% response rate. Findings from the data analyzed showed that a very high percentage (93.7%) of the respondents took help from doctors for health information followed by Pharmacists 551 (70.3%) and Nurses 535 (68.2%). A very low portion 19.3% of the respondents was dependent on libraries for accessing health information. So libraries in South East Nigeria should play more proactive roles in disseminating health information to chronic patients since it is the mission of medical libraries to provide access to desirable and up-to-date health information to patients. The medical librarians in Nigeria must take diverse initiatives like the United States National Library of Medicine's website. The patients and health professionals may access very resourceful consumer health information from this site like MedlinePlus and ClinicalTrials.gov. The study finally suggested that medical libraries in Nigeria may be in the best position to reach out to chronic patients by taking core initiatives like creating awareness and usage through outreach programmes and developing vibrant consumer health information resource collections (Anyaoku & Nwosu, 2017).

Epstein (2017) outlined various national developments and initiatives taken by the US health science libraries in providing support to research. Health science libraries in the United States are rapidly strengthening their electronic health care system. The study mainly focused on two important emerging trends like new initiatives of the Medical Library Association and the National Library of Medicine and expanding

roles for librarians in research support, precision medicine, data management, and bioinformatics. The National Library of Medicine (NLM) makes available access to a lot of health information resources freely worldwide, most notably PubMed, PubMed Central, MedlinePlus, GenBank, and TOXNET. In order to provide equal access to biomedical information for both physicians and common people, NLM has developed the National Network of Libraries of Medicine (NNLM) that is offering funding projects for local health libraries for health-related outreach projects, as well as professional development awards for librarians. The Medical Library Association (MLA) of the USA is fostering to scale up the quality of health care, education, and research throughout the world. MLA has identified six core professional competencies for health librarians covering Leadership and Management; Instruction and Instructional Design; Information Services; Information Management; Evidence-based Practice and Research and Health Information Professionalism. MLA has also developed an online learning management system called MEDLIB-ED for health information professionals for developing professional expertise through this online assessment tool. The academic health science libraries in the United States are offering a wide array of services to faculty and student researchers. Consultation services on data sharing and preservation, data management planning, data visualization, and finding and re-using data are also provided to researchers by many health sciences libraries. The study finally predicted the expanding roles of health librarians: serving as faculty members in evidence-based medicine courses, working as bioinformatics database specialists within science departments, writing grant proposals, serving on institutional review boards, and being involved in multilingual health-literacy programs and community partnerships (Epstein, 2017).

Uddin et al. in 2017 evaluated the use and impact of the usage of electronic resources of Hinari for medical research libraries in Bangladesh, with a particular focus on icddr,b (International Centre for Diarrhoeal Disease Research, Bangladesh) Library. The study was mainly based on various dimensions of Hinari like usage of e-resources, time and cost-saving benefits, research impact, and challenges faced by icddr,b researchers. The study utilized a structured questionnaire, personal observation, literature review, and interview methods for getting data following a mixed methodology combining both qualitative and quantitative methods. Hinari authority provided log-in data for icddr,b researchers from 2013-2014 have analyzed. Aside from this, a total of 150 questionnaires were sent among the respondents of icddr,b visited physically, out of which 90 were returned with a response rate of 60

per cent. Findings revealed that Hinari launched in Bangladesh in April 2003 and icddr,b is the top user of Hinari in Bangladesh. It is observed that biomedical researchers will not face any difficulties as long as Hinari resources are available in Bangladesh. A total of 280 organizations are registered in the Hinari program as of 8 February 2013. Results disclosed that a large number of respondents (42%) used Hinari daily followed by 27% fortnightly and 19% of users accessed Hinari monthly for retrieving full-text articles. Findings revealed that most of the users (60%) evaluated Hinari resources as "Excellent" and 36% of researchers used Hinari for downloading e-books. Results also confirmed that Elsevier's ScienceDirect is the most dominating online database accessible through Hinari in Bangladesh. Results also explored that low-cost access up to 14,000 HINARI journals reduces the economic burdens of libraries to a great extent. icddr,b scientific community has evaluated Hinari as the lifeblood for scaling up research activities. The study finally depicted that Hinari is creating tremendous opportunities for accelerating research advancements, most notably registration growth, training outcome, an increase of research publications, advancement of knowledge, the economic benefit of organizations, and respective country's benefit as a whole (Uddin et al., 2017).

Sonawane (2017) focused on developing the Library Discovery System to introduce library users to a new modern library service called Web-Scale Discovery Services (WSDS). The study presented various features associated with both the open-source and commercially available discovery system. It is found that Discovery System provides a single-window approach to segregated resources like OPAC, subscribed e-resources, Institutional Repository, Newspaper articles repository, Open Access content, and many more. The study explored commercial discovery tools like Primo and Primo Central, EBSCO Discovery Service, Summon and WorldCat Discovery, and Open source including Franklin, VuFind, eXtensible catalog, and Blacklight. Various challenges are involved in developing the Library Discovery System like metadata challenges, adoption of standards, and recommended practices. Comprehensive index coverage, the creation of an open-access index, and standardization of vocabulary are some of the initiatives for addressing the mentioned challenges. It is observed that several types of discovery systems are made available like Index-based Discovery Service, Non-Library Discovery Service, and Public Library Discovery Service. Dublin Core metadata is most suitable for the discovery system and OAI-PMH (Open Archives Initiative Protocol for Metadata Harvesting) is preferable with regard to Institutional Repository (Sonawane, 2017).

In today's digital environment, librarians are particularly well-positioned to play a significant role in the future of data science. Burton & Lyon (2017) explored the skills and management gaps of librarians that inhibit their ability to move forward in data science. It is found that librarians are still at the beginning of this data science journey. The study proposed new positions in the library should be formed as 'Data-intensive Librarians' for leveraging data science capability in the organization. The North Carolina State University is now offering training programs for librarians on the Data Sciences Libraries Project, funded by the IMLS (Institute of Museum and Library Services) along with various educational programs for librarians and library managers for discussing the world of data science (Burton & Lyon, 2017).

Okhovati, Karam, & Khajouei (2017) assessed the usability of the central library websites of medical sciences universities in Iran. The study was a cross-sectional and descriptive study that was based on a heuristic evaluation method to explore the usability of the websites. Three trained evaluators independently examined the 12 library websites adapting Nielsen's usability heuristics from 11 July to 10 September 2013. The study uncovered that a library website is a vital part of a library's identity aiming to access online resources and services. Users' need assessment is an important factor when designing an effective library website. Nielsen's 10 heuristics website evaluation criteria were used in this study as follows: 'Flexibility and efficiency of use', 'Visibility of system status', 'Error prevention', 'Match between system and the real world', 'Consistency and standards', 'Recognition rather than recall', 'Aesthetic and minimalist design', 'User control and freedom', 'Help users recognize, diagnose, and recover from errors', 'Help and documentation. Results discovered a total of 668 usability problems. The most common problems (27.1%) belonged to 'aesthetic and minimalist design' on the other hand 'help and documentation' heuristic covered the least common issues and a big percentage of major violations were found in 'help and documentation (56.1%). Library managers should give high priority to solving the catastrophic problems while evaluating the usability of library websites (Okhovati et al., 2016).

Dhuri (2017) traced out a Ph.D. study titled "*Use and user study of e-resources in medical and engineering college libraries in Goa*" under Tilak Maharashtra Vidyapeeth, India aiming to study awareness, purpose, and frequency of library resources usage by users in medical and engineering college libraries. It was a descriptive study in which a questionnaire method was used to collect data from 960 out of 975 library users comprising a response rate of 98.46%. Findings revealed that

the majority of library users used internet resources (96%) followed by e-journals (59%) and databases (12%). So, e-resources have a significant impact on medical and engineering users (Dhuri, 2017).

In the present online-based search and retrieval system, the library resources discovery service is the right option for searching in a single window rather than performing a search on various databases. Pal (2017) presented an overview of the implementation of the VuFind-Open Source Library Resources Discovery Service in the Central Library, Tripura as well as discussed various features and services of various commercial and open-source software available for Web-Scale Discovery Services. It is found that many popular commercial discovery software are available such as EBSCO Discovery Service (EDS), ProQuest Summon, Ex Libris-Primo Central, WorldCat Local, and Ovid Discovery; and open source software like VuFind, Blacklight, LibraryFind, Franklin, and SOPAC (Social Online Public Access Catalog). Results disclosed that most of the libraries in India are using VuFind as their web-scale discovery service. It is possible to search as a Google-like interface through VuFind. The study also explored the major features of VuFind Discovery Service like Federated Search, "More Like This" Resource Suggestions, Save Resources to Organized Lists, Author Biographies, Persistent URLs, Zotero Compatible, and so on. Finally, the author encouraged all the libraries to develop a single-window search for all resources through Vufind (Pal, 2017).

Most of the libraries around the world have adopted Web-Scale Discovery (WSD) services in the library information retrieval arena for providing users with a Google-like search environment. Narayanan & Byers (2017) highlighted on improving web-scale discovery services in which the authors pointed out that the discovery system has been touted as academic Google. The study revealed that providers and publishers have taken a variety of initiatives to enhance the discovery systems like publication finder (A to Z list) of library resources, full text linking mechanisms, Abstracting and Indexing (A&I) resource issues, metadata quality, discovery index coverage, and content harvesting. In order to enhance indexing, ranking, limiting, linking, and personalizing, publishers and WSD providers should have a strong relationship (Narayanan & Byers, 2017).

Mohsenzadeh, Radad, & Alipour-Hafezi (2017) traced the effective factors for integrating the digital library system in Iranian universities of medical sciences. An analytical-descriptive approach was used to gather data from literature focusing on

digital libraries evaluated by the 15 Delphi Panel members and analyzed by the Fuzzy TOPSIS technique (Technique for Order Preference by Similarity to Ideal Situation). Studies in the literature revealed that Integrated Digital Libraries (IDLs), Integrated Information Systems (IIS), and Digital Libraries (DL) were the core three systematic related phenomena for developing digital library systems. The findings showed that 34 affecting factors could be considered while integrating digital libraries in Iran Universities of Medical Sciences, such as Programming of the mother organization, Communication networks (Internet and the web), Interoperability, Protocols of integration, Financial resources, Specialist of digital libraries and so on. The touching factors could be classified into five main divisions of strategic, technical, digital, organizational, and human factors (Mohsenzadeh et al., 2017).

Ganshorn & Giustini (2017) outlined various library activities of Canadian health science libraries. For the growing emphasis on managing research data, Canadian librarians are taking various initiatives for the overall improvement of medical libraries. It is found that the Canadian Health Libraries Association/Association des biblioth`eques de la Sant'e du Canada (CHLA/ABSC) is the national association for Canadian Health Librarians. The study confirmed that Canada is lagging behind in terms of developing a robust system of coordination for health library services across the country since there is no flagship medical library. Budget cuts and underfunding are the major challenges for hospital libraries in Canada (Ganshorn & Giustini, 2017).

Hadapad (2017) conducted a Ph.D. research on the use of information resources and services of libraries attached to ayurvedic medical colleges by library users in Ayurvedic Medical Colleges in Karnataka State. A total of 1,872 responses were received through the questionnaire method. Findings revealed that the most frequently accessed e-resources were e-journals and e-newspapers (Hadapad, 2017).

Parmar (2017) investigated a Ph.D. study under Sardar Patel University, India titled *"Impact of Information and Communication Technology (ICT) on Medical College Libraries of Gujarat: A Study"* with a focus to find out the status of library resources and services in medical college libraries of Gujarat. Two sets of questionnaires were designed to collect data from 18 library heads of medical college libraries and 1170 library users out of 1380 comprising a response rate of 84.78%. Results indicated that 22.22 % of medical college libraries had full-fledged library automation, whereas 22.22 % of medical college libraries had partially and 44.44 % were in progress mode (Parmar, 2017).

Okeke et al. (2017) carried out a study aiming to look into the status of library and information resources and services rendered by 5 medical libraries in Enugu State, Nigeria. Data were collected from 245 users through the observational checklist and questionnaire method. The major findings revealed that print journals and books were available but e-resources and union catalogs were absent in the surveyed libraries. The surveyed libraries provided various information services to clients like Selective Dissemination of Information (SDI), Reference, Catalogue, Current Awareness Services (CAS), Circulation/Lending, Indexing, Abstract, and Medical Research. The study finally recommended that collaborative activities should be developed among the medical libraries to pull their resources (Okeke et al., 2017).

Mohsenzadeh (2017) investigated to explore the integration of digital libraries in Iranian universities of medical sciences. The research was conducted through an analytical-descriptive approach. The study explored that 34 affecting factors could be considered for the development of digital libraries in Iran Universities of Medical Sciences (Mohsenzadeh et al., 2017).

2016

The utilization of E-Books among undergraduate medical students at Lahore was examined by Rafiq & Warraich in 2016 in order to assess e-books utilization in terms of their format, usage, and awareness among medical undergraduate students at the existing level. The study showed that e-books have become an integral element for library collections for core benefits like easy and round-the-clock access and user-friendly features such as hypertext links, highlights, search and cross-reference functions, multimedia objects, bookmarks, annotations, and interactive tools. E-book technology is adopted by 40 top academic institutions worldwide for providing access to e-books of their users through library websites and developing digital libraries as reported by Elsevier. It was a descriptive study in which a questionnaire method was applied to gather data from 235 out of 300 (79 percent response rate) respondents of the three public medical colleges in Lahore, Pakistan (Rafiq & Warraich, 2016).

Kumar (2016) presented the results of a case study conducted by the Medical Students of M.M. University, Ambala, in order to assess the type, purpose, search patterns, purpose, frequency, time spent place of access to e-resources by medical students. A well-structured questionnaire was administered to 100 medical students for getting the necessary data. A total number of 78 filled-in questionnaires were received from samples (45 from Postgraduates and 33 from Undergraduates

students) showing an overall response rate of 78%. The chi-square test was also tested at a 0.01 % level of significance to compare the difference in of usage e-resources among PG and UG medical students. The result of the study reveals that e-resources are informative for updating medical knowledge. Search engine and medical research reports are highly used academic sources for both postgraduate and undergraduate medical students. The survey also depicted that library notice/e-mail and colleagues, and using the library are the main sources for students for e-resources awareness, and the students are not too satisfied with the present accessibility of e-resources. There is a tendency for using e-resources frequently compared to PG students. The major problems faced by students in terms of using e-resources included time consumption, slow downloading speed, viruses, and more expensive. The author predicted that modern digital infrastructure is much needed in Maharishi Markandeshwar University for creating an attractive environment for medical students in order to make the maximum access to e-resources (Kumar, 2016).

Hirabhai (2016) focused on assessing the utilization of resources and services of the university libraries by submitting a Ph.D. thesis to Shri Jagdishprasad Jhabarmal Tibarewala University, India titled "*Use of E-resources in the information technology scenario of medical college libraries of Gujarat state: a study*". Three sets of questionnaires were designed to collect data from 14 Librarians, 85 Faculty Members, and 105 Students respectively following the stratified random sampling method. It is found that all the studied medical college libraries have their own websites (Hirabhai, 2016).

Patil (2016) carried out a study aiming to explore digital library challenges and user expectations in the ICT era. In today's high-tech learning environment, the Internet, WWW, Content Management Systems, and other virtual computer technologies have posed various challenges for academic and research libraries. The study identified several library challenges in the ICT era, such as the Electronic publishing issues, Acquisition of digital resources, Media convergence in digital resources, Resource sharing, and the consortia approach. Availability of information in electronic form, Digital Information Explosion, Space Saving, Time-saving, Cost-effectiveness, Data, and Exploitation of computer-readable databases are some of the factors that forced libraries to digitize library resources. The study also addressed several ICT skills needed for library professionals, most notably Acquisition of e-resources, Metadata harvesting, Readiness for lifelong learning, Digital library software, Digitization

process, Language skills and Knowledge of Information and communication technology (Patil, 2016).

Tella & Oladapo Oyegunle (2016) explored a comparative analysis of available features and Web 2.0 tools on selected Nigerian and South African university library websites. The study identified the leading library websites of Nigerian and South African universities along with compared the web 2.0 tools, e-resources, and online databases linked in the selected library websites. The study applied content analysis as the research design. A total of 20 leading university library websites were selected in Nigeria and Africa for gathering data on their Web 2.0 features (such as blogs, RSS, instant messaging, and wikis), electronic resources, and e-databases. The results showed that the library websites of South African Universities are a little ahead in terms of Web 2.0 tools compared to Nigerian university library web pages though the link of Web 2.0 in the library websites is in the developing stage. It is also found that a total of 32 Web 2.0 tools are available on South African university library websites whereas only 23 Web 2.0 tools are on Nigerian university library websites. Moreover, the study revealed that Twitter and Facebook are the most popular Web 2.0 tools in the library websites of Nigerian and South African university libraries. The study implied that e-books and e-books are the most prominent web content on both Nigerian and South African university libraries' websites. With regard to accessing online databases, African libraries are also well ahead compared to Nigerian libraries (27 out of the 64 e-databases). The study concluded that, in order to have unhindered access to Web 2.0 tools, e-resources, and e-databases through the library website, the authorities of African and Nigerian universities should make adequate funds available for the libraries (Tella & Oladapo, 2016).

Grynoch (2016) provided an overview of Apps and mobile support services in Canadian academic Medical Libraries in order to examine the most frequently used medical mobile apps and types of promotion available in selected seventeen library websites of Canadian Medical Schools. The 17 medical schools' library websites in Canada such as Northern Ontario School of Medicine, Dalhousie University, University of British Columbia, University of Alberta, University of Manitoba, University of Ottawa, McGill University, McMaster University, Memorial University of Newfoundland, Queen's University, University of Calgary, etc. were critically reviewed. From the library websites, the medical apps were identified along with services and promotions using these apps also noted. Facebook and Twitter accounts were scanned for identifying apps related services/events within the last two years.

Smart phones are increasingly used in Canada and USA in the field of medicine including telemedicine, accessing e-resources, medical software, and remote patient monitoring capabilities. The findings of the study showed that all the 17 medical libraries linked medical apps on their websites and offered various services and the libraries provided a research guide on how to use medical apps. The Universite´ de Montreal holds the highest number of apps i.e. 128 whereas the Western University has a minimum of 4 apps. A total of 272 different apps were identified in which the average number of apps is 31 and the median of apps is 23 ranging from the subject of general medicine to Pharmacy. EBSCOhost Mobile, AccessMedicine, UpToDate, Lexi-Comp, Micomedex, Dynamed, Medscape Mobile, Epocrates Rx, Calculate by QxMD, Diagnosaurus, and PubMed were ranked as the top 11 medical apps in the surveyed medical schools. Promotion of apps using Facebook and Twitter accounts varied among medical schools. Fourteen and 15 libraries had Facebook and Twitter accounts accordingly out of the 17 libraries scanned. Posting on departmental Facebook accounts, blogs and library news outlets, digital displays, bulletin boards, and Tumblr were other noted promotional methods. The workshops, presentations, and drop-in sessions for mobile medical apps were being widely used in the medical schools of Canada for creating awareness of mobile medical apps (Grynoch, 2016).

Nowadays, customer service is treated as a core component of library services. Blevins, DeBerg, and Kiscaden (2016) assessed the quality of the library service desk at Hardin Library for the Health Sciences, University of Iowa, USA. In recent years, the evaluation of library services in the essential criterion for library metrics along with other criteria such as total full-time equivalent (FTE) staff, collection size, number of subscription databases, and expenditures developed by the Association of Academic Health Sciences Libraries (AAHSL). Single point-of-service desks are making significant changes in libraries for providing more seamless and higher-quality library services. The two primary tools SERVQUAL and LibQUAL+ have gained popularity in recent years for measuring library services. SERVQUAL (SERVice QUALity) is a free tool comprising 22 questions covering five dimensions: reliability, assurance, empathy, responsiveness, and tangibles whereas cost involved for administering LibQUAL+, also a set of 22 questions working in three dimensions: effect of service, information control, and library as place. So the study used the SERVQUAL tool by maintaining both the print version and an online survey. The online survey link was available on the library's home page on Library's Facebook and Twitter accounts and in that case, Qualtrics was used. The respondents were asked to provide feedback on multiple aspects of library services and demographic

information. A total of 122 responses were found where 62 were faculty/staff and 60 were graduate/postgraduate/fellow/professional students. The interesting fact was that no one responded using the print version. The online survey received positive comments on library services including: "Very quick to respond and responses have been helpful," "You all do a great job," "This is the best service I can imagine already," "Made me feel like my problem was important to staff," and "You always ensure my needs are met." The majority of 79 users strongly agreed on the question "Staff demonstrates a willingness to assist me" for receiving library services from the service desk in-person whereas 91 strongly agreed for evaluating the same question with respect to receiving services via phone, chat, or e-mail. The study finally concluded that the existing service quality in the library is high and it could be used as a benchmark for other libraries. Additionally, it is well noted here that there should be always room for improvement with the obligation to provide the highest level of service in the future (Blevins et al., 2016).

Bhat (2016) investigated a Doctoral study that highlighted the usage of e-resources by students and faculty members in medical college libraries in Jammu and Kashmir, India. Two sets of questionnaires were designed for collecting data from librarians and library users comprising faculty members and students. A total of 448 out of 626 responses were considered for data analysis. Results revealed that 78.12% of respondents used e-resources for retrieving subject-specific information followed by 66.51% for preparing thesis and 50.89% for ongoing research work (Bhat, 2016).

An attempt has been made by Patil & Tadasad (2016) in order to provide an overview of the available health care services information over the Internet. The authors demonstrated that the Internet and Information Technologies have been widely used for the dissemination of health information from health professionals to the general public. The results of the study showed that online health information can be retrieved from various sources like Websites run by health organizations; Homepages owned by individual doctors; Blogs authored by health advocates and online support groups. It is also found that a great variety of online health information databases are available, most notably EMBASE, MEDLINE/PubMed, African Index Medicus, Scopus, Web of Knowledge, portals, gateways, digital archives, and institutional repositories and websites of academic and health organizations. The study finally suggested that in order to improve the current health status of the Vijayapura city, public health practitioners and health professionals may take a lead position in

disseminating online health information to the general public (Patil & Tadasad, 2016).

Web-based resource management system developing Institutional Repository (IR) and Web Portal is currently being practiced in major academic and special libraries in Bangladesh aiming to enhance research competency and popularize web-based research and learning. With this view, M. Rahman and Sagorika (2016) carried out a study in order to explore the current practices of web-based digital resources management systems available in the libraries of Bangladesh and abroad. Directory of Open Access Repositories (OpenDOAR) and Registry of Open Access Repositories (ROAR), individual IR sites, and various e-journals have been consulted for getting the necessary information for this study. Results showed that some leading educational, agricultural, engineering, and medical institutions have already hosted their IR which has created a tremendous opportunity for preserving and disseminating research data. It is found that there are around 3047 registered IR systems throughout the world for sharing knowledge and accelerating research. Besides individual IR, joint repositories are also available like DRIVER (Digital Repository Infrastructure Vision for European Research), SHERPA-LEAP (London E-prints Access Project, a partner in SHERPA - Securing a Hybrid Environment for Research Preservation and Access), NORA (Norwegian Open Research Repository), JAIRO (Japanese Institutional Repositories Online) and Shodhganga@INFLIBNET. It is observed that, in Bangladesh, icddr,b Library has first taken initiatives to develop IR in 2006 followed by BRAC University Library, East West University Library, Independent University, Bangladesh (IUB) Library with GreenStone and DSpace software. Though the web-based education system has been gaining popularity all over Bangladesh, some problems hinder the growth of web-based knowledge management systems covering administrative complexity, inadequate financial support, lack of technical manpower, and inappropriate infrastructural facilities. The authors finally proposed to develop a national repository system for Bangladesh namely National Digital Repository System (NDRS) (Rahman & Sagorika, 2016).

Uddiin et al. (2016) investigated how libraries play a crucial role in higher educational institutions, research organizations, and societies in Bangladesh. The study was an attempt to discover the core values of libraries for boosting research, and academic and social development. The study explored that the library has basic 4 core values covering Accountability, Behavior, Skills, and Excellent Customer Service.

It is observed that libraries in Bangladesh are utilizing ICT for web-based library resources and services aiming to develop library networking and resource sharing, Institutional Repositories of digital local contents, and library automation. The study revealed that economic, education, research, and cultural advances in Bangladesh can be achieved through unhindered access to library resources. Honorable Prime Minister Shaikh Hasina told in the national conference of the Library Association of Bangladesh (LAB) on 17 October 2012 that "Libraries and information professionals play an important role in providing fastest information services to readers in building innovative and knowledge-based society in Bangladesh." The study revealed that most of the libraries in Bangladesh are not getting proper financial support for their overall development. So the Government Government of Bangladesh should come forward for the improvement of the libraries in Bangladesh aiming to achieve a "Digital Bangladesh" (Uddin et al., 2016).

Loan Fayaz & Sheikh (2016) discovered the health and medicine (H&M) open access repositories registered through the Directory of the Open Access Repositories (OpenDOAR) by examining their various facets like operational status, interoperability, updating policy, geographical distribution, language diversity, collection size, content types, and software used for content management. The findings confirmed that 254 Health and Medicine repositories were registered in the OpenDOAR (as of 30 April 2014) out of which the highest sharing came from the USA (15.4 per cent), followed by Japan (7.9 per cent) and the UK (7.5 per cent). The results revealed that 73.6% were created and maintained by higher education institutions and only 15% consisted of Disciplinary. A great majority (63.4%) have less than 5000 items in the collection while only 4.3% have more than 50000 items. In terms of content types, Articles are available in most of the repositories (76%) followed by Books (31.9%) and Theses (49.6%). A total of 67.3% of repositories had the compatibility of Open Archive Initiative/Protocol for Metadata Harvesting (OAI/PMH) and 30 different open source and commercial software were used by health and medicine repositories. It is observed that DSpace was used by the majority of organizations (34.7%) followed by EPrints and Digital Commons with 16.9% and 7.1% respectively. The data revealed that, at the time of the study, 91.7% of repositories were in operational mode. The study finally recommended that national and international organizations like WHO should come forward for strengthening open access health repositories in order to make available health resources freely across the globe (Loan & Sheikh, 2016).

Madhusudhan & Singh (2016) focused on a comparative analysis aiming to examine the current features and facilities of 4 Integrated Library Management Systems (ILMSs) namely Koha, Libsys, NewGenLib, and Virtua. It is found that ILMS are the driving forces behind smooth library operations and management of services. The study depicted that scalability, database type, operating system compatibility, support for bibliographic record formats, and interoperability are the core factors that should be considered while selecting ILMS software. Koha and NewGenLib are the open-source ILMS while Libsys and Virtua fall in the commercial ILMS group. Data revealed that Koha and Virtua scored the highest with 100 percent in terms of evaluating 26 core characteristics of ILMSs such as Transparency, Community involvement, Interoperability, Comprehensiveness, User-friendly, Active development status, Usability, Server and client architecture, Linux and Windows compatible, Toolkit, Application server, Web server, Database server, Backup, web-based modules, customization, etc. It is found that all the ILMSs under study have the core modules: acquisition, cataloging, serials control, circulation, and Web OPAC. In terms of Web 2.0/3.0 Features, RSS feeds are available in Koha, Libsys, and Virtua. Finally, the results indicated that Virtua scored the top with 77.9 percent, followed by Koha with 72.9 percent, and Libsys with 71.4 percent. The authors hoped that in the future the studied ILMSs should be developed by adding more advanced features like searching option, e-mailed search results option, OPAC, links to e-journals and e-books, book locator, RSS feeds, SMS-based support, and reservations, online chatting, modify, expend according to the requirement of the library, Library 2.0, etc. (Madhusudhan & Singh, 2016).

Aronoff (2016) executed a study under the heading “Surveying medical students to gauge library use and plan for a new medical library”. The survey had a 27% response rate, with 157 of 585 students enrolled in the MD program at the University at Buffalo Health Sciences Library, Buffalo, New York, USA. Data indicated that 33% of respondents preferred to study at home while only 16% at the library. Results also reflected that 77% never borrowed a book from the library and 96% never borrowed a DVD. Online library resources were preferred by 83% of respondents. The study finally provided features of a new medical library based on the students’ preferences like plenty of outlets, a high configured printer, strong WiFi connection, study space, proper ventilation, and comfortable furniture (Aronoff, 2016).

2015

A study was conducted by Awwad & Al-Majali (2015) titled "Electronic library services acceptance and use" in order to find out the determinants of use behavior (UB) regarding electronic library services in public Jordanian universities. Data was collected by using a questionnaire from a sample of 575 students. The researchers explored that the factors i.e. performance expectancy (PE), effort expectancy (EE), and social influence (SI) greatly influenced the students' use of electronic library services. The study also mentioned the moderating effects of students' characteristics, including age, gender, and experience, in addition to education level and academic discipline, as new effects. In the present ICT-based era, Electronic information resources are the most powerful tools for the academic community ever invented in human history. The study mentioned that the traditional library systems are converting to ICT – enabled systems in Jordanian university libraries for providing better, more convenient, and less costly services to their students. The study indicated that the students do not have sufficient ICT skills for using electronic resources. Library Directors should provide special guidance services to students while using ICT resources with up-to-date software and hardware facilities. The authors put forward recommendations like Information and Digital Literacy training programs for students, more involvement of faculties to promote awareness among the students to become familiar with electronic library services, designing a promotional campaign directed to all students and faculties for promoting electronic library services for accessing information efficiently and quickly and so on. The UTAUT (Unified Theory of Acceptance and Use of Technology) model in the context of electronic library services within an Arab culture is empirically validated through this study (Awwad & Al-Majali, 2015).

In the present online environment, library websites are gaining continuous popularity among the faculties and students for searching information rather than visiting library premises in person. The library website offers to brand of library images and also acts as an effective channel for disseminating information. However, designing a comprehensive and exclusive library website is an enormous challenge for today's librarians for delivering high-quality information resources and services to a wide spectrum of library clientele groups. Keeping this view in mind, Wijayaratne Anusha & Singh (2015) discovered a study under the title "Developing an academic library website model, a designer's checklist, and an evaluative instrument: A Delphi method approach". The authors developed a model for an academic library website based on two instruments i.e.an an evaluative instrument and a designer's checklist.

Two research questions were developed, the first one was “What are the content elements – in terms of four core dimensions covering resources, services, links, information; and the second one is What are the web design features – in terms of four core dimensions comprising of text and graphic design; consistency, navigation and downloading; accessibility for disabled; maintenance. The study identified various guidelines and standards on technical aspects of building a website such as “Usability Guidelines for Accessible Web Design” (UGAWD), Web Style Guide, and “Web-based intranet and internet information and applications”. The survey used a non-probability sampling technique (Purposive Sampling) for selecting panel members to rank the Delphi tools. The web content and web design panel consisted of 25 librarians from ten countries like the USA, UK, Canada, New Zealand, and Malaysia and requested them to rank the items according to the level of usefulness of the items, using a scale of 1 to 5. Data were formulated based on the views of the panel members through a 3-rounded Delphi study and brainstorming sessions were developed for the conceptual model of the academic library website. At the end of the first round of the Delphi study, a list of Web Content Pillar (60 items) consists of four blocks: “Resources” (WC1) with 12 items, “Services” (WC2) with 18 items, “Links” (WC3) with 10 items and “Information” (WC4) with 20 items. Consistency, Navigation and Downloading; Accessibility for the Disabled; Text and Graphic Design; and Maintenance are the four features included in Web Design Player. The Web Content Pillar covers various items like E-databases such as e-journals, and e-books; Tutorials on library-related topics; Online Public Access Catalogue (OPAC); Interlibrary loans service; Links to faculty; Help guides and instructions for available online and in-house services; Contact information of the library, etc. There are also different items for Web Design Pillar such as Using clear and logical titles for documents; Using text that is free of spelling and grammar mistakes; Formulating and maintaining an appropriate backup schedule; Avoiding using browser-specific terminology; Formulating and maintaining an appropriate revision plan, etc. Finally, the academic librarian must carry out several modifications and customization especially the web content pillar of this conceptual model to provide high-level services to their users (Wijayaratne & Singh, 2015).

Rajanikanta (2015) submitted a doctoral study to the University of Mysore, India aiming to analyze the usage of online journals by faculty members attached to medical institutions in Bangalore city. A close-end questionnaire was distributed to 1340 teachers in the 12 medical institutions, out of which 1070 were responded accounting for a 71.9% response rate. Data revealed that online journals have a

significant impact on teaching and research to a higher extent of 75% to 100% in the surveyed institutions (Rajanikanta, 2015).

Narayanan (2015) highlighted implementing Web-Scale Discovery Services from Indian Libraries' perspective since its wider acceptance by Indian Library Community. It is found that Web-scale Discovery services are getting popularity in most of the libraries across the world. Web-Scale discovery solutions provide a Single Search Box environment in which users can find all the relevant information on his/her desired topic. Two important components must be included in Discovery System i.e. contents or resources and technologies. Library ILS records, digital collections, institutional repository content, and content from locally developed and hosted databases are treated as resources of the discovery system. The study explored factors such as Coverage in Central Index, Quality of Metadata, Relevancy Ranking algorithm, Integration possibilities of ILS, Institutional Repository and other local databases, Integration possibilities of Subject Indexes, Advanced features in Discovery Layer, Enhancement options and features, Local technical support should be considered while adapting discovery services. Finally, the study concluded the several steps of the Discovery System covering preparing a resource sheet which includes all the subscribed resources of a library, content analysis, deciding upon the free and open-source resources to be included, procedures for catalog integration, Procedures for IR Integration, enhance the service by integrating with other services such as Lib-guides, Learning Management systems, etc., Customizations, branding, etc., set up the authentication process, test usability and Promotions activities (Narayanan, 2015).

Ajuwon (2015) investigated a study entitled "Internet accessibility and use of online health information resources by doctors in training healthcare institutions in Nigeria". The study depicted that 21st-century physicians are heavily dependent on the Internet for retrieving online health information resources. It was a descriptive study in which a questionnaire method was used from a sample of 901 out of 1280 resident doctors in 13 training health care institutions in South-West Nigeria consisting in a 70.39 response rate. The majority of the respondents 17.5% and 14.2% were from the Department of Medicine and Family Medicine respectively. Results showed that a total of 511(36.3%) respondents accessed the Internet through private subscriptions from home or working place whereas only 1.5% from the library. Data also confirmed that doctors mainly used the Internet for seminar presentations (98.8%), examination (94.5%), and research (93.1%) purposes. Doctors were also

facing some constraints in accessing health information resources through Internet, such as slow connection speed, frequent power outages, login problems, low bandwidth, slow information download, and so on (Ajuwon, 2015).

At present, health professionals are facing huge challenges to keep track of the seemingly exponential growth of scientific literature. Medical libraries are now providing mobile access to scientific literature through e-journals, e-books, and online databases. With this view, Capdarest–Arest & Glassman (2015) focused on several e-journal apps accessible through tablets and smartphones including BrowZine, Docphin, Read by QxMD, and ReadCube, as well as citation managers and publisher-specific apps. The study revealed that an enormous and seemingly overwhelming flood of scientific literature posed huge challenges for clinicians. Data disclosed that e-journal reader applications designed for smartphones and tablets are getting popularity among the doctors in USA and Canada. Similarly, mobile citation managers such as EndNote, Mendely, Zotero, and Papers useful apps for managing citations. Some leading publishers are now providing mobile access to their e-resources by specially designed apps: SpringerLink, OvidToday, and ScienceDirect (Capdarest–Arest & Glassman, 2015).

Islam, Agarwal & Ikeda (2015) highlighted the adoption of knowledge management (KM) for introducing innovative services for academic libraries. It is observed that the expendable cost of e-resources, declining usage, transition into digital services,, and increased demands for new services are some of the challenges facing academic libraries now. In this digital environment, medical libraries should redefine their role, leverage their strengths, and innovate to create responsive and convenient services. An open-ended questionnaire was designed for collecting data from 17 academic librarians in ten countries. The study confirmed that technological innovations such as E-books, digital libraries, online research assistance, RFID, mobile apps/Websites, presence on social media, e.g. Facebook, Twitter, and workshops on using online resources are extremely useful for implementing KM in academic libraries. The study finally proposed a theoretical framework of KM for Service Innovation in Libraries (KMSIL) (Islam et al., 2015).

Kalita (2015) discussed the importance of medical library consortia in India. The author found that budget insufficiency, demanding a variety of information needs, and better and effective utilization of resources were the major reasons for setting up a consortium. The study explored 9 Consortium for Health Sciences Libraries:

HELINET, National Digital Medical Library Consortium, medIND, NTRMEDNET, MUHS Digital Library Consortia, HINARI, UGC INFONET Digital Library Consortium, DELNET, and ICMR e-Consortia (Kalita, 2015).

Hossain & Mostofa (2015) conducted a study aiming to explore the present status of four private medical libraries in Dhaka city in Bangladesh. The study identified that financial constraints, lack of library infrastructure, adequate trained manpower, and managerial skills among the existing manpower were the major problems facing the private health libraries in Bangladesh. The study finally proposed an organizational visionary model for health sciences libraries focusing on Strategic Planning, Change management, LIS management, ICT infrastructure management, HR management, and IR management (Hossain & Mostofa, 2015).

Chamberlain, Elcock, & Puligari (2015) investigated a study aiming to gauge the present status of mobile technology (MT) in NHS health libraries in the United Kingdom. An online questionnaire survey link was emailed to NHS academic online discussion lists spanning February to March 2013 and received 199 responses in total. Results showed that only 18% of respondents performed research activities through the use of mobile technology (MT). Health libraries in the UK facing some challenges like network restrictions, budget cuts, and IT expertise (Chamberlain et al., 2015).

Arshad & Ameen (2015) evaluated the usage pattern of the Punjab University Library Website aiming to find out its topmost used resources and services. The study was based on Transactional Log Analysis (TLA) – an unobtrusive research method for analyzing data on website-using patterns. Results revealed that the university library website was heavily used by both on-and off-campus users. Open access journals, e-books, and e-journals were among the topmost used resources and services. It is interesting to note that open access journals were used more compared to HEC subscribed databases (Arshad & Ameen, 2015).

Hirabhai (2015) discussed the various types of e-resources and cost-effective online library services rendered by medical college libraries in Gujarat state, India. It is found that E-Databases, E-Journals, E-Magazines, E-Books, E-Learning, World Wide Web, and E-newspapers are the prominent resources for medical libraries. The medical libraries are moving towards automation and modern information services. Medical libraries can offer advanced effective and efficient services with the help of

ICT. The medical libraries offer various cost-effective services like Internet service, creation of databases of books and journals, online access to online databases, and so on (Hirabhai, 2015). The e-Resource used by faculty, researchers, and students in the medical college library has been discussed well and concluded that medical college users are more interested in useful e-Resources. The author further stated and concluded that most medical college libraries are purchasing e-Resources for their users. There are many e-Resources available even over the internet like e-journals, e-books, databases, blogs; portals, etc. but resources mostly used are e-Journals and e-books (Hirabhai, 2015).

The information needs and information-seeking behavior of Faculty Members in Government Medical Colleges of Karnataka constituted the doctoral thesis of K. Shaiksha Vali (2015) titled *"A Study on Information Needs and Information Seeking Behaviour of Faculty Members in Government Medical Colleges of Karnataka"*. The main aim of the study was to examine the collection and infrastructure status of medical college libraries in Karnataka. A structured questionnaire was designed to collect data from 855 respondents drawn from 10 Government Medical Colleges. Data revealed that automation facility was not available in the majority (90%) of the studied libraries (Vali, 2015).

2014

The current status of automation in libraries of selected management institutes at Aligarh was carried out by Anas, Iqbal and Ahmad in 2014. The survey used a fashioned questionnaire and informal interviews for collecting the data followed by a stratified sampling method and administered the questionnaire in line with a random method. The paper emphasized the proprietary library management software packages available in India such as Alice for Windows, NETLIB, TechLib, LIBSYS and VIRTUA. The study was mainly conducted for discovering the functions and services to be automated by surveyed libraries and the impediments to be confronted by the automation process. The findings of the study revealed that all the surveyed institutes began their automation process on or after 2003 and 75 per cent of studied libraries are partially automated. The paper emphasizes that automation has a great impact on introducing modern library services. Alice for Windows, NETLIB, TechLib7, and TechLib are widely used purchased software for library automation. The study also summarized that 75 per cent have a fully automated acquisition section, only 50 per cent have a fully automated technical and circulation section and 75 percent of users are satisfied with the overall functions of library activities. The

study explored the major impediments to successful library automation processes such as shortage of general library staff and skilled staff dealing with library automation and poor Internet connectivity. In this dynamic era of vast informational needs, libraries and information systems should be strengthened through an automation process (Ahmad et al., 2014).

Yi (2014) tried to find out the association between public library users' health information literacy capability and their self-perceived health information behavior. In the present constantly changing health care environment, people are heavily dependent on consumer health information. Public libraries in the USA are well-positioned to reach out to common people for disseminating health information to taking effective health care decisions. The study employed a mixed methodology research approach to triangulate the findings. A total of 200 surveys were distributed in Florida public libraries between March 2011 and May 2011, and 131 responses were received; thus, the response rate was 65.5%. Aside from this, the Short Test of Functional Health Literacy Ability (S-TOFHLA) was used for measuring the proficiency levels for health literacy. It is found that most of the respondents (98.5%) had enough proficiency level in health literacy, and there was a significant relationship between health literacy and some demographic characteristics such as gender and educational level and there was no significant association between health literacy ability and race. Results also showed that 38.2% of users relied heavily on libraries for getting health information and a good portion of the respondents assessed their health information behavior as high (Yi, 2014).

Networking of medical libraries in Andhra Pradesh, India has been proposed by Srinivasulu & Reddy in 2014 in order to motivate medical college libraries of NTR University of Health Sciences for sharing information resources and support services that have become quintessential. The paper discussed the medical library networking in response to functions, objectives, reasons for networking, benefits, drawbacks, services, future prospects, and implementation phases of completeness of the proposed networking model. The paper discussed the ways that medical college libraries can share resources in the networked information environment, as well as proposed a network design called "APMEDLIBNET". In today's online environment, medical libraries aren't capable to meet the diversified information needs of their users since no library can single-handedly obtain all the information that is needed or requested. The objectives of the proposed model are enumerated as pool and sharing information resources, developing a rich collection of medical information resources,

upgrading the quality of information services, establishing a referral center for maintaining a central online union catalogue, develop of Institutional Repositories, and so on. Suitable library software for medical college libraries, pre-requisites for medical library network, Network architecture of APMEDLIBNET, and Hardware and Software requirements for servers at the nodal centre are also outlined briefly. The proposed network became a necessity in Andhra Pradesh due to medical information explosion and budgetary limitations (Srinivasulu & Reddy, 2014).

In a study examined by Henderson in 2014 under the heading "New roles and new horizons for health sciences librarians and libraries" in which the author stressed the new skills and competencies of health science librarians for anticipating the needs of their patrons and proactively engaging with new roles that will help achieve the mission of their organization. The role of health science librarians moved from information gatekeepers to clinical medical librarians. The author identified the various new roles of health science librarians such as clinical informationist, liaison librarian, informationist, bioinformationist, embedded librarian, public health informationist, and disaster information specialist. Conducting systematic reviews, teaching citation management and sharing, helping with publishing issues, finding and teaching emerging technologies (which includes user experience librarian); and involvement with continuing medical education, grants development, teaching health information literacy throughout the curriculum in the schools of medicine and data management are enumerated as new activities of health science libraries and librarians. Since the advancement in technology, education, models, and health sciences research, health science library managers must find extra training for professional development for supporting research activities in their organization (Henderson, 2014).

Sohail & Alvi (2014) in the research article "Use of web resources by medical science students of Aligarh Muslim University" examined the frequency, purpose, place, techniques, and barriers of web resources used by medical students of Jawaharlal Nehru Medical College (JNMC), a constituent college of the Aligarh Muslim University, Faculty of Medicine. It was a descriptive study in which a well-structured questionnaire method was applied to gather data from 92 out of 120 (76.66 per cent response rate) undergraduates and post-graduate medical students using the Random sampling method. The results indicated that the highest percentage 36 (39.13 %) of students stated that web resources are greatly improving their knowledge and 32.60 % of respondents are accessing web resources occasionally

followed by 30.43% using daily and weekly each. Half of the respondents 50% used web resources from Cyber Cafe whereas 28.26% from other places. The majority of the students 76.46% relied on web resources to a great extent and 63.04% of students were taking assistance from friends in regard to using web resources whereas only 4.34% from 'Library Orientation'. Google and Yahoo were the most preferred search engines to 57.61% and 23.91% of students respectively. It is also found that encyclopedias and dictionaries were the most popular e-reference sources used by the students i.e. 46.55% and MedLine and ScienceDirect were the most consulted online databases to medical students. The study finally stated that almost all the respondents were fully aware of web resources and these are playing a prominent role in their academic activities (Sohail & Alvi, 2014).

An attempt has been made by Bhat & Mudhol (2014) to determine the present status of knowledge and use of digital resources available in Govt. medical college Jammu, Jammu And Kashmir, India. The main objectives of the study were to explore the purpose and utilization of the digital resources and services; trace out the impediments encountered by the medical students in accessing digital resources and finally suggest some important recommendations for overcoming the challenges of using digital resources. A well-structured questionnaire was administered to 200 medical students (pursuing MBBS, MD/MS, and P.G. diploma courses) at Govt. Medical College Jammu J. &. K. India to collect the primary data. A total number of 160 filled-in questionnaires were received from the respondents showing an overall response rate of 80%. The study depicted that, the majority of the medical students (55.63%) are aware of the usage of digital resources, and about 23.75% of the respondents use the computer daily for accessing e-resources. The findings also showed that 86.87 percent of the medical students utilized the digital resources for communication purposes followed by 71.25 percent to collect subject information and 45% of the users learned to use digital resources through self-study. It is also found that search engines got the first rank by the students for searching necessary information over the Internet and 'lack of training' and 'lack of time' were the main impediments accessing to digital resources. The study finally concluded that digital resources have impacted positively on the academic performances of the medical students, but recommended the need for them to implement information literacy programs in regard to digital resources, add more computer terminals and finally provide more financial support for strengthening digital resources in libraries (Bhat & Mudhol, 2014).

Corbet, Deardorff, & Kovar-Gough (2014) examined current data management roles for health librarians who are involved in the Electronic Medical Record (EMR) in the Canadian context. EMR is used by physicians in a local health care centre for accessing patients' information online. An overwhelming 89% of physicians in the United Kingdom use EMRs as opposed to only 23% in Canada. Eventually, EMRs play a vital role in evidence-based clinical research and local health care. A "state-of-the-art" review has been conducted focusing on the participation of health librarians in Canada. The leading databases like LISTA (Library, Information Science & Technology Abstracts), LISA (Library and Information Science Abstracts), MEDLINE, CINAHL (Cumulative Index to Nursing & Allied Health), Embase, and various sources of web-based grey literature have been searched for relevant literature. The literature search indicated that health librarians have taken few initiatives on EMRs due to EMRs having only grown in popularity in recent years in Canada. Canadian health librarians may follow the various initiatives on EMRs taken by health librarians in the USA. In the USA, most of the hospitals and health care centers relied heavily on the database expertise of the health librarians for implementing EMR systems. The study finally recommended that health librarians should develop their core competencies on EMRs for data management. Several online educational programs like the New England Collaborative Data Management Curriculum, MANTRA's Data Management Training Course, and Librarian Tool Kit are required for increasing the data management expertise of health librarians (Corbett et al., 2014).

In today's increasingly digital world, developing a mobile collection development policy has the utmost importance in academic libraries, especially for medical libraries. Keeping this in mind, DeRos & Jewell (2014) outlined several steps and criteria that are entangled in the process of establishing a collection development policy of mobile apps with a focus on Memorial Sloan Kettering Cancer Center Library, New York, USA. The various criteria like subject relevance, cost, access, legal issues, quality of content, the reputation of the producer/publisher, and copyright and fair use issues must be taken into account while evaluating mobile apps. Librarians and information professionals should have sound knowledge of operating systems and mobile devices offering guidance on mobile resources to their clientele. The Android, Blackberry, and iOS platforms are the most widely used mobile operating systems at Memorial Sloan Kettering. The mobile team consists of four members who are responsible for taking the final decision at Memorial Sloan Kettering for selecting the mobile apps which are available on the library website

using LibGuide (http://libguides.mskcc.org/mobile). The recommended mobile apps should be pertinent to the community's practice or research. Users' needs, requests, research, and scholarly universe are important factors in selecting mobile apps. As mobile experts, librarians have a firm grasp on what users need and expect that will shape the mobile resources collection recommended. The study also found that mobile apps and resources should be of high standards of quality in content, format, and merit. The publisher's reputation is another important indicator for selecting mobile apps. Popular App Stores like iTunes http://www.apple.com/itunes/charts/free-apps/ and Google Play https://play.google.com/store may be useful in uncovering the true producers of a mobile app. Both fee and no-fee mobile apps and resources should be selected based on users' demands. Functionality, licensing, copyright, fair use, and seamless access are other key components to effective mobile collection development. The mobile apps evaluation sites like iMedicalApps http://www.imedicalapps.com, MobiHealthNews http://mobihealthnews.com, Fierce Mobile Healthcare http://www.fiercemobilehealthcare.com, Happtique http://www.happtique.com, Google Play has a section for Medical apps https://play.google.com/store/apps/category/MEDICAL, Apple's Medical section https://itunes.apple.com/us/genre/ios-medical/id6020?mt=8, BlackBerry's Medical Guides http://appworld.blackberry.com/webstore/category/78/?lang=en&countrycode=US, Windows Phone app store http://www.windowsphone.com/en-us/store/top-free-apps/health-fitness/healthandfitness, Amazon Appstore's Health & Fitness apps section http://www.amazon.com/b/ref=sr_aj?node=2478845011&ajr=0 may help librarians to curate mobile apps (DeRosa & Jewell, 2014).

Wales (2014) explored health trends in the UK – Scotland, and Wales aiming to translate knowledge into action to improve the quality of health care. It is found that knowledge support in Scotland is facing various challenges like health quality improvement, public services integration, and digital innovation. To overcome these challenges, the study recommended that dynamic and networked health management services exploiting technology and evidence-based support should be introduced for transforming knowledge into frontline action. Cardiff University in Wales is well-positioned in health trends and plays a leading role in creating a network with other health libraries. All hospital-based NHS Wales libraries are now using Web 2.0 for delivering health care inquiry services. The medical libraries in Wales are now planning to introduce modern technologies for advanced library services like Web

2.0, joint procurement and sharing of resources, and harvesting data on library activities (Wales et al., 2014).

Joshi et al. (2014) reported on huge challenges facing health science libraries in India, Pakistan, and Sri Lanka. It is found that, though health care industries are growing rapidly Indian medical libraries are facing difficulties in terms of budget constraints and adaptation of new technologies. A few modern and technologically advanced libraries are well-positioned compared to the majority. Medical libraries in India were compelled to adopt state-of-the-art technologies for providing specialized services. Three government and university consortia are formed for accessing e-resources in India, namely Electronic Resources in Medicine (ERMED), ELINET (the Rajiv Gandhi University of HealthSciences); and NTR MEDINET (NTR University), and more than 11 major IRs are registered with OPEN DOAR in medicine field. MedInd (a national-level repository) and IndMed have been developed by the National Informatics Centre (NIC) of the Government of India for indexing Indian medical journals. the escalating cost of journals, adequate staff, and lack of resources were the major challenges facing Indian Medical Libraries. Medical libraries in Pakistan were facing financial constraints. HINARI program is not accessible from Pakistan, so medical libraries are heavily dependent on the digital library programme (www.digitallibrary.edu.pk) and Pakmedinet (www.pakmedinet.com) for accessing e-resources. HeLLIS was the most popular network for medical libraries in Sri Lanka. Research outputs in medical sciences have developed a concrete shape due to the availability of HINARI since 20210. WHO and the Ministry of Health are actively engaged in providing guidance and support to Sri Lankan Health Science Librarians (Joshi et al., 2014).

Lindsay & Earl (2014) investigated mobile device usage by health professionals at Preston Medical Library under the University of Tennessee (UT) Graduate School of Medicine and the UT Medical Center, USA. The study confirmed that the rapid adoption of mobile devices has compelled the library to develop new mobile apps for users. Data showed that about 56% of US adults owned smart phones in which 31% of them searched for health or medical information online. It is observed that more than 75 medical apps have been approved by the Food and Drug Administration (FDA). Preston Medical Library subscribed to the most popular databases that are fully or partly accessed through smart phones, most notably UpToDate, Access Medicine, CINAHL, The Cochrane Library, Embase, a variety of OVID collections, Procedures Consult, and STAT!Ref. The survey revealed the most popular medical apps for

health professionals: ePocrates, MedScape, UpToDate, Skyscape, Dynamed, Pocketmade, MedCalc, WebMD, iTriage, PediStat, Speed Anatomy, Nursing Central, Micromedex, and Visual DX (Lindsay & Earl, 2014).

Marshall et al. carried out a study aiming to gauge library and information service impact on patient care quality. The study was based on a large-scale critical survey of physicians at 56 library sites serving 118 hospitals in the USA and Canada in which respondents provided their feedback on library e-resources usage for solving a special clinical case. A total of 4520 respondents participated in the survey and 75% of physicians handled patient care differently using information obtained through the library. Data depicted that taking assistance from library staff; performing a search in a physical library; searching the library's website, and searching library resources on an institutional intranet are the major methods for information access by the respondents (Marshall et al., 2014).

Devi (2014) in his Ph.D. thesis entitled "*Library services in medical and paramedical colleges in Assam: analytical study*" reviewed the existing resources, services, and facilities in the government as well as private medical and paramedical college libraries in Assam, India. A total of 750 user questionnaires were distributed and at last 537(71.6%) samples were considered for data analysis. It is interesting to note that only three Government (21.42%) and one private medical libraries were automated during the period of the study. It is also found that Medical and Paramedical college libraries were facing many hindrances in terms of library facilities and services (Devi, 2014).

Stokes, Light, & Haines (2014) highlighted library support of health mobile app usage during clinical clerkships. The study revealed that smart phones usage has become widespread in medicine, and clerkship students are heavily dependent on mobile medical apps to meet clinical information needs. The University of Vermont's Dana Medical Library is proactively engaged in providing mobile resource support services to medical students preparing for clerkships. A well-structured questionnaire was sent to 111 respondents and 31 completed the survey for a completion rate of 28%. An online subject guide is available through the library website providing detailed directions for searching and installing library-licensed mobile resources. The study also reported the barriers to mobile use during clerkship such as "Not the right kind of information/apps"; "Not enough time" "No wireless/connectivity" and "Climate/culture of the hospital did not support use". Epocrates, Medscape,

UpToDate, DynaMed, Micromedex, clinical calculators, immunization schedules, First Consult, and USMLE World were used most frequently among mobile resources apps cited by the respondents (Stokes et al., 2014).

Islam & Hossain (2014) focused on marketing initiatives taken by university libraries of Bangladesh in order to promote library resources and services through library websites. A checklist of criteria has been developed and a total of 57 public and private university library websites have been examined for collecting necessary for this study. Data showed that 38.5% of universities didn't have any library website. It is found that library programmes, upcoming events, and current updates were available to only 22.8% of studied university library websites. It is also found that 40.4% of libraries provided the link to new collections on their web pages. The surveyed libraries also provided web-based library services such as online application forms, online document delivery, reserve library materials, and online user education. The links to e-books and e-journals were available to 38.6% and 52.6% of library websites accordingly. The study finally concluded that in this modern age of ICT, university libraries in Bangladesh must design a rich library website for marketing information resources and services (Jaber Hossain & Anwarul Islam, 2014).

Wu et al. conducted a survey implemented at seven health sciences libraries in the USA with a special focus on the University of Southern California (USC) Health Sciences Libraries (HSL) for searching answers on three facets: ownership of devices, awareness of new technologies, and interaction of technologies with the library setting. Data were collected from 1,513 respondents (students, faculty, and staff) out of 6,270 potential respondents of 7 organizations. Results showed that 56% percent of respondents used PC laptops, 46% Mac laptops, 74% smartphones, 34% tablet devices, and 15% e-book readers. It is found that 33% of respondents didn't use e-books and preferred print books while 20% intended to use e-books in the future. Respondents have a strong willingness to check basic library information and use the library's electronic resources through their smartphones and tablets (Wu et al., 2014).

Boruff & Storie (2014) demonstrated a survey on smartphones and other mobile devices usage to answer clinical questions and find medical information by students, residents, and faculty in 4 Canadian universities. Data were collected through a web-based survey from 1210 respondents aiming to investigate the types of online

resources sought, obstacles to access, needed library support, awareness of institutionally licensed resources, and most frequently used mobile apps. data revealed the most frequently used mobile apps were: PubMed (6.9%), Lexicomp (10.3%), UpToDate (18.9%), Epocrates and Medscape/ eMedicine (tied at 11.5%), DynaMed, (5.7%), PEPID (5.3%), a medical calculator (5.0%), Micromedex (1.8%), or the general web or Internet (1.6%). The study reported some key barriers to accessing mobile resources such as lack of information literacy training, limited skills for using e-resources, installation problems of software, and limited time (Boruff & Storie, 2014).

2013

Nemati Anaraki, L., & Babalhavaeji, F. (2013) investigated the awareness and ability of medical students in using electronic resources of the integrated digital library portal of Iran using a structured questionnaire circulated among 300 medical students sampled from three major Iranian universities. A stratified random sampling method was followed. The findings revealed that the students of the three surveyed universities are not well concerned with using the electronic resources of the Integrated Digital Library (IDL) portal of Iran. Among the investigated universities, students of Tehran University of Medical Science (TUMS) used the EndNote, Elsevier, Thomson, Scopus, and Proquest databases most. All the students expressed the effect of the IDL on their academic activities as much as 72 percent at Tehran University of Medical Science (TUMS), 64 percent at Iran University of Medical Science (IUMS), and 66 percent at Shahid Beheshti Medical University (SBMU). The paper recommended that there is an urgent need to arrange information literacy training programs in accessing, searching, and downloading e-resources effectively at regular intervals; to install high-speed computer terminals in the various departments and departmental libraries; to develop library websites for accessing and searching online resources and more e-journals should be subscribed for researchers for effective use of the Integrated Digital Library (IDL) portal of Iran (Nemati Anaraki & Babalhavaeji, 2013).

Satpathy & Satapathy (2013) highlighted the role of medical college libraries as a hybrid library (both print and electronic) in the 21st century in their study entitled “Users’ Perception on Medical College Libraries’ Systems and Services of Odisha”. It was a descriptive study in which a questionnaire method was applied to gather data from 310 out of 450 (68.89 per cent response rate) undergraduates and post-graduate medical students using Random sampling of three medical colleges in

Odisha. In the studied libraries, the use of ICT and library automation system is yet to take off in full swing. The user behavior is constantly changing due to the transition of libraries from print to electronic. As a result, medical libraries should give special attention to implementing modern library systems and services for updated clinical decisions for health professionals. Most of the surveyed libraries in the study are performing their library activities in a traditional method. The results revealed that the total number of books in these libraries is up to 20,000, journal subscription ranges from 50 to 100 titles and bound journal volumes were up to 10,000. The print media is still dominating the reading sources in the libraries. So the overall performance in terms of library e-resources and ICT-based services is poor and not satisfactory. However, the situation is changing and the medical college libraries should subscribe to online medical databases, e-journals, and e-books, develop a strong communication network with Wi-Fi facilities to provide access to e-resources, implement their own Library Website, Web OPAC, and Web 2.0 capability for active participation of users in promoting effective library services (Satpathy & Satapathy, 2013).

Black, Harris, Mahraj, Schnitzer, & Rosenzweig (2013) highlighted the growing importance of collaboration between the University of Michigan Taubman Health Sciences Library and the University of Michigan Medical School Office of Research for creating a proactive approach for the partnership to facilitate research grants. In recent years, the core aim of the health sciences library is to support faculties/researchers in the preparation of competitive grant applications. To facilitate this process, the two libraries are offering two-hour, face-to-face, hands-on workshops on the usage of EndNote and Graphics (proper placement of charts, graphics and images) in grant proposal applications and a Guide to scientific writing and publishing. In recent times, medical libraries played a vital role in meeting the new demands and requirements to carry out best clinical practices and research and more importantly, to get needed funding. The authors expressed the opinion that the library may reach a strong position as a key collaborator in the medical and research arena in providing the researcher's best support in the various stages of grant applications. The University of Michigan Taubman Health Sciences Library and the University of Michigan Medical School Office of Research have also developed various web-based and podcast resources for the researchers and made these available to their respective library/institution Websites and YouTube (Black et al., 2013).

Kumar, A. (2013) submitted his doctoral study at Kurukshetra University, India on "*Changing Use Pattern from Print to E-Journals in Health Science Libraries in Haryana, Chandigarh and Delhi: an analytical study*" aiming to know the attitude of the medical professionals towards printed and e-journals in the health science libraries. Two sets of questionnaires were designed to collect data using the random sampling method. A total of 954 questionnaires out of 1375 were found properly filled and suitable for the study. Results indicated that about 74.2% of users preferred using e-resources; however, 25.79% showed concentration toward print books and journals (Kumar, 2013).

An elementary model plan of library networking and resource sharing was proposed by Jahan, Mannan & Kabir (2013) that was suitable for the special libraries in Bangladesh. The study focused on the current scenario of infrastructural facilities, manpower, finance, and other resources required for resource sharing and networking in the selected 5 special libraries in Dhaka City. The special libraries in Bangladesh are facing various challenges like modern technological facilities, lack of qualified staff, acute shortage of funds, inadequate information resources, and a lack of willingness of the authorities. Therefore, resource sharing is treated as a burning issue for the special libraries in which modern and dynamic technologies should be adapted. The survey used two sets of structured questionnaires, one for the library heads of 5 libraries and another for the library users comprising researchers (15), faculties (25), and students (60). The study revealed that BIDS (Bangladesh Institute of Development Studies) library had the maximum library collections in terms of books, journals, and theses (60%) followed by icddr,b library with 20%. A majority of libraries i.e. 80% felt that their library collections are almost adequate and 60% of libraries had almost adequate manpower. Finally, the authors proposed a model for resource sharing named "BANGLADESH SPECIAL LIBRARY NETWORK (BDSLIBNET)". The core objective of BDSLIBNET should be to provide access to all types of information resources for all the users among the member libraries. The model was configured based on the "Directed Network" in which BIDS Library will be the Focal Point. The study recommended that though the implementation of BDSLIBNET is an ambitious and challenging task, proper planning, standard ICT infrastructure, adequate financial support, appropriate library standards, information policy and strong willingness may concrete the future shape of the proposed model (Jahan et al., 2013).

Ullah and Anwar (2013) explored the competencies of medical librarians in Pakistan using the survey method through a structured questionnaire, listing 84 competency statements, applying a 5-point Likert scale, that was distributed among the head librarians and chairpersons of library committees (CLC) in 115 medical libraries. This study deals with the various aspects of professional competencies and skills such as, knowledge of print and electronic reference resources in health sciences; ability to use medical bibliographic databases; knowledge and application of biomedical informatics; knowledge of Integrated Library Automation Systems and so on. It was concluded that medical librarians will have to use medical databases, biomedical informatics, knowledge and application of NLM classification scheme and MeSH, expertise in evidence-based medicine, etc. for providing advanced library services to user communities (Ullah & Anwar, 2013).

de Bem & Coelho expressed that Knowledge Management (KM) should be practiced in libraries like other business organizations for generating new knowledge and developing of new procedures and practices of KM that can decrease library expenditure, increase revenue and staff efficiency, improve the library activities and services and library performance and guarantee a leading position in the knowledge market. The study explored the six basic steps of the conceptual framework for the KM process i.e. Discovery of existing knowledge, Acquisition of knowledge, creation of new knowledge, Storage and organization of knowledge, Sharing of knowledge, and Use and application of knowledge. The study also discovered various KM tools and practices applicable in libraries, such as Communities in practice, Mentoring, Web 2.0 tools, Network Analysis, Collective Cataloging, Information Management / Services, Systems and Information Technology, Mapping of Knowledge, Knowledge plan, etc. (de Bem & Coelho, 2013).

Kritz et al, (2013) in their research article “Utilization and perceived problems of online medical resources and search tools among different groups of European physicians” examined the online resources and tools used by physicians and identified potential barriers preventing the successful retrieval of health information over the Internet. A web-based online questionnaire (multiple response/dichotomous questions and 5-point Likert scale rating) link was sent to 15000 European physicians and 500 completed responses were found suitable for analysis. Data revealed that medical research databases (59%, 277/469), general search engines (78%, 372/476), Wikipedia (40%, 184/461), or medical society websites (38%, 176/467) were used by most of the physicians for obtaining medical information

online. General health websites and online physician network communities are regularly consulted by doctors for searching health information. The study finally identified prominent barriers to retrieving online medical information such as Inaccessibility to relevant information, lack of time, and questionable trustworthiness (Kritz et al., 2013).

An attempt has been taken by Thakur (2013) to carry out a doctoral study under Pt. Ravishankar Shukla University, India aims to examine the information need and information-seeking behavior of medical scientists in Chhattisgarh. A total of 305 questionnaires out of 500 were selected for analysis of data. Findings indicated that for selecting the most preferred sources of information, 80.32% of the respondents marked Textbooks/Handbooks as 1st preference, followed by the Internet as 2nd preference with 73.77% (Thakur, 2013).

Siddike, Munshi & Mahamud (2013) stressed the marketing of web-based academic library services in Bangladesh with the help of the website. A total of 16 university library websites were scrutinized based on seven core criteria i.e. visibility, networking, information, consultation services, online services, and online resources. Data revealed that fifteen (93.75%) libraries have direct links from the institutions' home page to the library. The results also confirmed that 87.5% had a link to electronic journals, 68.75% of library websites had a link to OPAC, 50% had links to e-books, and 43.75% had multimedia resources available on their home pages. The authors finally suggested that university libraries in Bangladesh should develop robust user-centered Web-based interfaces (Siddike et al., 2013).

Cooper & Crum (2013) identified and documented a comprehensive list of new changing roles and competencies of health science librarians during the period from 1990–2012. The study is based on a systematic review for exploring related literature using MEDLINE, Library and Information Abstracts, Library Literature, Scopus, and Web of Science. A total of 50 articles finally had been selected for this study. Data revealed new activities through literature from 1990-2012 of medical librarians covering Embedded (Liaison, Informationist, Clinical informationist, Bioinformationist, Public health informationist, Disaster information specialist), Systematic reviews, Emerging technologies (emerging technology librarian, user experience librarian), Continuing medical education, Grants development and Data management (research data librarian, data services librarian). The study also identified new roles of health librarians by job announcements, 2008–2012 such as

Metadata Librarian, Digital content librarian, Scholarly communication librarian, and Translational research librarian (Cooper & Crum, 2013).

Sollenberger & Holloway (2013) highlighted the evolving role and value of libraries and librarians in health care with a focus on Edward G. Miner Library, University of Rochester, Rochester, New York. It is found that clinicians in the USA are highly dependent on technology in order to incorporate evidence into practice for improving quality and patient outcomes. The study identified major roles of health librarians i.e. managing electronic information resources; selecting and subscribing to important library resources; negotiating prices; maintaining a relationship with vendors; ensuring remote access through proxy servers; organizing the information on digital portals; building interfaces to facilitate searching; and collecting and analyzing usage data to validate responsible use of institutional resources (Sollenberger & Holloway, 2013).

2012

Kinengyere, Kiyingi & Baziraake (2012) assessed the usage of three universities in Uganda that are offering medical education under the title "Factors affecting utilization of electronic health information resources in universities in Uganda". The study highlighted that e-resources specially e-journals are fundamental components in medical education for supporting learning, teaching, and research activities as well as assisting evidence-based practice for effective patient care. E-journals are also treated as a significant component in library collections worldwide. In order to meet the ever-increasing demands of library users, e-resources are increasing rapidly in the area of health sciences. The core e-resources available in the surveyed libraries include Hinari, Ovid, Popline, MD Consult, WHO Library, Up-To-Date, Medline, Cochrane, Wiley InterScience, and EBSCO. The main objective of the study was to explore the factors affecting the utilization of health e-resources in medical universities in Uganda. A total of 111 responses were received in the survey out of the target population of 111 respondents and informants, representing a 100% response rate and a total of 133 thesis/dissertations were reviewed. The study found that the usage of e-resources in Uganda medical institutions is still low since only 54 out of 133 documents cited e-resources. A limited number of computers in the library, lack of e-resources awareness, poor searching skills, and even slow Internet speed are the main constraints for accessing e-resources. The results found that 87.5% of the total respondents used e-resources, 94.2% who received e-resource training used e-resources compared to 81.7% who had not received that training. So there was a

statistically significant relationship ($p<0.045$) between e-resource usage and training. The study also depicted that Hinari was the most popular, much used, and comprehensive medical database (Kinengyere et al., 2012).

Dhanavandan, Esmail & Nagarajan (2012) examined the scenario of access and awareness of ICT resources and services in medical college libraries in Puducherry which aimed to assess the e-resource types, information needs, library access and awareness of the faculty members in medical college libraries. It was a descriptive study in which a questionnaire method was applied to gather data from 150 out of 200 (75 per cent response rate) faculty members from the Medical Libraries in the Union Territory of Puducherry. It was found from the study that 52(34.67%) respondents out of 150 respondents stated that the collection of the library is excellent. The results also depicted that the majority (40.66%) of the respondents visited the library for the purpose of collecting material for their subject and it is followed by collecting current and general information and 131 (87.33%) responded used e-resources for the purpose of research/study. A small number of respondents (30%) preferred library textbooks followed reference books and journals for collecting information. The majority of 110 (73.33%) respondents stated that information overload is the main barrier to accessing electronic resources followed by other hindrances like limited number of PCs, time consumption, and lack of IT knowledge to use e-resources (Dhanavandan et al., 2012).

Bhatt (2012) carried out a study under the title "An Analytical Study of the Medical College Libraries of Gujarat in the Age of Information Technology" to examine the existing ICT infrastructure facilities, human resources, and library resources and services available at Medical College Libraries of Gujarat. The survey was conducted to explore the present state of 13 Medical Libraries. It is found that all the surveyed medical libraries have a considerable number of learning resources like printed books, current journals, back volumes, research reports, thesis and dissertation, and conference proceedings, and only Government, Medical Libraries have a good collection of e-resources to support medical education. The study also revealed that the strength of professional and non-professional library staff was inadequate to provide necessary library services and only three libraries are fully automated followed by seven libraries partially automated and three libraries to be started in the future. Findings also depicted that, only two (15.38%) libraries had an excellent collection of hardware systems whereas 53.85% of libraries responded their hardware collections as 'Good'. The majority 46.16% of libraries used Windows XP as their

most popular computer operating system and most (69.23%) of the libraries had LAN connectivity. Excepting one, all the libraries had Internet connections for accessing digital resources. Since the ICT infrastructure in the surveyed libraries was not encouraging, the author finally recommended that more stress is given to human resources, financial aid, and strong ICT infrastructure for facing the challenges of diversified information needs of medical professionals (Bhatt, 2012).

Kumar (2012) attempted to identify the usage of ICT by medical students in Government Medical College, Chandigarh, India. The study examined awareness and use of e-resources, the infrastructure of ICT, the role of ICT in medical education, and problems with ICT tools among other things. The author expressed that developed countries have invested a lot in developing a strong ICT infrastructure in medical education for ensuring the quality of health services that medical professionals provide. The key barriers to quality medical education in developed countries are poor access to the latest medical information, qualified medical educators, and a lack of modern medical institutions. It was a descriptive study in which a close-ended questionnaire method was applied to gather data from 47 out of 63 (74.60 per cent response rate) medical students using Random sampling of Government Medical College, Chandigarh. The study revealed that most of the respondents opined that ICT plays a significant role in medical education and 70.20% of respondents in an agreement with the usage of ICT in medical education. Furthermore, it was evident from the study that, 25.53% of respondents stressed developing a Library Website in order to access easy and remote access to library resources and services whereas 40.42% urged that more collection on e-resources should be available in the library. For getting better library services, 21.27% of the respondents advocated that the library should be fully automated and 38.29% of the respondents recommended a library networking and resource sharing system. The results also depicted that 70.21% of the students used computers on a regular basis and 72.34% used the Internet daily for accessing medical resources. A majority (55.31%) of the medical students stated that 'Inadequate number of PCs' is the main impediment to use electronic information, 40.42 percent 'Lack of time to use', 27.65 percent 'No campus computer network', 36.87 percent 'limited accesses to computers', and 19.14 percent showed ' E-resources not available in the library is one of the constraints to use e-resources. The study finally suggested that digital literacy training and WiFi and LAN technology should be set up on the campus for practicing up-to-date and evidence-based medicine in the future (Parveen, 2012).

Chu et al. (2012) emphasized the web 2.0 application in medical-related organizations in order to investigate whether the usage of web 2.0 applications was beneficial or not. An online survey system of the questionnaire link using Survey Monkey was sent by e-mail to 140 medical organizations (university medical libraries, public hospitals and non-profit medical organisations) and finally, a total of 30 valid responses were found suitable for analysis with a response ratio of 21 percent. A follow-up phone interview using Skype was also conducted after completing the online survey. There are multiple-choice questions, open-ended questions, and 10 Likert scale items in the questionnaire. It was found that Web 2.0 is becoming more widespread since 46.7% of respondents currently using web 2.0 while 33.3% were planning to use it in the future. The study disclosed 8 important web 2.0 application(s) like blogs, Wikis, Google Document, podcasting, RSS, media sharing, social bookmarking, and social networking that are currently being practiced in the surveyed organizations for effective information/knowledge management in medical/health settings. The majority of the respondents 75% and 62.5% were using RSS and blogs respectively. The studied organizations mainly used web 2.0 for information sharing (85.7%) and promoting existing services (78.6%). The main benefit of using the web 2.0 application was the sharing of information which received the highest mean score of 3.37. The study also demonstrated that human resources, technologies (both software and hardware), time for its implementation, and user training were taken into consideration for establishing web 2.0 within an organization. It was also observed that 'time-consuming' and 'low staff engagement' were the main 2 obstacles for web 2.0 applications. The study finally concluded that web 2.0 technologies have a significant impact on medical organizations for effective knowledge and information sharing (Chu et al., 2012).

In today's dynamic changing health environment, medical professionals heavily rely on smart phone for searching for information to solve a clinical question. Responding to the health information by medical professionals, the Health Sciences Library (HSL) at the University of Colorado Anschutz Medical Campus developed a strategic vision to make its digital health resources and services effortlessly available at all times via smart phones. With this view, Yeh, & Fontenelle (2012) assessed a usability study of a mobile website in the Health Sciences Library of the University of Colorado Anschutz Medical Campus. Results found that HSL's current website is HTML based so users need to zoom in to view the site using smart phone. To provide a better user experience, the HSL IT team used a freely available PHP mobile device detection script that automatically redirects users to the HSL's optimized website for smart

phones supporting the “One Web” concept. The results confirmed that an optimized website is at an advanced level compared to a non-optimized website in terms of effectiveness, efficiency, and satisfaction from the users’ end. However, the HSL’s optimized mobile website should be updated on a regular basis by getting continuous users’ feedback (Yeh & Fontenelle, 2012).

Gardois et al. (2012) examined a study on the implementation of Web 2.0 services in academic, medical, and research libraries. The study was based on scoping review mapping to analyze the results of the available literature on the topic. A total of 19 online databases were utilized for searching the literature, such as ACM Digital Library, ProQuest, CINAHL, Embase, Scopus, Web of Science, etc. Finally, 255 (4%) were coded and analyzed out of 6461 articles. It is found that Web 2.0 services have a significant impact on academic and medical libraries have eventually increased the use of online resources by final users. The researchers have categorized the Web 2.0 software and services into four major areas: communication; collaboration; multimedia/content; and uncategorized. It is found that nearly 24.7% articles discussed on the use of conferencing, chat and instant messaging tool followed by blogging (N = 38, 13.4%) and podcasts / screencasts (N = 29, 10.2%), social networking (N = 24, 8.5%) and wikis (N = 23, 8.1%). Data revealed that a great majority of articles (76.9%) were case studies or case reports followed by 11.8% were survey types. The vast majority of studies were conducted in the United States (N = 159, 62.4%) (Gardois et al., 2012).

Islam (2012) emphasized web-based library cooperation, networking, and consortia for access to worldwide information for the academic and special libraries of Bangladesh. It was a descriptive study in which a close-ended questionnaire method was applied to gather data from 29 out of 42 (69 per cent response rate) librarians. The main objective of the study was to ascertain the status of the collection of information resources, networking, resource sharing and automation of libraries in Bangladesh. Data showed that 80% of studied libraries had a library automation system. Results depicted that BRAC University Library, East-West University Library, icddr,b Library, Islamic University of Technology (IUT) Library and North South University Library had taken initiatives for digital library systems. The study also ascertained that paucity of funds, lack of administrative support, lack of trained staff, and lack of funds for recurring expenditure were the key hindrances for set up library automation system in Bangladesh. The study finally recommended that

library consortia should be formed and a necessary budget should be ensured for ICT development in libraries (Islam, 2012).

Graham et al. (2012) demonstrated a study on building mobile services for the NYU Health Sciences Libraries (NYUHSL) by designing a website using Drupal, an open-source content management system running on PHP and MySQL. The mobile website of NYUHSL designed for i-pad and i-phone launched on June 23, 2010, in which users were able to read e-books and e-journals (Graham et al., 2012).

A study investigated by Singh & Gill (2012) aimed to know the usage of e-journals among the users of ICMR (Indian Council of Medical Research) libraries in Delhi. It was a descriptive study in which a close-ended questionnaire method was applied to gather data from 109 out of 164 (66.4 per cent response rate) library users. Data depicted that 93.5% of respondents were aware of e-journals. Findings also confirmed that on an average 60% of users used e-resources daily. It is observed that 94.4% of respondents used e-journals for performing research, followed by 65% for updated information and 49.5% for preparing manuscripts (Singh & Gill, 2012).

Adewale, Omolola & Ladipo Sunday (2012) examined the role of ICT tools in medical research with special reference to Lagos State University College of Medicine Library, Ikeja, Nigeria. The study indicated that medical libraries in Nigeria are playing a significant role in creating knowledge-based information management. The study finally recommended the formation of a medical library consortium that will comprise all the medical libraries in the country (Adewale et al., 2012).

Kemdarne (2012) submitted a doctoral thesis to the Tilak Maharashtra Vidyapeeth, Pune, India on "*A study of library automation and networking in dental college libraries affiliated to Rajiv Gandhi University of health sciences, Bangalore"*. The main objectives of the study were to explore the present status of library automation and networking in dental college libraries affiliated with Rajiv Gandhi Health University, Bangalore, and recommend suggestions to improve the quality of library automation and networking in dental college libraries. Findings revealed that out of 35 libraries, 20 (57.15%) libraries are automated and use the library software for library activities (Kemdarne, 2012).

2011

Folb, Wessel & Czechowski (2011) have conducted a comparative study of electronic books and print books for clinical and academic use in the Health Sciences Library System (HSLS) e-book study at the University of Pittsburgh. The study is based on a web-based survey of a random sample (n = 5,292) of library remote access password holders. A total of 871 completed and 108 partially completed surveys were found with a response rate of 16.5%–18.5%. The study found that academic health science libraries are expanding their e-book collections and investing a lot in improving e-book access. HSLS has been collecting e-books from vendors such as Ovid, MD Consult, STAT!Ref, McGraw-Hill, and Rittenhouse and at the time of the study licensed over 2000 e-books. All HSLS e-books had MARC records in the online library catalog available through the libraries' website. Additionally, library users could access Pitt University Library System e-books from providers such as ebrary, netLibrary, Springer, and Knovel. Results confirmed that 55.4% of the respondents used e-books frequently and out of which 21.3% of faculty members used e-books for class readings, while 86% of students and fellows reported using e-books to support clinical care. Users also choose various features of e-books like searching, printing, saving, bookmarking, annotation, and highlighting. Libraries should give priority to marketing and user education for increased use of e-book collections (Folb et al., 2011).

Baro, Endouware & Ubogu (2011) evaluated the information literacy skills of the medical students in the College of Health Sciences at Niger Delta University, Nigeria aiming to find out the information needs, awareness of online resources, search skills, and the problems encountered by students in the CHSs when searching for information. It was a descriptive study in which a structured questionnaire method was applied to gather data from 135 out of 156 (86.54 per cent response rate) medical students using the Random sampling technique. The study traced out the most interesting fact that MEDLINE, HINARI, EbscoHost, e-books, and medical CD-ROMs are the least used or are never consulted by the students though these databases are heavily used around the world in the health environment. Data revealed that 33.3% of respondents paid attention to the currency of information and sources before use. It is also found that 57% of respondents experienced difficulties in searching for information from the library followed by 50.4% who encountered a problem while accessing foreign medical journals. The study finally suggested that the library should provide training programs on advanced search skills of online databases such as MEDLINE, HINARI, EbscoHost, British Nursing Index, and so on.

Abide this, medical librarians should lobby for adequate funds to buildup online resources (Baro et al., 2011).

2010

Srinivasulu & Reddy (2010) performed a survey on Medical College Libraries in Andhra Pradesh, India. The survey was conducted to examine the present state of 32 medical college libraries, evaluate the extent of supporting the information needs of medical students and identify the major constraints. Two sets of questionnaires were designed for the survey. One is for the medical college librarian was delivered to 22 library professionals and the other for medical college library users was distributed to 526 UG and PG students. The study found that 63.64% of librarians have got the training in ICT, 59.09% of librarians felt that the staff member working in their libraries are inadequate to perform daily library routine activities. A major percentage of the libraries (86.36%) were not subscribing to Indian online journals and (81.82%) to international online journals. The majority of the libraries (63.64%) were providing access to PubMed and (72.73%) internet service to their users. Almost all the libraries (81.82%) are not automated and the majority of users (78.86%) responded that they had not used the library catalogue/ OPAC to search library holdings. Almost all the respondents (96.20%) replied that modernization of the libraries is necessary and (97.72%) felt that the networking of medical college libraries is a prerequisite for delivering smooth services. It was recommended that the computerization of medical college libraries is necessary and training in computer applications is essential for the librarian. The authorities should take proper steps to create awareness of catalogue /OPAC among the users by conducting an information literacy programme (Srinivasulu & Reddy, 2010).

Thanuskodi (2010), in his study, stated that the internet is the basic medium for the dissemination of health care information. Health sciences professionals are approaching new ways of finding health information. They use the internet and online resources for fulfilling various purposes like accessing medical records, providing remote patient care through telemedicine facilities, and accessing health care literature. The study discloses that doctors are faced various problems in accessing e-Resources in terms of the virus, difficulty in using digital resources, and limited access to computers and online databases (Thanuskodi, 2010).

Samaradiwakara, 2010 conducted a study on the utilization of Information & Communication Technologies (ICT) in the scholarly communication process of

medical academics in Sri Lanka. It is found that medical academics are at the frontiers of new medical technologies and information by integrating the best possible utilization of ICT. A well-structured questionnaire supplemented by interviews was administered to 131 medical academics to collect the primary data from respondents following the Stratified random sampling method. A total number of 125 filled-in questionnaires were received from samples showing an overall response rate of 95.42%. Results showed that the majority of respondents (78.4%) were from clinical support departments whereas 21.6% were from Clinical departments. It is also found that 92.8% of the respondents used ICT on daily basis for managing their academic activities. The survey revealed that almost all medical academics (99%) used ICT for scholarly activities and only 20% of academics used Electronic Discussion Groups, as well as Bulletin Board Systems for their scholarly activities. More than half of the respondents (52.07%) relied heavily on PubMed, free online journals, and subscribed online journals for downloading full-text articles. Finally, the study recommended that ICT facilities especially Internet connections should be expanded more for medical academics by best possible utilization of ICT (Samaradiwakara, 2010).

2009

Maharana, Biswal & Sahu (2009) investigated the usage of ICT by medical students in library of VSS Medical College, Burla aiming to explore the impact of ICT in health education and assess students' attitudes towards using ICT in their academic activities. It was a descriptive study in which a questionnaire method was applied to gather data from 128 out of 150 (85.33 per cent response rate) medical students using Random sampling of VSS Medical College. The results revealed that the majority of the respondents (78.12%) are heavily dependent on ICT for effectively performing their medical education. A large portion of the respondents recommended various ICT facilities in the library like Library website, E-resources, Networking with other medical libraries and information systems, Automation of the library, Digital library facilities, and Local Area Network for the library. Findings confirmed that more than 80% of students used the Internet on a regular basis and the noteworthy finding is that the inadequacy of e-resources, PCs, and IT staff have stood in the way of successful usage of ICT in the library. Finally, the study suggested developing library cooperation and interlibrary loan among the medical libraries in Orissa or at the national level for improving the use of ICT in the library. Some medical colleges provided links to useful and qualitative e-Resources from their web pages for medical studies and can be used. Rowan University

(http://www.lib.rowan.edu/som/find/eresources) provided links to various medical resources like Access Emergency medicine, access medicine, access surgery, AIDSinfo, Annual Reviews, MBJ Case report, clinical key, Drug information portal, Dynamed, Embase, nature, Ovidmedicine, Popline, PsycINFO, Pubmed, etc. Medical College of Wisconsin is useful for medicine on their webpage (http://www.mcw.edu/Libraries/Resources/Databases.htm) also linked some resources The resources in medicine linked are: E-medicine, JSTOR, Drug information, Drudigest, Clinically, Badgerlink, ebrary, EBSCO (Medical), JCR, Lexicomp, NCBI, PubMed, Ovid-PsycINFO, Ovid-MEDLINE, Web of Science, Scopus, Toxnet, Academic online, Annual Reviews, PACT, BIOSIS, MEDLINE, Toxnet, Wildcat, etc. All these are in addition to e-Journals and e-books (Maharana et al., 2009).

2008

Harger (2008)'s study entitled "Electronic Resources in Medical Libraries: Issues and Solutions" is a collection of ten articles on issues of electronic access and the use of books and journals in medical libraries. The author has pointed out that the management of electronic resources has become an essential function for medical libraries. The further author opined that the use of e-Resources is increased due to "costs and challenges of shifting collections from print to electronic materials; collaborative arrangements and cost-sharing that may save on the cost of bundled electronic journals; models for pricing electronic journals, development of electronic journals, and history of pricing; development of open access scholarly publishing and ways open access affects the pricing of subscription journals; and the issue of open access publishing and desired relief for library budgets" (Harger, 2008).

2007

Kumar, (2007) in his Ph.D. thesis entitled "Status of Medical College Libraries in Karnataka and Maharashtra: A Comparative Study" highlighted 7 chapters covering Introduction, Review of literature, Research methodology, Medical education in India, Analysis and interpretation, Discussion of the result and Conclusion. The research methodology chapter includes the objectives of the study, hypotheses, importance, tools of the study, sampling, and limitations of the study. The core objectives of the study were to compare some of the important library components like collection development, physical facilities, library services, manpower, budget, digital/virtual library services, timings, etc., of the libraries undertaken for the study in the state of Karnataka and Maharashtra. The study also covered library services

made available for the users to achieve the educational objectives of the parent institution and compare the infrastructure made available for providing information services in their libraries. Findings uncovered that libraries have to essentially implement/host exclusively dynamic library websites for providing convenient access to online resources. The results revealed that the status of automation in Maharashtra is far better than in Karnataka and even some of the libraries have not taken the initiative to implement the Automation process itself and the library services have been hampered due to many hurdles like lack of management support, IT infrastructure, expertise, budget and basic facilities including lack of demand from the users (Kumar, 2007).

Conclusion

The foregoing reviews overwhelmingly indicate that the medical libraries in the developed countries have undergone tremendous development covering all the areas that should a modern library have. Moreover, there are too many studies conducted in foreign countries to evaluate the service quality of medical libraries but there are very few studies in Bangladesh. However, none of these studies seem to have dealt exclusively with the application of Health Information Systems and Services in the Medical Libraries of Bangladesh, thereby making the present investigation exigent and significant. The present study, therefore, tries to expose the status of public libraries and their library systems and services and attempts to show how they can be best equipped to meet the diverse information needs of the users in the 21st century.

CHAPTER 3

HEALTH SYSTEM AND MEDICAL LIBRARIES: BANGLADESH SCENARIO

Chapter 3

Health System and Medical Libraries: Bangladesh Scenario

Bangladesh is improving significantly over the last 15 years in the health sector appreciated internationally under the leadership of Honorable Prime Minister Sheikh Hasina. In the context of the limited financial capabilities and acute shortage of doctors, nurses, and midwives, hopefully, the country will achieve the targets of Sustainable Development Goals (SDGs) by 2030 on time. The Government of Bangladesh is committed to maximizing health services for all the people by delivering quality health care services along with delivering high-quality information services to Doctors. Bangladesh is setting milestones in many aspects of the health sector as the Government of Bangladesh is investing its maximum initiatives in the health sector. Bangladesh has created tremendous success stories in many health areas that have been recognized worldwide.

As one of the most populous countries in the world, Bangladesh, facing a lot of challenges and opportunities in the public health sector. The population is estimated to be over 162,650,853 (July 2020 est.) (The World Fact Book, 2020). The GDP of Bangladesh is 302.571 (2019) billion (The World Bank, 2020). Health is treated as one of the core human rights, the Government of Bangladesh has undertaken wide-ranging initiatives focusing on the development of the health sector, which has started to yield positive results. The life expectancy at birth increased from 45 years during the 1970s to 74 years in 2020. The infant mortality rate reduced from over 100 per 1000 live births during the 1970s to about 28 per 1000 live births by 2020 (The World Fact Book, 2020). Currently, a better health infrastructure exists in Bangladesh, since there are a good number of public and private medical colleges and hospitals, district hospitals that serve as referral centers, Upazila (sub-district) health complexes, private clinics, and diagnostic centers.

One thousand people need to have more than four doctors, nurses, and midwives. There is a little more than one in Bangladesh. This information has been found about the health manpower of Bangladesh in the global report of the World Health Organization on various indicators of the health sector. Analysis of this report titled “World Health Statistics 2022” shows that Bangladesh lags behind in healthcare manpower in South Asia. In terms of manpower, Bangladesh is ahead of only

Afghanistan in South Asia. Bangladesh ranks seventh. The Maldives is on everyone. The 75th World Health Conference kicked off on 22 May 2022 at the World Health Organization headquarters in Geneva. One day before the conference, the World Health Organization published this global report on health sector statistics. This report is primarily intended to monitor the progress of the Sustainable Development Goals (SDGs) in the health sector.

The World Health Organization says having the infrastructure or modern equipment is not enough. It is important to have adequate and skilled manpower to keep them running effectively. The World Health Organization (WHO) said in its Manpower Strategy for SDGs that 4.45 doctors, nurses, and midwives were needed to provide services to 1,000 people. There are 0.67 doctors for one thousand people in Bangladesh. And for one thousand people, there are 0.49 nurses and midwives. There are 1.16 doctors, nurses, and midwives for one thousand people in Bangladesh. That means 74 percent fewer doctors, nurses, and midwives than the standards set by the World Health Organization (Prothom Alo). So, Bangladesh falls behind in recruiting the minimum threshold of health professionals for every 10,000 population as set by the World Health Organization. According to Global Health Security (GHS) index, Bangladesh positioned 95th among 195 countries in providing access to better health services and drop behind Sri Lanka and China in the Asia region (NTI, 2021).

The WHO report emphasizes the importance of universal health care. According to statistics, 51 percent of the people in Bangladesh are covered by the universal health care index. This means that 51% of the people in the country get quality services when they need them. Another implication is that 49 percent of people do not receive quality services when they need them. Besides, it is said that 10 percent of the family income of 24 percent of people goes to meet the medical expenses. More than 6 percent of people spend more than 25 percent of their family income on treatment. For years, public health experts and health economists have been saying that many families in the country are falling below the poverty line to meet medical expenses, and many are becoming impoverished (Morol).

However, Bangladesh has made remarkable progress in the Health Sector over the last 10 years since Independence. A good number of public medical colleges, private medical colleges, private hospitals, district hospitals, medical universities, health institutes and research centres, private clinics, rural health centers, and community clinics are being developed with modern ICT-based facilities. A great number of

teaching and training institutions for healthcare have established, and the number of seats in these teaching/training facilities has also been increased in recent years. After 50 years, there are now Upazila Health Centers in every Upazila of the country. There is one government primary health care center in almost every union. Around 14,000 community clinics across the country have brought primary health care to people's doorsteps. When independent Bangladesh started its journey in 1971, there were only eight medical college hospitals, one postgraduate medical institute, 36 tuberculosis clinics, 151 rural health centers, and 91 maternal and child welfare centers in the country. After 50 years, there are now Upazila Health Centers in every Upazila of the country. These have been upgraded from 31 to 100-bed hospitals. These hospitals have an emergency department, outpatient department, and inpatient department. In addition, there are separate maternal and neonatal departments. These hospitals have all kinds of treatment facilities except for specialized diseases. These hospitals provide vaccinations, treat acute respiratory infections, and provide family planning services. There is a special corner for nutrition. There are opportunities for testing with X-ray facilities. In the 50 years of independence, the country has reached several milestones in the health sector. Reducing neonatal and maternal mortality, eradicating polio, and cholera, and use of food saline to control diarrhea, malaria, filariasis, and typhoid diseases, Bangladesh is a worldwide example. Experts say that this achievement has been made possible by the combined efforts of government and non-government organizations and the people.

After independence, Bangladesh was at the bottom of almost all indicators in the country's health sector. In 50 years, that country has stood tall. Now Bangladesh is in a good position compared to Pakistan, Nepal, and many more countries in healthcare. More than 15,000 community and satellite clinics have been set up across the country to ensure healthcare for rural people. Through this, a strong network has been created for the primary health care of the people of the village.

Therefore, Bangladesh has the lowermost health budget in South Asia in terms of GDP. The country's total health expenditure is 2.34 percent of GDP and per capita, health expenditure is only $110. For over a decade, government spending on health has been within 5 percent of total government spending. In this case, the expenditure in the health sector should be increased to 6 percent in the coming 2022-23 fiscal year and 10-12 percent in the mid-term of the Eighth Five Year Plan. The situation of coronavirus infection has given a real picture of the health system of the country.

There is no provision for free healthcare in the country for those below one year of age and over 65 years of age. There is no allocation for treatment of heart disease, cancer, and kidney disease in all medical colleges. Improvements in the health sector have been possible due to proper policies and plans of the government. Modern medical systems including automation and robotic surgery are now available in Bangladesh. In the future, Bangladesh will go through advanced development in medical services compared to developed countries. Indeed, there was no health infrastructure in the country at the time of independence. However, in order to further improve public health care, appropriate plans need to be formulated and implemented. In addition, more hospitals need to be built and recruitment of more doctors and nurses to provide needed health care services to common people. Defective organograms and administrative bureaucracy need to be addressed duly.

Basic Health Facilities of Bangladesh

The basic information on Health services and medical education in Bangladesh is presented below table.

Table 3.1: Health facilities of Bangladesh

Health facilities	Number
Total number of government facilities under the DGHS	2,258
Total number of primary-level facilities (except community clinics)	2,003
Total number of secondary and tertiary level facilities	255
Total number of registered private hospitals and clinics	5,321
Total number of registered private diagnostic centers	9,529
No. of hospital beds under the DGHS	54,660
No. of hospital beds in private hospitals registered by the DGHS	91,537
Total number of facilities run by DGHS, including registered private hospitals	7,579

Organizational Structure of Healthcare System

The Ministry of Health and Family Welfare (MOHFW) is the apex body for the administration and management of health sector policy and planning. There are also two separate directorates – also called the 'two wings' – for (I) Health Services Division and (II) Medical Education and Family Welfare Division. The various functions like making policies and guidelines concerned with health financing, health-related matters, management and maintenance of nursing care, and so on are supervised by Health Services Division. On the other hand, Medical Education and Family Welfare Division (MEFWD) is responsible for the overall management of

medical colleges and medical universities, medical education, making policies regarding family planning matters, registration of birth and death, etc. MOHFW comprises the supreme authority called the Directorate General of Health Services (DGHS) for the overall management of health manpower and policies with more than one hundred thousand officers and staff members.

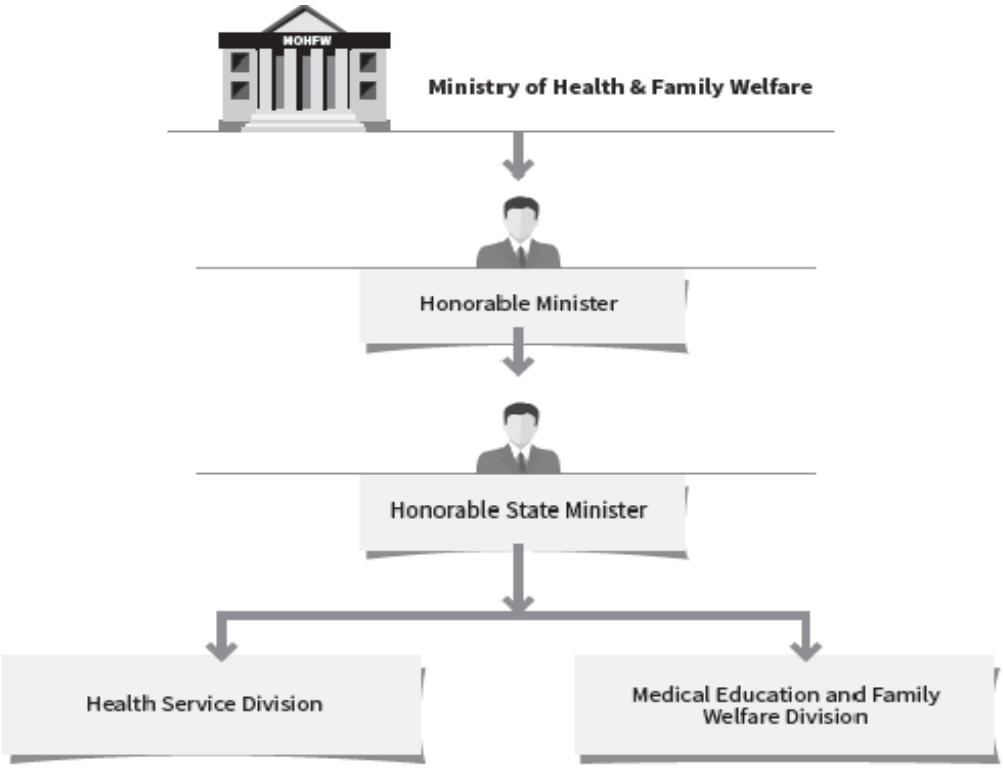


Figure 3.1: Divisions of the MOHFW, Source: (Directorate General of Health Services, 2020)

Implementing Authorities

At present, a total of nine implementing authorities are available in MOHFW as listed below:

1. Directorate General of Health Services (DGHS)
2. Directorate General of Nursing and Midwifery (DGNM)
3. Directorate General of Drug Administration (DGDA)
4. Directorate General of Family Planning (DGFP)
5. National Institute of Population Research &Training (NIPORT)
6. Transport & Equipment Maintenance Organization (TEMO)
7. Directorate General of Health Economics Unit (DGHEU)
8. Directorate General of Health Engineering Department (DGHED)
9. National Electro-medical & Engineering Workshop (NEMEW)

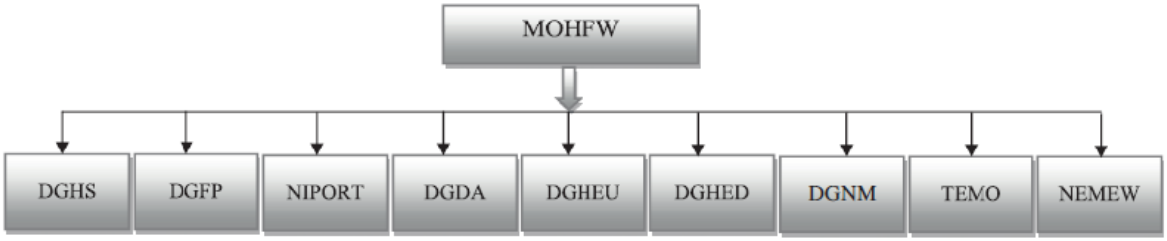


Figure 3.2: Implementing authorities under the Ministry of Health and Family Welfare, Source: (Directorate General of Health Services, 2020)

Regulatory bodies

At present, under the MOHFW, the five regulatory bodies of the health sector are :

1. Bangladesh Medical and Dental Council (BMDC)
2. Homeo, Unani and Ayurvedic Board
3. Bangladesh Pharmacy Council (BPC)
4. State Medical Faculty (SMF)
5. Bangladesh Nursing Council (BNC)

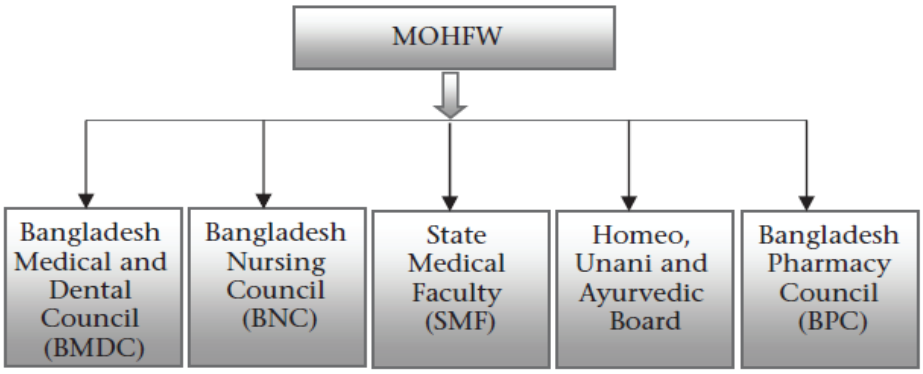


Figure 3.3: Regulatory bodies under the MOHFW, Source: (Directorate General of Health Services, 2020)

Directorate General of Health Services

The DGHS provides administrative support to the Ministry for running new health programs and interventions. The six tiers of healthcare infrastructure like national, divisional, district, upazila (subdistrict), union, and ward under the DGHS.

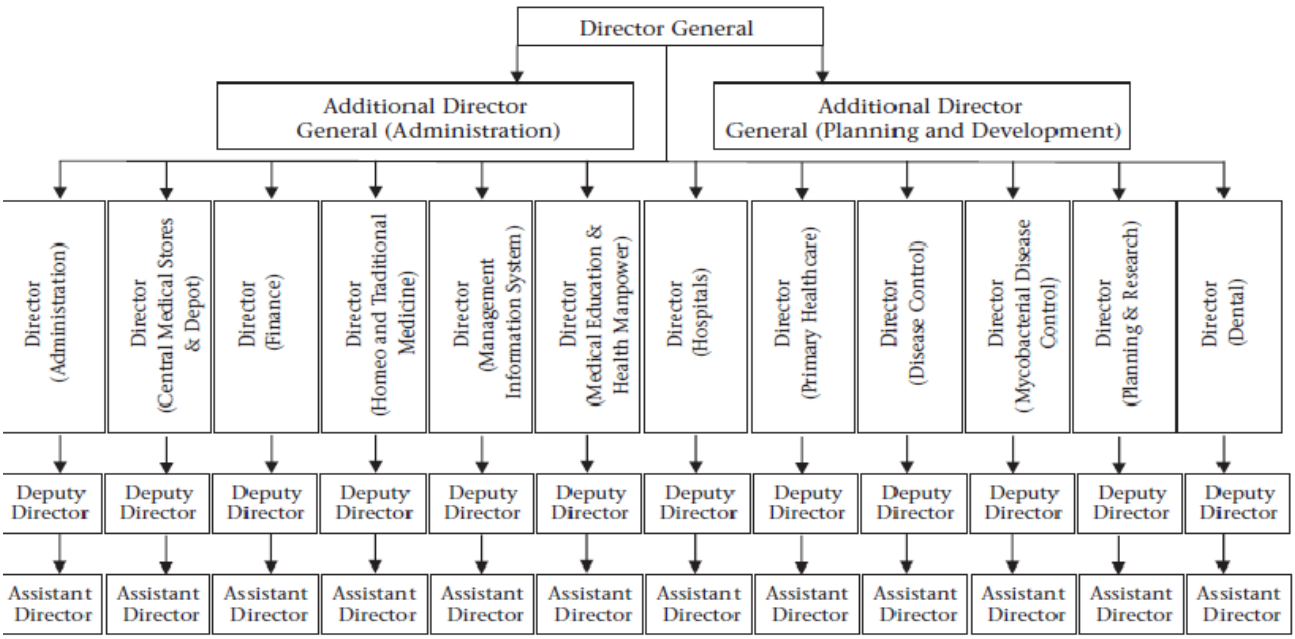


Figure 3.4: Administrative setup of the Directorate General of Health Services, Source: (Directorate General of Health Services, 2020)

Health Rights, Acts, and Policies

The Constitution of the People's Republic of Bangladesh guarantees that" Health is the basic right of every citizen of the Republic. Article 15 of the Constitution says, "It shall be a fundamental responsibility of the state to attain, through planned economic growth, a constant increase of productive forces and a steady improvement in the material and cultural standard of living of the people."

Important Health Sector Policies/Strategies

- National Health Policy 2011
- Health, Nutrition and Population Sector of the 7th Five-year Plan
- National Nutrition Policy 2015
- 4th Health, Population and Nutrition Sector Program (HPNSP) 2017-2022
- Healthcare Financing Strategy 2012-2032: Expanding Social Protection for Health towards Universal Coverage
- Bangladesh Health Workforce Strategy 2016–2021

National Health Policy 2011

Goal and objectives

The National Health Policy 2011 was formed to overcome the existing health challenges in Bangladesh. It is based on the following principles (Directorate General of Health Services, 2020):

First: Make necessary basic medical utilities for all the people who live in all upazilas and develop the health and nutrition status of the people

Second: Offer easy and sustained availability of health care services

Third: Ensure optimum quality of primary healthcare and governmental medical services

Fourth: Reduce the intensity of malnutrition among people and implement effective and integrated programs for improving nutrition status

Fifth: Undertake programs for reducing the rates of childhood and maternal mortality

Sixth: Adopt satisfactory measures for ensuring improved maternal and child health and install facilities for safe and hygienic child delivery

Seventh: Improve overall reproductive health resources and services

Eighth: Ensure the presence of full-time doctors, nurses, and other officers/staff, and provide and maintain necessary equipment and supplies at each of the upazila health complexes and Union Health And Family Welfare Centers (UHFWCs)

Ninth: Devise necessary ways and means to make optimum usage of available opportunities in government hospitals and the health service system

Tenth: Formulate specific policies for medical colleges and private clinics and introduce laws and regulations

Eleventh: Strengthen and expedite the family planning program with the objective of attaining the target of replacement-level of fertility

Twelfth: Explore ways to make the family planning program more acceptable, easily available, and effective among the extremely poor and low-income communities

Thirteenth: Arrange special health services for the mentally-retarded, the physically disabled and the elderly population

Fourteenth: Determine ways to make family planning and health management more accountable and cost-effective by equipping with more skilled manpower

Fifteenth: Introduce systems for treatment of all types of complicated diseases in the country and minimize the need for foreign travel for medical treatment abroad.

Health Budget for 2021-2022

Health is one of the important sectors that needed the best of efforts during this COVID pandemic - overwhelmed with patients, and doctors and demands a sufficient budget allocation. But in terms of budget allocation, the Public Health Sector of Bangladesh receives little attention. In the Fiscal Year 2021-22 (FY 21-22), the health sector receives only 0.95% of the allocation of the total Gross Domestic Product (GDP). The total budget for healthcare in FY 2021-22 stands at BDT 327.31 billion, which composes around 5% of the total budget. The sector-wise segregation of budget 2021-22 is presented in Figure 3.5.

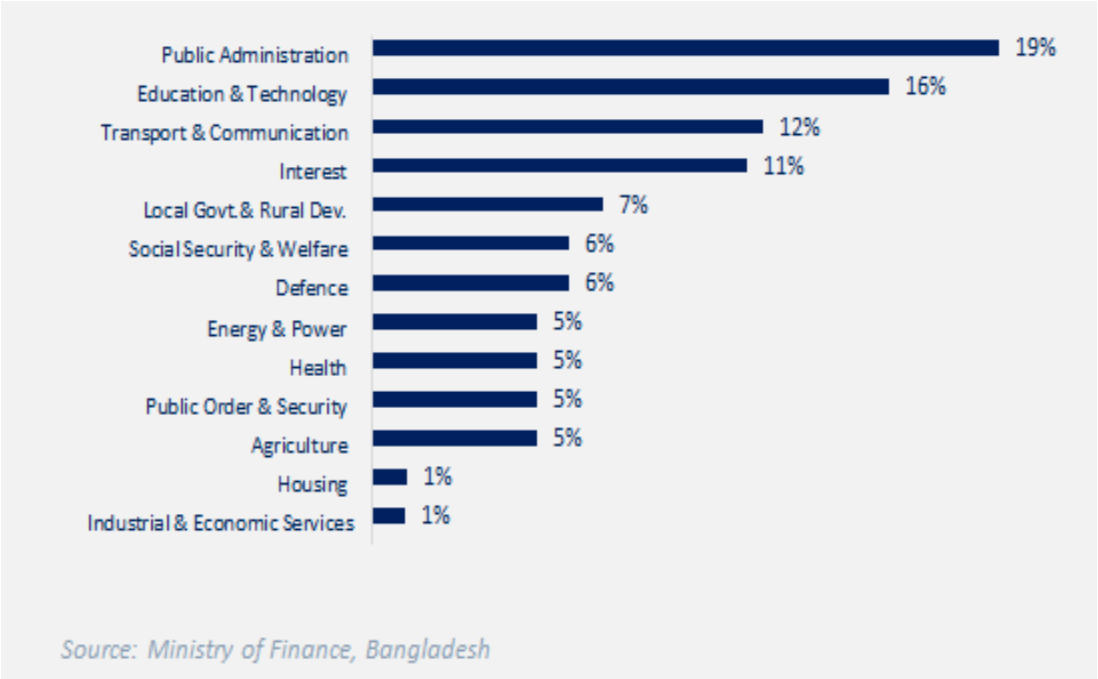


Figure 3.5: Sector-wise segregation of budget 2021-22

Health Workforce

The overall health workforce situation of the DGHS is demonstrated in Table 3.1.

Table 3.2.: Number of sanctioned, filled-up and vacant posts under DGHS

Category		Sanctioned post	Filled up post	Vacant post	Rate of vacancy (%)
Class I	Doctors	27002	25594	1408	5.21
	Non-Doctors	528	226	302	57.20
Class II*		989	687	302	30.54
Class III		51580	36319	15261	29.59
Class IV		25155	15792	9363	37.22
Total		**105254**	**78619**	**26635**	**25.31**

Source: HRIS, DGHS ; *Excluding nursing posts

Health Information System (HIS)

Management Information System (MIS) under DGHS has been developed in order to establish Health Information System (HIS) and eHealth in Bangladesh. The major functions of the HIS are as follows:

- Equipping health facilities with computers, laptops, accessories, gadgets at all levels of health facilities
- Placement, maintenance, and up-gradation of software (database, application, customization, etc.)
- Maintenance and up-gradation of Data Center and Disaster Recovery Center(s)
- Strengthening of human resource capacity through training and, in case of shortage, through outsourcing of services

eHealth Program

Continue and expand the existing mHealth services, such as SMS-based Complaints & Suggestion System, Shasthya Batayon, bulk SMS, and explore other innovative and effective mHealth services are the main functions of the eHealth Program.

Medical Education

In Bangladesh, medical educational institutions are called "medical colleges", "medical universities", etc. Medical universities in Bangladesh are the highest medical educational institutions having multiple medical colleges under each of them. Medical Education and Family Welfare Division is mainly responsible for the management of medical education covering nursing and midwifery education, indigenous education, and homeopathic education; and coordinating training and research activities on medical, dental, nursing, and midwifery, homeopathic, pharmaceutical, para-medical (MATS and IHT), and allied subjects.

The Centre for Medical Education (CME) started its journey in 1983 at Mohakhali, Dhaka in collaboration with WHO and UNDP. Health professionals receive all types of continuing professional development (CPD) trainings from the CME. Center for Medical Education (CME) is engaged for updating the MBBS Curriculum 2012 in Bangladesh. Medical Education and Health Manpower Development (ME&HMD) Unit under DGHS is the leading authority for the production of a competent and motivated health workforce in Bangladesh including Sustainable Development Goals (SDGs). The main goal of ME&HMD is to Provide quality medical education in

medical teaching institutes for Universal Health Coverage. The core activities are highlighted below:

- Streamlining postgraduate medical education
- Ensuring quality of graduate-level medical education
- Ensuring quality of para-professional education
- Ensuring need-based proper development of health manpower
- Conducting admission tests for students of MBBS, BDS, IHT, MATS, Ayurvedic and Homeopathic Medical College, Diploma and BSc Nursing courses
- Procurement of furniture, machineries, and dental colleges, and other medical institutes
- Strengthening libraries with journals and books and establishing a unique e-library.

A snapshot of teaching institutions and the available number of seats in these institutions are presented in below tables (Table 3.3 – Table 3.5)

Table 3.3: Teaching/training institutions for Healthcare

Teaching/training institutions	Total	Govt.	Private	Autonomous
Postgraduate medical teaching institutions	39	22	10	7
Medical Universities (BSMMU, Chittagong Medical University, Rajshahi Medical University, Sylhet Medical University and BUHS)	5		1	4
Medical colleges	106	36	70	
Armed Forces and Army Medical Colleges*	6	6		
Dental colleges and dental units in medical colleges	35	9	26	
Nursing institutions offering Basic BSc Nursing course	60	15	45	
Nursing institutions offering Post-basic BSc Nursing Course	41	4	37	
Nursing institutions offering Specialized Diploma	4	1	3	
Institutions offering Diploma in Nursing and Midwifery	183	43	140	
Unani and Ayurvedic Medical College	4	2	2	
Homeopathic Medical College	2	1	1	
Unani and Ayurvedic Diploma College	23	1	22	
Homeopathic Diploma College	61	0	61	
Medical Assistants Training Schools	209	9	200	
Institutes of Health Technology (IHT)	108	11	97	

*No. of Armed Forces Medical College - 1; No. of Army Medical Colleges – 5

Source: (Directorate General of Health Services, 2020)

Table 3.4: Available no. of seats in teaching/ training institutions

Name of degree	Total	Govt.	Private	Foreign
Postgraduate medical degree (CME Survey, 2017) (MD, MS, Diploma, M Phil, MPH, MMEd, FCPS, MCPS, etc.)	2,486	1,048	1,112	112
Bachelor of Medicine & Surgery (MBBS)	12,082	4,068	6,231	1,783
MBBS offered by Armed Forces and Army Medical Colleges	375			
Bachelor of Dental Surgery (BDS)	2,050	532	1,405	113
Bachelor of Unani Medicine and Surgery (BUMS); Bachelor of Ayurvedic Medicine and Surgery (BAMS)	200	100	100	
Bachelor of Homeopathic Medicine and Surgery (BHMS)	150	50	100	
Diploma in Unani Medicine and Surgery (DUMS); Diploma in Ayurvedic Medicine and Surgery (DAMS)	1150	50	1100	
Diploma in Homeopathic Medicine and Surgery (DHMS)	3050	0	3050	
Medical Assistants Training	14,358	818	13540	
BSc and Diploma courses in health technology	11,625	2,685	8,940	

Source: (Directorate General of Health Services, 2020)

Table 3.5: Infrastructural progress of health institutions from 2009 to 2019

Type of institution	Year		Increased in numbers	Increased in Percentage (%)
	2009	2019		
Medical university	1	4	3	0.9
Government medical college	17	36	19	5.8
Private medical college	40	70	30	9.2
Army and Armed Forces Medical College	1	6	5	1.5
Government dental college and unit	3	9	6	1.8
Private dental college and unit	11	26	15	4.6

Source: (Directorate General of Health Services, 2020)

Medical Libraries of Bangladesh

Advancement in any field is based on relevant and accurate information, and the collection of information is one of the toughest jobs in the context of a developing country. Though Health-related information is easily accessible through innovative e-Health and m-Health strategies throughout the world, the medical libraries, accumulate both printed and online health resources for the ease of access of health professionals. In this context, adopting ICT strategies in all medical libraries of Bangladesh, and revitalizing library systems has been of enormous help in visiting and revisiting our actual situations of the library services in the country. The availability of updated and reliable health data and information is essential to monitor the progress of health care services and health education and only medical libraries can serve this purpose efficiently. Medical libraries in Bangladesh should adopt new philosophies and technologies for developing health resources in the present ICT-based academic environment, the explosion of information, in multidimensional form.

Most of the medical libraries in Bangladesh are performing traditional activities. Traditional roles of medical libraries in Bangladesh are summarized as:

- Library Planning
- Financial Management
- Collection Development and Acquisitions
- Planning fundraising for the library
- Library Marketing
- Personnel Management
- Library Circulation
- Collections Management
- Technical Processing Activities
- Reference and Information Services

The information systems, both in the public and private sectors of Bangladesh, are not effective due to a lack of understanding of the values of libraries and information services by the authorities and therefore, inadequate allocation of financial resources by respective authorities to build modern medical libraries. A good number of medical libraries are available in Bangladesh that is attached to every medical college, medical university, post-graduate medical institute, Unani and Ayurvedic Diploma College, health ministry, hospital, nursing institute, Homeopathic Diploma College, Medical Assistants Training Schools, Institute of Health Technology, National Health Library, International Medical Research Organization and so on. It is recognized that

medical libraries play an important role in establishing a knowledge-based society. Ensuring the quality of health education in a country is impossible without the modernization of medical libraries. It has been observed that the Government of Bangladesh is not paying much attention to organizing medical libraries due to budgetary constraints. As a result, medical libraries are suffering a lot. Traditional library practices are still predominant in most of the medical libraries in Bangladesh. Medical Library is a type of special library maintained by a university, college, hospital, medical research institute, public health agency, or medical association to meet the information needs of students, researchers, and physicians from the most preferred sources like printed resources and e-resources. Medical libraries should develop library web pages integrated with the homepage of the respective institutions. It is observed that a separate library webpage is not available for sharing e-resources and library services in our country. Apart from two or three medical libraries, no medical libraries of universities and colleges are maintaining library websites using Intranet according to our survey. The overall scenario of the ICT infrastructure of medical colleges and university libraries in Bangladesh is not satisfactory at all.

The overall scenario of the ICT infrastructure of medical libraries in Bangladesh is not in a good condition due to financial constraints. Whatever the resources are, medical information should be disseminated properly using ICT facilities. The budgetary constraint is the main barrier for all medical libraries. Authorities of the medical universities and medical colleges need to understand this matter. Adequate fund is required in the library for the development of ICT to provide web-based library services. To increase their knowledge of ICT, library professionals need to participate in various training programmes and conferences on the use and application of technologies in medical libraries. The attitude of the library professionals needs to be changed from their traditional trend and they should get rid of the dependency on IT professionals in near future. Hence, medical libraries in Bangladesh must have to improve the quality and value of their services, so that they could survive in this competitive era of information and knowledge. Library professionals should have knowledge of hardware and software related to library services which are essential. Initiatives from the government bodies like the Directorate General of Health Services (DGHS), Ministry of Health and Family Welfare, Ministry of Education, Ministry of Science and Technology, and Ministry of ICT should come forward to overcome the challenges of medical libraries in Bangladesh.

CHAPTER 4

MEDICAL LIBRARY SYSTEMS AND SERVICES: INTERNATIONAL SCENARIO

Chapter 4

Medical Library Systems and Services: International Scenario

Health professionals need updated medical information, latest drug information, new treatment procedures, current clinical trials, and new tactics in medicine and associated areas for delivering high-quality medical services. In this circumstance, medical libraries have indeed a greater responsibility. Since the last decade, the growth and development of medical education and medical libraries in developed countries are increasing significantly for ensuring quality medical education. The medical libraries in developed countries have changed tremendously with the spread of r-resources, online databases, mobile apps, and the shift to online publishing of health information. Health sciences libraries worldwide have adapted ICTs in all the areas of library systems like Integrated Library Management System, Digital Library System, Institutional Repository System, Knowledge Management System, Artificial Intelligence (AI) Library System, Library Website and have also subscribed a lot of online medical databases for accessing online information resources. These modern library systems provide wider access to health information online and enable a direct interaction of the user with online databases. The activities of these library systems contribute to the promotion and dissemination of medical information.

In this knowledge-based economy, medical libraries in the developed countries are investing a huge amount in building digital information collections, appropriate access measures accessing to digital collections, maintaining library portals that offer federated searching options for finding information resources in a single platform, and marketing their own information resources through institutional repositories, and library websites. Information and Communication Technology affects every facet of medical library systems and services. The popularity of digital resources, library networking, and consortia are the core development areas in the health sciences libraries. Modern library systems and services radically changed the academic and research activities of medical libraries. Many health science libraries are shifting from print to electronic sources. The core motto of medical libraries is to support sound academic and research activities of the parent institutions, deliver innovative information services and develop a knowledge management system. Medical libraries in developed countries are continuously transforming their resources from print to online aiming to provide the latest information for physicians. E-resources have a

huge impact for the clinicians on the advancement of modern health sciences in today's information society. The integrated library system, digital library system, and library website help them access online resources both on-campus and off-campus.

Medical Library Systems

Modern library systems are currently being practiced in the major health sciences libraries around the world. Medical libraries and librarians must take proper initiatives for delivering user-centered services for developing a standard medical library system. Most of the medical libraries around the world are now providing modern library services to physicians and medical students. The most notable modern library systems are listed below:

- **Integrated Library Management System (ILMS):** It is a multi-function web-based multimedia content Information Management System that integrates the basic information system for managing all sorts of library activities and services, such as Ex Libris (Aleph 500), NewGenLib, Virtua, Endeavor Information Systems (Voyager), WorldShare Management (OCLC), Koha (open source) and so on. The key areas for Library Management Systems (LMS) cover acquisition, stock management, circulation, processing, reporting, accessing e-resources, and user management. Library Automation System is one of the major parts of ILMS. A comparative analysis of the leading ILSs is shown in Table 4.1:

Table 4.1: Characteristics of the ILMSs

Characteristics	**Integrated Library Management System (ILMS)**			
	Koha	**NewGenLib**	**Libsys**	**Virtua**
Transparency	√	√		√
Interoperability	√	√	√	√
Comprehensiveness	√	√	√	√
User friendly	√	√	√	√
Supports multi-user and multiple security levels	√	√	√	√
Usability	√	√	√	√
Server and client architecture	√	√	√	√
Linux and Windows compatible	√	√	√	√
Programming language	Perl	Java	C/C++	Java
Application server	√	√	√	√
Web server	√	√	√	√
Database server	√	√	√	√

Source: (Madhusudhan & Singh, 2016)

- **Digital Library (DL) Systems**

  DL originated from Computer Science, and DL Systems (DLS) have a significant role in developing modern library systems. DL is the addition of the traditional library system in the digital environment. The core components of DL systems are digital resources, networking technologies, smart users, digital repositories for the preservation of digital assets, advanced IT resources, software, digital library services, and skilled library personnel to handle digital content.

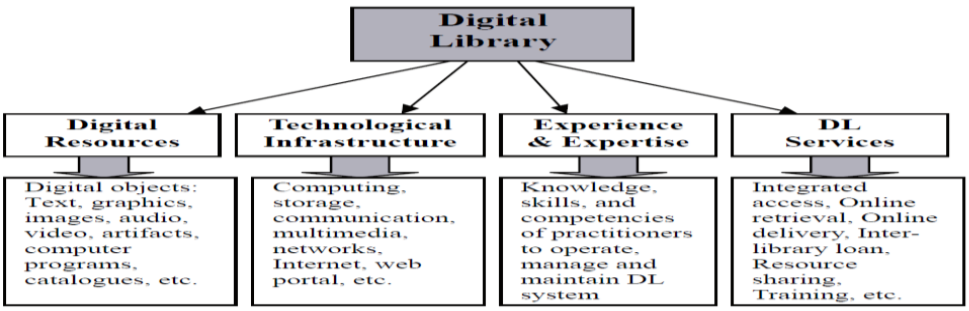


Figure 4.1: Components of a DL System

Source: (Roknuzzaman et al., 2009)

The digital library and repository software available can be broadly classified into (Mahesh, 2008):

01. Open Source Software (OSS), such as DSpace, ePrints, Fedora, ARNO, i-TOR, CDSware, and Greenstone Digital Library (GSDL). Jose, S. (2007), in a global survey on the adoption of OSS in this area, identified some 20 OSS packages, with DSpace being the most popular followed by ePrints, GSDL, and Fedora.
02. Commercial software, such as CONTENTdm, DigiTool from ExLibris, and digital library software by VTLS Inc, etc.
03. Custom-made software

Table 4.2: Leading Digital Library/IR Software

Name of Software	Working Environment	Developed / Marketed	License	URL
CONTENTdm	OCLC CONTENTdm comprises Windows, PHP, web servers (Apache and Microsoft Internet Information Services for the installation	OCLC (2006)	Commercial	http://www.contentdm.org/
CONTENT Pro	Content Pro manages any images, video, and digital documents	Innovative Interfaces Inc. (III)	Commercial	http://www.iii.com/products/contentpro

Contd. Table 4.2

Fedora repository	Apache Tomcat and Jetty function are used as open source web servers and servlet containers	DuraSpace	Open source	http://fedorarepository.org
EOS.Web.Digital	modules in EOS.Web.Digital include "Electronic Resource Management, Electronic Content Management, Content Aggregator, Reference Tracking, IP Authentication, Classification Management, and Knowledge Builder	Electronic Online Systems (EOS) International	Commercial	http://www.eosintl.com/eos-web/digital/
SimpleDL	Contains Apache HTTP Web Server, MySQL database, and PHP (Hypertext Preprocessor) for web application	NA	Commercial	http://www.simpledl.com/index.html
ArchivalWare	The web-based library management system that is used to capture, manage and search a diverse set of digital content	Progressive Technology Federal Systems, Inc. (PTF Ex Libris Group Limited S)	Commercial	http://www.archivalware.net/
DigiTool	DLS for managing, preserving, searching, managing, and retrieving library digital collections and institutional repository	Ex Libris Group Limited	Commercial	NA
FocusOpen digital asset manager	Powerful web-based open source DLS	FocusOpen Software	Open source	http://focusopen.com/
DSpace	It is based on Postgre SQL and Oracle	HP-MIT Alliance in 2002	Open source	http://www.dspace.org/introducing
Greenstone	It is compatible with macOS, Windows, and Unix/Linux.	New Zealand Digital Library project research group at the University of Waikato and is sponsored by the UNESCO	Open source	http://www.greenstone.org
ResourceSpace	ResourceSpace is a web-based open source DLS running in Linux, Mac, and Windows platform	Montala Limited	Open source	http://www.resourcespace.org/
EPrints	The most common software stacks called LAMP (Linux, Apache, MySQL, and PHP) is used for Eprints	School of Electronics and Computer Science at the University of Southampton	Open source	http://www.eprints.org

- **Institutional Repository (IR) System**

  A digital Institutional repository is an online repository for digital information resources that are managed and accessed by a university/college or research institute. Institutional Repository is an online platform of scientific outputs created by the faculties, scientists, and staff of an institution and accessible to all users worldwide. The rise of the IR is initiated for sharing scientific output and research activities within the digital environment at zero cost. Various types of e-resources i.e. journal articles, theses and dissertations, research data, academic materials, or any other scholarly work that are written by faculty, research staff, and students of an institution, and accessible over the Internet without any barriers (Crow, 2002). Most of the medical library systems developed the IR systems.

- **Development of Library Website**

  The development of a library website is the most common part in the major medical libraries. Web sites have become an essential component of academic libraries and the services that they provide. The services provided by Medical Libraries have extended well beyond those offered at an on-site facility.

  Table 4.3 Characteristics of a user-friendly website

S No	Usability features
1	Mobile Compatibility
2	Accessible to All Users
3	Well Planned Information Architecture
4	Fast Load Times
5	Browser Consistency
6	Placement and content of site map
7	Information search
8	Effective Navigation
9	Up-to-date information
10	Download time
11	Good Error Handling
12	Open new browser windows
13	Respond according to users' expectations
14	Web advertising
15	Social Media Icons
16	Hyperlink description
17	Contact Info
18	Use of colour
19	Organisation of information
20	Navigational aids
21	Valid Mark-Up & Clean Code
22	Faculties information

Source: (Islam & Tsuji, 2011)

- **Radio Frequency Identification (RFID) System**

  RFID system is the modern technology used in the medical libraries to replace the electromagnetic and barcode systems in the late 1990s (Chandrashekara & Mulla, 2006). Radio-frequency-based technology and microchip technology are used combinedly in the RFID system. The main components of the RFIS Systems are Antenna, RFID Tag, RFID Reader, RFID tag tracking solution (Barcode, QR Code, GPS (Global Positioning System), NFC (Near Field Communication), IoT (Internet of Things), BLE (Bluetooth Low Energy) and so on (BookTec Information, 2007).

Medical Library Services

In this present technology-based information society, the vision of medical libraries should be to develop a 21st Century world-class information resource centre equipped with modern ICT tools and technologies for delivering high-quality information services to physicians and scientists. Modern digital technologies have radically changed the entire scenario of the libraries and medical libraries are not the exception. In the early 1990s, the Ohio State University in 1975 developed OPAC and the Dallas Public Library in 1978. In the late 1990s, the Internet became the lifeblood of modern library systems and services. Amazon's first version of the Kindle was very much popular at that time for reading e-books. With the advent of the library website, Web 3.0, Library 3.0, cloud computing, Artificial Intelligence, digital library, electronic library, Institutional Repositories, and, the availability of digital resources, ILMS, etc., libraries worldwide have been shifting from the printed era to the hybrid or digital era. Besides, diversified information needs of the users and the wider availability of Smart phones and iPads moving the way information is delivered and accessed. Many modern medical libraries in developed countries are now offering innovative library services to their users. The most notable modern library services are listed below:

Web-based Library Services: Web-based Library Services are managed by the internet, library website, and web-based library automation software. It is the most modern feature of medical libraries. The core features of web-based library services are accessing online resources, off-campus access to library resources, online reference services, checking library profile and loan status, Library 2.0, searching library collections, online reservation, rules and regulations of using library services, user guide along with getting access to online journals, electronic document delivery services, Web-based reference tools, search multiple catalogs (federated search), Electronic SDI services, web OPAC, and so on.

Web 2.0 Library Services: Web 2.0 library services have interacted with users for getting the latest information. The core elements of Web 2.0 technology include RSS (Real Simple Syndication), Wiki, Blog, Dig, Tag, Social Bookmark, SNS (Social Networking Sites), IM (Instant Messaging), Podcast/Vodcast. Web 2.0 technology should be linked to the library website in order to improve the interaction between the user and the information provider. Online reference services, SDI services, and Micro-Blogging (Twitter) can easily be performed through Web 2.0 and medical libraries can offer attractive and dynamic services for the clinicians of Web 2.0.

Mobile-based library Services: Medical library users are heavily dependent on smart phones and tablets for accessing library services in a 24/7 manner. Mobile-based library services include:

- OPAC;
- Access to online databases;
- Access to ebooks and e-journals;
- Check e-mail;
- Access their library account to view loaned items, reservations, and fines;
- Renew checked out items;
- Create a personalized reading list;
- View suggested reading lists.

Institutional Repository (IR)/Digital Repository (DR) Service: An institutional repository (IR) is an online digital repository for creating, selecting, managing, preserving, and disseminating information resources of an institution, particularly an academic/ research institution. The major features are:

- Marketing scientific output of an institution to a worldwide audience;
- Exploiting the visibility of digital resources;
- Showcasing the research activities of a particular institution;
- Preservation of digital resources;
- Measuring research activities.

Distance Learning Library Services: Distance Learning Library Services is essential for providing access to digital information resources remotely through IR, the library website, and in some cases Library 2.0. The services include:

- Access to the library's digital collection

- Electronic Document Delivery Service
- Research data service
- Reservation of courses

WorldCat Discovery Services: WorldCat Discovery is a comprehensive online catalog to search for books, journals, magazines, newspapers, videos, and government publications available at the libraries around the world.

Virtual Reference Services (VRS): VRS is the most modern library service for medical libraries by E-mail, web form, and in a real-time system. Question acquisition, Triage, Answer formulation, Tracking, and Resource creation are the main steps for VRS. Clinicians can ask questions at any time through the library website/e-mail and the queries are answered online by a skilled reference librarian.

RFID-based library services: RFID (Radio Frequency Identification) technology adds a new dimension to modern library services effectively and efficiently. RFID is based on radio-frequency-based technology and microchip technology. The expected management and services using RFID are as follows.

- Check in/out from circulation desk
- Self check in/out facilities
- Out drop box for patrons
- Shelf management systems
- RFID gate/ Anti-theft detection
- Tagging to the printing materials
- Patron Card
- Auto inventory and statistics

Research Data Services (RDS): The services include advanced guidance on various aspects of data management, data curation, text mining guide, web projects, research data management, and technical support for various data management software like Python, R, Stata, SPSS, GIS, JavaScript.

Federated Search Services (VuFind): It facilitates library patrons performing a single search interface for all library e-resources instead of searching multiple interfaces. VuFind is an open-source search and discovery interface. It is one of the core library services of medical libraries.

Web-Scale Discovery Services (WDS): Medical libraries have adopted web-scale discovery services to support research & learning. Web-scale discovery allows online access to a huge array of library subscribed and open-access content such as content from open access repositories, publisher and aggregator content for tens of thousands of full-text e-books and e-journals, and additional content from online databases.

Off-campus access to e-resources: The medical library uses a system called EZProxy to provide off-campus access for authorized users from the respective organization. By clicking on the requested link from the library website for an e-book, journal, or database, the users are prompted through a sign-in and authentication and then linked to the requested resource. The Virtual Private Network (VPN) remains also fully available for anyone who prefers that mode of access, and VPN login will continue to be necessary for some selected e-resources.

Plagiarism Checking Service: Many medical libraries provide this service efficiently. Plagiarism is the core problem of research and it is very important for any researcher as it contains the integrity of researchers. Plagiarism facilitates to loss of the respect of advisers and peers by which researchers might fail to earn the credit of the scholarly community and professional referrals. If researchers are active in a professional research organization, plagiarism may result in loss of financial assistance or leadership roles.

Journal Citation Reports: The world's leading journals have the Journal Impact Factor (JIF) so that a scientist can easily identify the peer-reviewed, standard, and authentic journals. Many medical libraries provide the Journal Impact Factor service to scientists using the Web of Science database that is treated as a Journal Citation Report.

Reference Management Service: Medical libraries offer Reference Management Service for the clinicians through various software like EndNote, Mendeley, Zotero, RefGuide, etc.

Remote access (OpenAthens) to library resources: OpenAthens is an authentication system that provides access to the particular library's subscribed/registered online resources. Authentic library users can log in to the Open Athens account for accessing e-resources from off-campus. The e-resources can be

searched through keyword, journal title, subject, Digital Object Identifier (DOI), or PubMed ID.

Bibliometric and Scientometric Services: These services cover the most potential areas of research, citation analysis, finding out h index, publication status of a specific scientist, collaborative research activities, and core research donors.

Information Literacy Services: Information literacy involves evaluating, using, and evaluating information in an ethical manner. The library users can get basic orientation on library rules and regulations, library websites, library resources, and library services.

Online Medical Databases

Medical online databases are the key resources in modern medical libraries. These databases are very much helpful for health professionals. The core online medical databases are stated below:

MEDLARS (Medical Literature Analysis & Retrieval System): It is the first online medical searching system & bibliographic database introduced by NLM, Maryland (USA). The MEDLARS started in 1960 and the system has several major updates. It is finally started in 1964 to furnish bibliographic access to NLM's large biomedical digital collection.

MEDLINE (MEDlars onLINE): MEDLINE is the leading online bibliographic database developed and maintained by the National Library of Medicine (NLM). The areas covered health sciences, medicine, nursing, dentistry, veterinary medicine, and the health care system. It contains more than 26 million references to journal articles in biomedicine. MEDLINE indexes medical literature dating back from 1966 to the present and currently, citations from more than 5,200 leading medical journals.

MEDLINE Complete: MEDLINE Complete is the leading full-text database providing access to online biomedical and health journals. It provides full text for thousands of top medical peer-reviewed and non-open access journals. It is an important database for doctors, nurses, health professionals, and researchers. Content Includes (EBSCO, 2022c):

- More than full-text access 3500 peer-reviewed, non-open access journals
- 5,200 journals indexed with searchable cited references

MedlinePlus Health Information: MedlinePlus is the free medical/health website for patients and clinicians maintained by the NLM. It provides reliable, up-to-date information about diseases, conditions, Body Location/Systems, Diagnosis and Therapy, and Health and Wellness, Drugs and supplements (National Library of Medicine, 2020b)

Medscape: Medscape is the top online global platform for physicians and nurses worldwide, offering essential point-of-care drug and disease information; the latest medical news and expert suggestions; relevant medical advice, and comprehensive clinical information and resources essential for doctors (WebMD LLC, 2022).

ClinicalKey: It is a clinical search engine and point-of-care database of Elsevier specially designed for physicians. Healthcare professionals and students can get the latest evidence-based information with the help of ClinicalKey in a diversity of information sources, including clinical calculators, drug information, full-text reference books and journals, practice guidelines, synoptic content, videos, customized patient education handouts, and more (Elsevier, 2022a).

PEDro (Physiotherapy Evidence Database): It is an open-access database of over 49,000 trials, reviews, and guidelines evaluating physiotherapy interventions. Evidence-based physiotherapy contents are easily searchable from PEDro. It is an excellent online database for evaluating the effects of physiotherapy interventions (PEDro, 2020).

ViDAL Consult: ViDAL Consult is designed for hospital and private practitioners for accessing reference clinical information on drugs, and to control prescription safety (VIDAL Drug Information System, 2022).

OVID Databases: Ovid is the product of Wolters Kluwer treated as an internationally recognized leader in the field of Medical, Scientific and Academic research information solutions. Ovid offers more than 6,000 eBooks and many book collections, over 1,400 premium, peer-reviewed journals, and over 100 bibliographic and full-text databases. The Ovid databases are very useful for clinicians, and other healthcare professionals to find important medical information for reaching the right decision for patient care (Wolters Kluwer, 2022).

Embase: Embase, produced by Elsevier, is a rich biomedical research database for clinicians. Embase allows physicians to build comprehensive systematic reviews for studying all of the published literature on a particular topic and make the best-informed evidence-based medical decisions. Biomedical researchers can conduct Systematic Reviews using Embase which is treated as a best practice for evidence-based medicine. Embase guides also the researchers in using the PICO (Population Intervention Comparison Outcomes) method in a search for formulating an advanced query to explore deeply indexed content. It also helps track drug-disease relations and drug-drug interactions (Elsevier, 2022b).

Browzine Library: BrowZine, is the bookshelf-style app that allows the researchers to browse, read, share, and save licensed online journal articles and combines thousands of peer-reviewed journals from hundreds of publishers. Rather than search databases for specific journal issues, BrowZine creates a personal bookshelf of journals as well as exports articles to EndNote, Mendeley, and Zotero (University of Toronto Libraries, 2022)

APA PsycInfo: PsycInfo is an expansive abstracting and indexing database with more than 5 million records devoted to covering the behavioral and social sciences. With more than five million interdisciplinary bibliographic records, this database delivers embattled findings across the full spectrum of behavioral and social sciences (American Psychological Association, 2022).

Cochrane Library: The Cochrane Library, produced by John Wiley & Sons, Ltd. as part of Wiley Online Library, an updated evidence-based health care database in medicine and other healthcare specialties. The available databases are the Cochrane Database of Cochrane Reviews) and Cochrane Protocols; the Cochrane Clinical Answers and the Cochrane Central Register of Controlled Trials (CENTRAL); and (Wikipedia, 2022a).

CINAHL Complete (Cumulative Index to Nursing and Allied Health Literature): CINAHL Complete is one of the best research databases source that provides access to full-text nursing & allied health journals. CINAHL Complete includes rigorous curation and indexing of open access (OA) journals, which has resulted in a growing collection of 1,096 active global OA journals (EBSCO, 2022a).

Dynamic Health: Dynamic Health is an evidence-based tool intended to get quick answers to questions and adopt a culture of evidence-based practice and critical thinking leading to improved patient outcomes. Dynamic Health Content covers Diseases & Conditions, Signs & Symptoms, Tests & Labs, Care Interventions, and Drug Guide (EBSCO, 2022b)

JAMAevidence: It offers clinicians integration with Evidence-based medicine (EBM) getting the best available evidence with clinical experience. JAMAevidence helps decision-makers recognize the best available evidence by providing guides to the systematic consideration of health problems and the outcomes of health care (JAMA Network, 2022).

Lens: Lens is the global patent and scholarly knowledge database for making it freely accessible to the public for solving science and technology-enabled problems. Lens provides access to over 225+ million scholarly works, 127+ million global patent records, and more than 370+ million patent sequences, with rich metadata (Lens, 2021).

Johns Hopkins ABX Guide: The Johns Hopkins ABX Guide is intended for updated, authoritative, evidence-based information on the treatment of infectious diseases. This comprehensive web and mobile resource unite features of drug indications, diagnosis; dosing, side effects, and interactions; pharmacokinetics, pathogens; management; and vaccines information (Johns Hopkins Medicine, 2022a).

Johns Hopkins HIV Guide: The Johns Hopkins HIV Guide, offers the latest confident clinical decision support information to clinicians' fingertips in the areas of HIV diagnosis, management, and relevant medications. It serves as a ready guide to finding answers quickly for clinicians (Johns Hopkins Medicine, 2022b).

Global Infectious Diseases & Epidemiology of Network Online (GIDEON): GIDEON is the world's leading global Infectious Diseases and Microbiology online database. The program includes (GIDEON Informatics Inc., 2022)

- 25,000+ historical and current infectious disease outbreaks
- 2000+ pathogens
- 37,000+ graphs

STAT!Ref®: It is the leading medicine e-resource, which permits users to automatically cross-search full-text titles, journals, and evidence-based point-of-care authoritative resources. It covers 600+ growing resources in over 50 healthcare disciplines, STAT!Ref provides the latest healthcare information in a speedy manner (Teton Data Systems, 2022).

TOXLINE (TOXicology information onLINE): It is the product of the National Library of Medicine, a comprehensive collection of online bibliographic information in the areas like pharmacological, biochemical, physiological, and toxicological effects of drugs and other chemicals.

Drug Information Portal: Drug Information Portal, produced by NLM, offers physicians to select drug information from the U.S. National Library of Medicine and other key U.S. Government agencies. More than 49,000 drugs information are available in this portal (National Library of Medicine, 2022a)

LactMed: LactMed provides information on drugs and other chemicals in the area of breastfeeding. It is a free online database that can be accessed through https://www.ncbi.nlm.nih.gov/books/NBK501922/ (National Library of Medicine, 2022b).

TRIP (Turning Research Into Practice) Database: The TRIP database started its journey in 1997. It is a meta-search engine designed to allow users to quickly search and easily find and use high-quality research outputs published worldwide. PICO search is also possible using TRIP (Trip Database Ltd., 2022).

PQDT (ProQuest Dissertations and Theses): It is the world's leading online database of full-text access to dissertations and theses. The database includes over 5 million citations and 3 million full-text works. Approximately 4 million researchers at 3,100+ institutions around the world are currently using this portal (ProQuest, 2022).

IndMED: IndMED provides access to over 100 peer-reviewed medical journals published in India.

PubMed: PubMed is the world's largest citation database, made available by the NLM, that comprises more than 34 million citations for biomedical literature from

MEDLINE, life science journals, and online books. It is a free database that started its journey in 1996. National Library of Medicine (NLM), located at the National Institutes of Health (NIH) and National Center for Biotechnology Information (NCBI), in the U.S. take the core responsibilities to maintain PubMed. There are links to full-text content from PubMed Central and publishers' websites (National Library of Medicine, 2022c).

Hinari: Hinari Access to Research in Health Programme provides online access to the major journals in biomedical and health sciences, either free of charge or with affordable subscriptions, to not-for-profit institutions in developing countries. Up to 22,000 e-journals, up to 68,000 e-books, up to 110 other information resources are now available in Hinari in more than 125 countries (WHO, 2022)

Web of Science: Web of Science™ is the world's leading citation database, developed by the Clarivate which is treated as the most powerful research engine. Web of Science Core Collection is the main database of the Web of Science platform and the world's dominating citation index for scientific and scholarly research. It contains over 21,100 peer-reviewed, high-quality scholarly journals published worldwide in the areas of social sciences, and arts & humanities disciplines (Clarivate, 2022).

ScienceDirect: ScienceDirect is the world's leading full text online database of Elsevier. It comprises over 19 million pieces of articles and book chapters from more than 2650 peer-reviewed journals and 43,000 e-books (ElSEVIER, 2022c).

Scopus: Scopus is Elsevier's abstract and citation database of Science, Technology and Medicine launched in 2004. It comprises 1.8+ billion cited references, 84+ million records, 17.6+ million author profiles and more than 7000 publishers arouns the world (Elsevier, 2022d)

InCites: InCites are provided by the Web of Science™. InCites provides data for over 12,000 unified organizations and more than 1,000 funding organizations.

Publons: Publons provided by the Web of Science™ for tracking scientific outputs, citation metrics, peer reviews, and journal editing work in a single, easy-to-maintain profile of an individual researcher.

Oxford Journals: It is a subscribed online journals database, made available by Oxford University Press (OUP), and provides access to more than 600 peer-reviewed journals.

SpringerNature: Providing researchers with access to 3000+ e-journals and 300000+ e-books.

EBSCO Discovery Library Search: EBSCO is the leading federated online search platform through research databases, e-journals, magazine subscriptions, and e-books of a library that can be searched through a single platform.

American Society for Microbiology (ASM) Journals: ASM journals are the most prominent journals in clinical microbiology that provides access to more than 18 peer-reviewed journals.

Global Index Medicus: The Global Index Medicus (GIM) provides global access to biomedical and public health literature for the organizations of low-middle income countries.

Sage Journals: Providing researchers with access to 1000+ e-journals.

JSTOR: It provides access to over 2,600 top scholarly journals in the humanities, social sciences, and sciences from 1200 publishers

PLoS Journals: It is an open access journals platform. PLOS publishes 12 peer-reviewed open-access journals i.e. PLOS ONE, PLOS Biology, PLOS Medicine, PLOS Computational Biology, PLOS Genetics, PLOS Pathogens, PLOS Neglected Tropical Diseases, PLOS Water, PLOS Sustainability and Transformation, PLOS Global Public Health, PLOS Digital Health, and PLOS Climate.

ProQuest: Medical library databases: This online database currently provides access to over 1500 journals globally.

Wiley Online Library: It is a subscribed online database, made available by John Wiley & Sons, and provides access to more than 1600 peer-reviewed journals, 250 reference works, and more than 22000 e-books.

iThenticate: It is an online text-similarity detecting tool for researchers and professional writers for potential plagiarism checking.

UpToDate: UpToDate is an electronic database for current clinical information for practicing clinicians, researchers, nurses, and interns. This database mainly deals with evidence-based clinical support and improved outcomes globally. More than 38,500 medical institutions use UpToDate as their Clinical Decision Support (CDS) systems to help to take care of patients and for a better outcome.

Indian Journals: IndianJournals.com is a vast collection of interdisciplinary of more than 200 Indian Journals and Research Publications.

OARE: OARE (Online Access to Research in the Environment) enhances environmental research by connecting academics, and researchers in low- and middle-income countries in the natural environment. Up to 14000+ peer-reviewed journals and 38000 online books, and other information resources are available in OARE (WHO, 2022).

ARDI: ARDI (Access to Research for Development and Innovation) enhances research by connecting academics, and researchers in low- and middle-income countries in science and technology. Up to 9075 peer-reviewed journals and 52378 online books, and other information resources are available in ARDI (WHO, 2022).

Directory of Open Access Journals (DOAJ): DOAJ is an open-access journals platform that provides access to 17569 journals from 130 representative countries (DOAJ, 2022).

World Health Organization Institutional Repository (WHO IRIS): The Institutional Repository for Information Sharing (IRIS) is the online repository for preserving books, reports, and other documents published by WHO. Freely accessible from all over the world.

Ulrich's Periodicals Directory: Ulrich's™ is the authoritative source of bibliographic and publisher information on more than 300,00 periodicals of all types leading periodicals around the world.

Dimensions: It is the world-leading comprehensive research database of linked data in a single platform. It supports the whole research cycle ranging from exploring funding agencies to analyzing research metrics. Dimensions offer multiple benefits to researchers like exploring research outputs, accessing full-text articles, powerful filtering options for searched results, and linking ORCID accounts with Dimensions (Doigital Sciences, 2022).

Medical E-books Platforms:

Medical libraries in developed countries have invested a lot in building and accessing e-books. Most of the users are aware of the e-book collections. Physicians and scientists working in the diversified field of health sciences are the heaviest users of e-books in modern medical libraries. Electronic books are expanding continuously in academic health sciences libraries. Most print books have been replaced with electronic books. Today, various options of e-books are available, including online versions of printed textbooks, downloads for portable readers, and Web-published resources such as DynaMed. Since the early 1990s in the fertile soil of the World Wide Web, the National Library of Medicine has been playing a leading role in electronic access to medical information. Now, clinicians and researchers easily locate journal articles and textbook chapters through online bibliographic databases. Online electronic books over their printed counterparts include key advantages like access from multiple locations within the institution or from other locations; access by multiple users at one time; features such as news updates, dictionaries, atlases, calculators, videos; search in greater depth than traditional tables of contents and indexes; and hyperlinking to related information in the text, citations, or full-text references (Heyd, 2010). The major e-book platforms are presented in Table 4.4.

Table 4.4: Core medical e-book platforms

E-book Platform	Brief Description	Name of Provider	Access Mode	Web Address
AccessAnesthesiology	Online database for medical students, nurse anesthetist students, residents, and others in the health care field interested in anesthesia for providing access to electronic books, quick reference material, drug monographs, multimedia, sample cases, and anesthesia study tools for the board review	McGraw-Hill	Licensed	https://accessanesthesiology.mhmedical.com/
AccessBiomedical Science	Comprehensive online resource updated regularly for students, faculty and researchers at the Masters or PhD level in Biomedical Science covers the essential topics ranging from public health and pharmacology, biomedical engineering, toxicology, neuroscience, bioinformatics, and more for easy reference,	McGraw-Hill	Licensed	https://accessbiomedicalscience.mhmedical.com/

Contd. Table 4.4

	research, and review			
AccessCardiology	Medical addresses the most current standards of care, research, and clinical trials through references from leading experts in the field of cardiology in areas such as interventional cardiology and electrophysiology	McGraw-Hill	Licensed	https://accesscardiology.mhmedical.com/
AccessEmergency Medicine	A comprehensive online emergency medicine resource provides quick diagnosis and treatment answers for a broad spectrum of complaints encountered in the emergency department (ED), ranging from neurologic and pediatric emergencies, to poisoning and trauma – specifically designed for optimized viewing on any device	McGraw-Hill	Licensed	https://accessemergencymedicine.mhmedical.com/
AccessHemOnc	A comprehensive online HemOnc resource covers the entire spectrum of hematology-oncology from the basics to specialty-specific content – optimized for viewing on any device	McGraw-Hill	Licensed	https://hemonc.mhmedical.com/
AccessMedicine	A comprehensive online medical resource that provides a complete spectrum of knowledge from the best minds in medicine, with essential information accessible anywhere	McGraw-Hill	Licensed	https://accessmedicine.mhmedical.com/
AccessNeurology	A comprehensive online neurology resource covers the entire spectrum of neurology from the basics to specialty-specific content – optimized for viewing on any device	McGraw-Hill	Licensed	https://neurology.mhmedical.com/
AccessObGyn	comprehensive online ObGyn resource covers the entire spectrum of obstetrics and gynecology–for viewing on any device	McGraw-Hill	Licensed	https://obgyn.mhmedical.com/
AccessPediatrics	A comprehensive online pediatric resource provides instant access to information essential for completing evaluation, diagnosis, and case management decisions, as well as for pursuing research or self-assessment and board review -- all in one place	McGraw-Hill	Licensed	https://accesspediatrics.mhmedical.com/
Access Pharmacy	A content-rich online pharmacy resource allows users to explore leading pharmacy references, search curriculum topics, research drugs and supplements	McGraw-Hill	Licensed	https://accesspharmacy.mhmedical.com/
AccessPhysiotherapy	A leading physical therapy textbooks, procedure and exercise videos, image galleries, self-assessment tools, and a unique cadaver dissection tool –optimized for viewing on any device	McGraw-Hill	Licensed	https://accessphysiotherapy.mhmedical.com/
AccessSurgery	A new dimension to online surgical education and clinical practice	McGraw-Hill	Licensed	https://accesssurgery.mhmedical.com
Books@Ovid	A growing list of nearly 5,500 current, online book editions from the world's most prestigious scholarly publishers, including one of the largest selections of core clinical eBooks.	Wolters Kluwer	Licensed	https://www.ovid.com/platforms/point-of-reference/books.html
Cambridge University Press	More than 1,000 medical ebooks for the global market	Cambridge University Press	Licensed	https://www.cambridge.org/core/what-we-

Contd. Table 4.4

				publish/books
Ebscohost eBook Collection for Healthcare	Wide selection of e-books across many health care topics	EBSCO	Licensed	https://www.ebsco.com/health-care/products/ebooks
eBooks by GIDEON	GIDEON eBooks are an encyclopedia of infectious diseases across all countries, worldwide. There are over 400 eBooks available in PDF that together summarize the status of individual infectious diseases in every country of the world.	EBSCO	Licensed	https://www.ebsco.com/health-care/products/gideon
NCBI Bookshelf	Bookshelf is a full-text electronic literature resource of books and documents in life sciences and health care at the National Center for Biotechnology Information (NCBI). Created in 1999 with a single book as an encyclopedic reference for resources such as PubMed and GenBank, it has grown to its current size of >2500 titles	U.S. National Library of Medicine	Free	https://www.ncbi.nlm.nih.gov/books/
Hinari e-books	Hinari enables low- and middle- income countries to gain access to one of the world's largest collections of biomedical and health literature. Up to 63,000 e-books and up to 110 other information resources are now available to health institutions in more than 125 countries	WHO	Free but registration required	http://extranet.who.int/hinari/en/browse_book_titles.php?all=true
MyiLibrary	With 750,000 titles & counting, covering all major disciplines & subjects, MyiLibrary is the most comprehensive online e-content platform on the market today. Included in the 2,500+ imprints offered via the MyiLibrary platform are the most popular publishers in the world, from academic publishers such as Taylor & Francis, Oxford University Press, Cambridge University Press, Springer and Elsevier	ProQuest	Licensed	https://www.myilibrary.com/Home.aspx?ReturnUrl=%2fError.aspx
Taylor and Francis -CRCnetBASE (Science, Technology and Medical)	A full range of medical and surgical e-books collection, with particular depth in cardiology, dermatology & cosmetic science, obstetrics & gynaecology, reproductive medicine, general practice, general surgery, medical education, and complementary & alternative medicine	Taylor and Francis	Licensed	https://www.taylorfrancis.com/
Oxford Medicine Online	Oxford Medicine Online is a digital platform hosting Oxford University Press' prestigious medical titles with over 1000 e-books	Oxford	Licensed	https://oxfordmedicine.com/
ProQuest's Health & Medicine Ebook	Offers anytime, anywhere access to more than 12,800 ebooks* carefully curated to support any academic or community college medical program	ProQuest	Licensed	https://about.proquest.com/libraries/academic/ebooks/Health-Medicine-Ebook-Subscription.html
PsychiatryOnline	PsychiatryOnline offers a well-rounded psychiatry and psychology selection of more than 100 e-books covering diagnosis and differential diagnosis, case vignettes, multidisciplinary	American Psychiatric Association	Licensed	https://psychiatryonline.org/books

Contd. Table 4.4

	treatment guidelines, and the latest research.			
R2 Digital Library	The R2 Digital Library is a web-based database offers fully integrated and searchable medical, nursing and allied health source book content from key health science publishers, on a web-based platform over 5000 e-books	Rittenhouse Book Distributors	Licensed	https://www.r2library.com/
Elsevier e-books	Elsevier is a leading publisher of health science e-books that provides access to over 6000 e-books and decision support tools to doctors, nurses, health practitioners and students.	Elsevier	Licensed	https://www.elsevier.com/catalog?producttype=book
Karger ebook Collection	The eBook Collection Program, comprising over 2,600 titles, offers fast, convenient and seamless online access to specific content for medical researchers and scientists	Karger	Licensed	https://www.karger.com/Collections/ebook
Wiley Online Books	A comprehensive coverage of more than 1800 titles starting from the basic medical sciences such as endocrinology, pathology and immunology, to all the major medical disciplines including surgery, internal medicine and dermatology	Wiley	Licensed	https://www.wiley.com/learn/librarysolutions/online-books.html#health
Springer e-books	An unlimited 24/7 online access to over 1,800 eBooks and more than 290 new titles added per year	Springer	Licensed	https://www.springer.com/medicine
FreeBoos4Doctors !	An online collection of 375 medical e-books	Flying publisher	Free	https://login.research4life.org/tacsgr0www_freebooks4doctors_com/
Free Medical Books	Contains links to thousands of free online medical books	Free book centre	Free	http://www.freebookcentre.net/medical_text_books
Directory of Open Access Books	An online collection of 33954 academic peer-reviewed books from 410 publishers	DOAB Foundation	Free	https://www.doabooks.org/
IntechOpen	More than 1600 books of health sciences available published under the Creative Commons Attribution 3.0 license.	IntechOpen Limited	Free	https://www.intechopen.com/books/subject/health-sciences
WHO Medicine Bookshelf	The Portal contains 6335 medicines and health products related publications from WHO, other UN partners, global NGOs, development agencies and their partners, countries and academics, and is updated monthly.	USAID	Free	https://digicollections.net/medicinedocs/

Medical Mobile/Tablet Apps:

At present, health professionals are facing huge challenges to keep track of the seemingly exponential growth of scientific literature. Medical libraries are now

providing mobile access to scientific literature through e-journals, e-books, and online databases. Smart phones are increasingly used in modern libraries specially in Canada and USA in the field of medicine including telemedicine, accessing e-resources, medical software, and remote patient monitoring capabilities. Most of the medical libraries in developed countries linked medical apps on their websites and offered various services and the libraries provided a research guide on how to use medical apps. Similarly, mobile citation managers such as EndNote, Mendeley, Zotero, and Papers useful apps for managing citations. Some leading publishers are now providing mobile access to their e-resources by specially designed apps: SpringerLink, OvidToday, and ScienceDirect. The major medical mobile apps are presented in Table 4.5.

Table 4.5: Medical mobile apps for health libraries

Sl. No.	Name of App	Brief Description	Access Mode
01.	AccessMedicine	AccessMedicine is an extensive collection of books, multimedia, and other special features are available online in a format that is optimized for small form factor devices (responsive design).	Licensed
02.	Read by QxMD	It helps physicians keep up to date with the latest research in the specific area of practice.	Licensed
03.	Clinical Key	This app provides full access on a small form factor device to the extensive content in Elsevier's Clinical Key. Clinical Key includes hundreds of textbooks and journal articles.	Licensed
04.	Micromedex	It is a collection of many different drug databases, including Martindale, the Physician's Desk Reference (PDR), DRUGDEX, DISEASEDEX, POSIONDEX, and several alternative medicine databases.	Free
05.	VisualDx	It is a diagnostic decision support system designed by clinicians to aid medical professionals in the diagnosis of visually identifiable diseases.	Licensed

Contd. Table 4.5

06.	UpToDate	UpToDate is the leading clinical decision support resource with evidence-based clinical information – including drug topics and recommendations that clinicians rely on at the point of care.	Licensed
07.	STAT!Ref	STAT!Ref® online is a reputable healthcare e-resource enabling users to intuitively cross-search full-text, evidence-based and authoritative resources.	Licensed
08.	CINAHL Plus	It provides nurses, allied health professionals, researchers, nurse educators, and students with an expanded version of CINAHL Database, the cumulative index to nursing and allied health literature.	Licensed
09.	DynaMed	It is the next-generation clinical reference tool physicians can rely on for fast, easy access to point-of-care decision support.	Licensed
10.	Medscape Mobile	It contains selected information from WebMD's Medscape and eMedicine online sites.	Licensed
11.	Calculate by QxMD	'Calculate' is a clinical calculator and decision support tool for iOS and Android devices, freely available to the medical community.	Free
12.	Drug Information Portal Mobile	A mobile interface to information for over 31,000 drugs. Names, usage, and structures are displayed	Free
13.	MedlinePlus	It includes summaries for over 800 diseases, conditions and wellness topics as well as the latest health news, an illustrated medical encyclopedia, and information on prescription and over-the-counter medications.	Free
14.	Browzine	Allows you to browse nearly the entire individual library's online collection of subscription-based periodicals (journals) by subject area or title, create virtual bookshelves, and read/save content.	Licensed

Contd. Table 4.5

15.	The Mayo Clinic's Library	The Mayo Clinic is one of the largest not-for-profit, academic health systems in the U.S.	Free
16.	GoodRx	It is a website and mobile app that tracks prescription drug prices and offers drug coupons in the United States. GoodRx checks more than 75,000 pharmacies in the United States.	Free
17.	EBSCOhost Mobile	It provides seamless access to the EBSCOhost (ehost) or EBSCO Discovery Service (EDS) interfaces via mobile devices	Licensed
18.	EndNote for IPad	A downloadable bibliography and database manager that enables you to collect citation information from databases, websites, and more; organize them, and use them to create bibliographies and in-text citations.	Licensed
19.	Mendeley Institution Edition	It is a reference manager and academic networking resource usable through mobile phone or tablet	Free
20.	Wiley Online Library	Many Wiley Online Library journal titles have individual mobile apps on which to read the content.	Licensed

Impressive Medical Libraries

A brief description of world-leading medical libraries is enlisted below:

The United States National Library of Medicine (NLM)

NLM is the world's major medical library maintained by the federal government of the USA. NLM started its journey in 1836. The core developments of the NLM include the development of the National Center for Biomedical Communications in 1968, MEDLINE database creation in the 1970s, the establishment of the National Center for Biotechnology Information in 1988, free access to MEDLINE in 1997, MedlinePlus in 1998, and launching ClinicalTrials.gov and PubMed Central in 2000.

Location: Located in Bethesda, Maryland, USA.

Website: https://www.nlm.nih.gov/

Major Library Resources: PubMed/MEDLINE, MeSH, UMLS (Unified Medical Language System), MedlinePlus, OPEN-i, BLAST, Clinicaltrials.gov etc.

Lane Medical Library, Stanford University School of Medicine

Lane Medical Library is a state-of-the-art medical library within the Medical Student Education group. The mission of Lane Medical Library & Knowledge Management Center is to enable biomedical discovery by connecting people with knowledge.

Location: Stanford University, 450 Jane Stanford Way, Stanford, California 94305–2004.

Website: https://lane.stanford.edu/index.html

Major Library Resources: The core of Lane Library's collection development activities is focused on both digital and print resources covering 12,299 e-Journals, 57,995 eBooks and 810 Databases. Popular resources are: ClinicalKey, DynaMed, DocXpress, e-Anatomy, Embase, Google Scholar, JAMA, Lexi-Comp, Web of Science, VisualDx, UpToDate, Science, Scopus, Pubmed, Ovid, NEJM, Nature, Micromedex.

Harvey Cushing/John Hay Whitney Medical Library, Yale University School of Medicine

The Cushing/Whitney Medical Library is the central library of Yale University School of Medicine.

Location: 333 Cedar Street, New Haven, Connecticut 06510.

Website: https://library.medicine.yale.edu/

Major Library Resources: The top resources are: Ovid (Medline, Embase, PsycINFO), Web of Science, PubMed@Yale, DynaMed, UpToDate, ClinicalKey, CINAHL, and Scopus.

Francis A. Countway Library of Medicine, Harvard University Medical School

It is one of the largest medical libraries in the world, opened in 1965. It serves as a resource in clinical medicine, the biomedical sciences, dentistry, and public health.

Location: 10 Shattuck Street, Boston, Massachusetts 02115

Website: https://countway.harvard.edu/

Major Library Resources: Embase, Cochrane Library, Micromedex, CINAHL Plus, DynaMed, GIDEON, PsychaitryOnline, SPIE digital library, CABI, PsycINFO, PubMed, Web of Science, Isabel, JAMAevidence, STAT!Ref, ClinalKey, MEDLINE etc.

University of California San Francisco (UCSF) Medical Library

The UCSF Library is the leading health sciences library in the world, containing an expansive collection of e-resources. At its core, the Library facilitates modern library services to the UCSF community and faculties.

Location: San Francisco, California
Website: https://www.library.ucsf.edu/
Major Library Resources: PubMed@UCSF, Embase, Web of Science, NEJM, UpToDate, Micromedex, Lexicomp, AccessMedicine.

Health Sciences and Human Services Library at the University of Maryland School of Medicine

The Health Sciences and Human Services Library opened in 1998 for providing academic and research activities at the University of Maryland.
Location: Baltimore, Maryland
Website: https://www.hshsl.umaryland.edu/
Major Library Resources: PubMed, Embase, Web of Science, Micromedex, Lexicomp, PsycInfo, SocINDEX, Cochrane Library.

Health Sciences Library, University of Colorado

The Health Sciences and Human Services Library provides academic and research activities at the University of Colorado.
Location: 12950 E. Montview Boulevard, Aurora, Colorado 80045
Website: https://library.cuanschutz.edu/
Major Library Resources: PubMed, Micromedex, Access Pharmacy, Google Scholar, Ovid Medline, CINAHL, Bates Physical Exam Videos, UpToDate, IsabelDX, ClinicalKey, Dynamed.

University Library – Medical University of Vienna

The University Library of the Medical University of Vienna, which was founded in 2004, is the largest specialist medical library in Austria. With 4,000 electronic journals and 13,900 electronic books and e-resources, the library focuses on digital media; the number of downloads of journal articles and chapters of books is significantly greater than one million per year.
Location: Vienna, Austria
Website: https://ub.meduniwien.ac.at/en/
Major Library Resources: PsycInfo, CINAHL, ClinicalKey, Cochrane Database of Systematic Reviews (CDSR), Dynamed, EMBASE, MEDLINE, Scopus, Trip Database, UpToDate, Web of Science.

The National University of Singapore Medical Library at the Yong Loo Lin School of Medicine

The National University of Singapore Medical Library opened in 1905 for providing academic and research activities at the University of Singapore.

Location: Singapore

Website: https://libportal.nus.edu.sg/frontend/ms/medical-library/about-medical-library

Major Library Resources: AccessMedicine, Cochrane Library, UpToDate, Embase, MicroMedex, PsycInfo, MEDLINE.

Medical Library, University of Cambridge

The Medical Library was established in 1973 provides academic and research activities at the University of Cambridge. The book collection of over 50,000 volumes contains core textbooks and specialty titles both in print and e-version. The journal collection is increasingly growing up, with over 104,000 e-titles accessible.

Location: Cambridge, CB2 1TN, United Kingdom

Website: https://library.medschl.cam.ac.uk/

Major Library Resources: Cochrane Library, UpToDate, Embase, MicroMedex, PsycInfo, MEDLINE, PEDro, OTSeeker, CINAHL, EMCARE, Embase,

Welch Medical Library, Johns Hopkins University of Medicine

Welch Medical Library provides a huge range of academic support to the faculty, staff, and students of Johns Hopkins University of Medicine, Nursing and Public Health. The Library offers modern services like full-scale systematic review service; citation management service; literature search and online instruction; and grants management for research projects.

Location: Baltimore, Maryland 21205 USA

Website: https://welch.jhmi.edu/

Major Library Resources: ClinicalKey, DynaMed, Micromedex, UpToDate, Browzine, CINAHL Plus, Web of Science, Embase,

Health Sciences Library System (HSLS), University of Pittsburgh

The Health Sciences Library System (HSLS), University of Pittsburgh has a rich collection of resources in print and electronic format for faculty, students, and researchers in the schools of the health sciences.

Location: Pittsburgh, Pennsylvania 15261

Website: **www.hsls.pitt.edu**

Major Library Resources: ClinicalKey, ProQuest dissertations & theses, UpToDate, Browzine, CINAHL Plus, Web of Science, Embase, PANCE/PANRE, PsychiatryOnline, WorldCat,

Health Sciences Library, University of North Carolina

The University of North Carolina, Health Sciences Library is supporting tremendously the clinicians, faculties, and students for academic and research activities in health sciences.

Location: Chapel Hill, North Carolina 27599-7585

Website: **https://hsl.lib.unc.edu/**

Major Library Resources: PubMed, ProQuest Health Management Database, UpToDate, Global Health, IndexCat, SPORTDiscus.

Louise M. Darling Biomedical Library, University of California

The Louise M. Darling Biomedical Library plays a significant role in accessing high-quality information in the areas like Public Health, Dentistry, and Nursing and has a good collection of e-resources and online databases.

Location: Los Angeles, USA

Website: https://www.library.ucla.edu/location/biomedical-library-louise-m-darling

Major Library Resources: CINAHL Complete, EMBASE, F1000Prime, PsycINFO, R2 Digital Libraries, STAT!Ref, Springer, UpToDate, Entrez, Micromedex.

Health Sciences Library (HSL), University of Washington

The mission of the Health Sciences Library (HSL) at the University of Washington (UW) is to meet the demand for academic and research activities of the University of Washington. The library offers various services like Accessibility at UW Libraries, After-hours Access, Course Reserves, Off-Campus Access, Requesting & Delivery, Reserve a Study Space, Searching Web OPAC, Copyright Guide, Systematic Reviews, etc.

Location: Seattle, Washington 98195-7155

Website: https://hsl.uw.edu/

Major Library Resources: DynaMed, Clinicalkey, UpToDate, Embase, CINAHL, Micro.

CHAPTER 5

PROFILE OF SURVEYED MEDICAL LIBRARIES

Chapter 5

Profile of Surveyed Medical Libraries

Over the years, Bangladesh has made significant improvements in the health sector with a developing economy. However, it still lags behind the developed and many developing countries in terms of various indicators of health and medicare. As stated earlier, at present there are 1.16 doctors, nurses, and midwives for one thousand people in Bangladesh. High population density, financial constraints, corruption, rapid urbanization, aging population, shortage of qualified health care personnel, changing disease patterns etc. are some of the major challenges in the health sector of Bangladesh. Dhaka Medical College (DMC) is the first public medical college of Bangladesh that was established in 1946. After 9 years, the second Government medical college Rajshahi Medical College (RMC) was established in 1956. Bangladesh Medical College (BMC), the first non-government medical college, was established in 1986 (Amin et al., 2008).

Since time immemorial, libraries have been considered as the most important center for acquiring knowledge. But the picture in the context of Bangladesh is completely opposite. We need to change our mindset first. Only then will the country's libraries and the manpower engaged in library services be given importance. Especially in the developed world, the quality of health sciences libraries and library services is much better. In the 'National Education Policy' framed by Dr. Kudrat-e-Khuda, the library of the academic institution has been compared to the heart of a human being. But the condition of medical libraries in most of the medical institutions in Bangladesh is not promising. Over the last 10 years, a good number of medical institutes, colleges, and universities had been established. Medical libraries are the main knowledge hubs in almost all health sciences institutions. The medical libraries in Bangladesh have been broadly classified into the following five types: 1) Academic Libraries 2) National Health Library 3) Research/Special Libraries 4) Hospital Libraries and 5) Association Libraries.

The academic libraries are being further grouped into postgraduate and undergraduate ones. Institutes offering post-graduate degrees such as MS, MD, FCPS, etc. are marked as post-graduate institutions. Undergraduate institutions like medical colleges, dental colleges, medical assistant training schools, colleges of nursing, institutes of health technology, and Homoeopathy, Unani and Ayurvedic

colleges have been offering mainly offering bachelor's degrees such as MBBS, BDS, BUMS, etc. Currently. there are a total of 112 recognized medical colleges in Bangladesh, 36 of which are public and 70 private medical colleges. Along with, 6 medical colleges are run and controlled by the Bangladesh Armed Forces and are under the Ministry of Defense. BMDC (Bangladesh Medical and Dental Council) is the focal point for administering high standards of medical education and recognition of medical qualifications in Bangladesh. However, medical libraries of 22 leading national and international organizations of multiple disciplines were chosen for the present study as stated below:

- 3 Public Medical University Libraries
- 1 Private Medical University Library
- 1 Private Hospital Library
- 4 Public Medical College Libraries;
- 6 Private Medical College Libraries and
- 5 Specialized Medical College Libraries
- 2 International Organization Medical Libraries

Scenario of Surveyed Medical Libraries

a) Public Medical Universities and Their Libraries

01. Bangabandhu Sheikh Mujib Medical University (BSMMU) Library

Bangabandhu Sheikh Mujib Medical University (BSMMU) is the leading postgraduate medical institution in Bangladesh. It aims to advance health, national health care services, course design for post-graduate medical education and training activities in various areas of medical sciences, and also to promote health research activities in the country. BSMMU started its journey as the first and only medical university in Bangladesh in 1998. The university is currently offering a high level of medical degree as Diploma, MD, MS, MPhil, and FCPS. The university is located at Shahbag, Dhaka.

BSMMU has a well-furnished modern academic library recognized as BSMMU Central Library located at Block # A, which comprises 22,000 sq. ft. on the 4th and 5th floors. More than 750 users at a time can read in the library's well-equipped reading area.

Library Resources: Resources consist of 5,201 volumes of bound local and international journals; over 26,907 volumes of books; 1583 copies of WHO (World

Health Organization) publications; 2,731 copies of the thesis; 329 copies of CDs/DVDs; 690 copies of news clippings and 652 copies of other reports. Liberation War Corner is also available in BSMMU Library.

Library Services: The library provides innovative library services to physicians, faculties and students. The library offers various types of services such as circulation, reader's guidance, Selection Dissemination of Information service (SDI), audio-visual and referral services, reading room service, reference service, and Internet facilities to library members.

ICT Facilities: System of Library and Information Management "SLIM" is the Integrated Library Management System of BSMMU Library. BSMMU Library also has a modern electronic library known as Digital Library for researchers. More than 40,000 electronic resources using AGORA, OARE, GOALI, Hinari, and ARDI databases. All departments have access to the Central Library through University Local Area Network (BSMMU, 2021).

Library Website: The current website of this university library is: https://bsmmu.edu.bd/page/70/About-the-library

02. Chittagong Medical University (CMU) Library

The Chittagong Medical University (CMU) was established on 12 May 2016 as per the Chittagong Medical University Act, 2016 (Act No 17 of 2016). The university aims to enlarge higher education in medical science, improve research activities, and maintain high standards in both undergraduate and postgraduate health professional education. CMU is a promising public medical university, located in the historic port city of Chittagong, Bangladesh. The goal is to contribute to the ongoing institutional and instructional change in medical education so that it can adapt to the 21st-century professionalism needed for society. CMU is committed to transformative education, so that future physicians/health professionals can actively contribute to important national and global health issues, including vulnerabilities in improving the health and well-being of the population. At present, 16 medical colleges, 2 dental colleges, and 4 nursing colleges are under this university (Chittagong Medical University, 2021).

CMU Library activities have not started yet and the authority is trying to set up the Library soon. The development of CMU Library is ongoing since the university is

primarily emphasizing infrastructural and academic activities. It will take more time to set up a full-fledged library in the university. We hope, in the future, CMU Library will be a leading medical university library in Bangladesh and the authority should take proper initiatives and allocate the proper budget so that the Library can function as a modern medical university library.

03. Rajshahi Medical University (RMU) Library

The Rajshahi Medical University was established on 12 May 2016 as per the Rajshahi Medical University Act, 2016 (Act No 18 of 2016). The main motto of the university is "Education, Innovative research, and quality healthcare through state of art technology to promote quality human health by thriving Medical Resources & Specialists". The present Government has taken tremendous efforts and accepted challenges to establish Rajshahi Medical University to fulfill the dream of the father of the Nation Bangabandhu Sheikh Mujibur Rahman to establish 'Sonar Bangla'. It will exclusively be a research-based university as desired by the honorable Prime Minister. Medical university attached 1000 bedded hospital will provide sophisticated and new generated health care services to the people. RMU will play a significant role in research and innovative activities in the areas of new medical technologies and modern treatment. At present, 23 medical colleges, 7 dental colleges, 16 nursing colleges, 1 Unani college, and 2 institutes of health technologies are under this university (Rajshahi Medical University, 2020).

RMU Library activities are going on at Rajshahi Medical University, aiming at improving and expanding library services of the scopes of medical education, research, and academic activities. Research and innovation, the continued process of development, is regarded as an integral part of medical science, and can only be achieved through setting up a modern medical university library in RMU and making the university a "Center of Excellence" in this region. We hope that in the future, RMU Library will be able to uplift the information services delivery at a world-class standard and will remarkably contribute to the development of the health sector not only in Bangladesh but also in other parts of the world. Over course of time, RMU Library will be a worldwide reputed medical university library by its name and fame.

b) Public Medical Colleges and Their Libraries

01. Dhaka Medical College (DMC) Library

Dhaka Medical College, Dhaka is one of the most renowned and oldest Medical colleges in Bangladesh & also in South East Asia. Dhaka Medical College was established in 1946 and since then, this prestigious institution has produced several physicians, surgeons, medical scientists, and teachers who are serving in the country and different parts of the world. Dhaka Medical College, as a pioneer, leading and largest medical college and hospital is always committed to providing quality undergraduate and postgraduate medical education and quality healthcare services in all specialties in the country. The college runs the MBBS and post-graduate courses. MBBS course is permitted to admit 197 students per year. Now Dhaka Medical College has 1000 local and around 100 foreign students in undergraduate and around 900 students in postgraduate courses. It is located at Secretariat Road, Shahbagh, Dhaka, Bangladesh (Dhaka Medical College, 2021).

The DMC Library shares around 4200 sft. area on the 3rd floor of the college building. The library is open for the students and faculty members from 8:00 to 2:30 P.M.

Library Resources: The Library is a well-decorated library that has a collection of around 34,500 books, and 1700 thesis/dissertations, and it preserves around 550 loose journals. Still, the library follows manual processes for organizing library resources and services.

Library Services: The library provides a wide range of loan facilities for the students as well as reading room facilities. Other services are hampered due to an acute lack of professional staff. Up to December 2020, the library was operated by 8 staff members of which 1 professional and 7 non-professional staff who are the library attendants, office assistants, and peons of the library. For the sake of protecting its valuable library resources and smooth functioning of the library, DMC authority must take immediate steps to recruit an adequate number of professional staff and necessary fund support. The library materials are organized according to traditional manual cataloging by non-professional staff and even no classification scheme is followed.

ICT facilities: The library has no provision for ICT facilities.

Library Website: As of 20 April 2021, the DMC Library Website is not functional under the DMC website.

02. Shaheed Suhrawardy Medical College (ShSMC) Library

Shaheed Suhrawardy Medical College is a medical institution located in the Dhaka district of Bangladesh. Directly managed by the government, the company was established in 2006; Which is currently one of the leading medical education institutes in the country. Here 1-year term hand-to-hand learning (Internship) along with 5-year term MBBS curriculum is running; so that 200 students are admitted every year and 5-year term BDS curriculum is available; so that about 50 students are admitted every year. Ayub was established as a central hospital in 1963 during the rule of East Pakistan. The educational activities of the college started with the Department of Pathological and Radiological.

Architect Louis I Kan plans to build the Shaheed Suhrawardy Hospital. Despite initially providing medical services as a hospital, due to long-standing demands, the Bangladesh government decided on September 5, 2005, to convert Shaheed Suhrawardy Hospital into a medical college and admit 100 students and on May 6, 2006, the college started its educational activities as Begum Khaleda Zia Medical College. Later on July 1, 2009, the name of the medical college was changed to Shaheed Suhrawardy Medical College. The Medical College Hospital has 500 students and 2000 staff. (Shaheed Suhrawardy Medical College, 2016).

The ShSMC Library is situated is located in the first floor of the college academic building. It consists of a reference room for the use of the faculty and doctors. There are two general reading rooms with accommodation for about 300 students.

Library Resources: The college library has a collection of over 9505 textbooks and about 600 national and international journals and 1 institutional journal. Library holds the latest collection of medical books but no electronic resources.

Library Services: The library offers mainly basic traditional services, including the reading room, circulation, reference, Wi-Fi, photocopy, computer printing, and readers' guidance. General textbooks can be borrowed by faculty members for a specific period. There are a total of 6 non-professional staff members including 1 Librarian (In-charge), 2 Library Assistants, and 3 MLSS to serve the Library. The library materials are organized according to the traditional manual process by non-professional staff and even no classification scheme and cataloging code are followed.

ICT Facilities: There are five computers and the whole library is under Wi-Fi internet service.

Library Website: The current website of this university library is: https://www.shsmc.gov.bd/facilities/library/

03. Sir Salimullah Medical College (SSMC) Library

Sir Salimullah Medical College is a renowned public medical college and hospital in Bangladesh. It is located on the banks of the river Buriganga in Old Dhaka. Its former name is Mitford Hospital. Before 1855, it was a Dutch factory used for business purposes. The hospital was established in 1858. The first initiative was taken to build Mitford Hospital in 1820. Robert Mitford, the then Collector of Dhaka, took this initiative. At the time of his death in 1836, he donated his property to the hospital. Lord Dalhousie later decided to build a hospital on the property. The value of his donated property was then 1,600,00 TK. Later, on May 1, 1858, the journey to Mitford Hospital began.

The journey of Dhaka Medical School started on July 1, 1875. Construction of the new medical school building began on April 2, 1887. It was inaugurated on October 22, 1889, two years later. In 1903, Sir Salimullah, the Nawab of Dhaka, gave a grant for the establishment of a maternity and women's ward here. In 1962, Dhaka Medical School was transformed into Medical College and the college was renamed Mitford Medical College. The following year, in 1963, the name of the college was changed to Sir Salimullah Medical College in recognition of the contribution of Nawabs. The college was transformed into a full-fledged medical college in 1972 and the first batch of MBBS courses was admitted in 1973. (Sir Salimullah Medical College, 2021).

The SSMC library is situated on the ground floor of the new academic building with a large collection of medical resources.

Library Resources: The Library consists of more than 250 Journals, 1 own journal, more than 36000 medical books, and 114 theses, Ph.D., and research papers. SSMC has a fast-developing special library section with books on health sciences.

Library Services: The library offers mainly basic traditional services, including the reading room, circulation, reference, WiFi, photocopy, computer printing, and readers' guidance. General textbooks can be borrowed by faculty members for a specific time. One professional librarian and 4 non-professional staff are involved with this library. The library materials are classified according to DDC Scheme by professional staff but no cataloging code is followed.

ICT Facilities: The Library introduced ICT in 2006 and from then it has 1 computer, 1 photocopy, and 1 printer.

Library Website: The current website of this university library is: https://www.ssmcbd.net/library.php

04. Armed Forces Medical College (AFMC) Library

Armed Forces Medical College (AFMC) is a military medical college located inside the Dhaka Cantonment. It was established by the Government of Bangladesh in 1999. It is run by the Bangladesh Armed Forces and is a college under the Ministry of Defense. There are two types of students: Medical Cadet (AFMC Cadet) and Army Medical Corps Cadet (AMC Cadet). Its administrative activities started on June 20, 1999, with 56 medical cadets. It is under the Ministry of Defense, approved by the Ministry of Health and Family Welfare, and recognized by the Bangladesh Medical and Dental Council. This medical college admits 100 students every year and till 2008 it was affiliated with Dhaka University. It has been affiliated with the Bangladesh University of Professionals since 2009. (Armed Forces Medical College, 2016).

Armed Forces Medical College has a well spacious and decorated library with an area of 5000 sqft. and the library has a rich collection of medical books and journals.

Library Resources: The library has a good collection of audio-visual resources. The library is trying to develop a rich collection of health sciences. A sufficient budgetary allocation is provided for the procurement of medical books for each financial year. Besides, the AFMC library has a stock of more than 13,665 books and 70 journal titles covering all aspects of medical science. AFMC publishes the Journal of Armed Forces Medical College biannually. The Journal is approved by BMDC and enlisted in Hinari. The journal is available on the college website as well as at BanglaJol.

Library Services: Besides the reading room services, the library offers circulation, reference, referral, CAS, and Internet services for its users. The library has no provision for indexing or abstracting services. The library maintains a register for incoming users. The library also provides photocopy and printing facilities for the users.

ICT Facilities: A total of 20 computers with broadband internet connections are available in the library computer lab. The medical students can explore the online books and journals from the computer lab that helps them to become information literate in the medical sciences.

Library Website: Library website is not available as of April 24, 2021.

c) Private Medical Universities/Colleges/Hospitals and Their Libraries

01. Bangladesh Medical College (BMC) Library

Bangladesh Medical College started functioning on 24 April 1986 and it is the first private medical college in Bangladesh. The Dhaka University granted affiliation to the College on 10 May 1988 and was recognized by Bangladesh Medical and Dental Council. The college is positioned at Road # 14/A, Dhanmondi, Dhaka-1209, Bangladesh (Bangladesh Medical College, 2016).

The BMC Library is a modern fully air-conditioned library located on the first floor of the college building with an area of approximately 4000 sqft.

Library Resources: The library has a collection of over 7700 books including expensive latest monographs, 200 loose journals, 100 magazines, and 200 bound journals. It subscribes to 16 international medical journals on an annual basis.

Library Services: The library has seating arrangements for 100 students and 15 teachers at any given time. The Medical Education Unit (MEU) is attached to the library. Besides the reading room services, the library offers circulation, reference, referral, CAS, and Internet services for its users. The library has no provision for indexing or abstracting services. The library maintains a register for incoming users. The library also provides photocopy and printing facilities for the users.

ICT Facilities: A total of 5 computers are available in the library for students and faculty members. The students can browse the Internet at no cost. PubMed is the core database used by doctors. There is also a rich collection of CDROM and video cassettes.

Library Website: Library website is not available as of April 24, 2021

02. Holy Family Red Crescent Medical College (HFRCMC) Library

The Holy Family Red Crescent Medical College started its academic activities in the academic year 1999-2000 with 50 students. The Holy Family Red Crescent Medical College and Hospital is situated at 1, Eskaton Garden Road, Dhaka-1000 on 8.10 acres of land. The creation of the new modern six-storied academic building covering is already completed and academic activities have started in the meantime at all the levels (Holy Family Red Crescent Medical College, 2021). The HFRCMC library is located on the first floor of the new academic building with a small collection of medical resources and the total library area is approximately 4500 sqft.

Library Resources: The Library consists of more than 1500 bound journals, 800 loose journals, 1 own journal, and more than 2500 medical books. The library is trying to develop a rich collection of books on health sciences but a sufficient budget allocation is not provided for the procurement of medical books.

Library Services: The library offers mainly basic traditional services, including the reading room, circulation, reference, WiFi, photocopy, computer printing, and readers' guidance. General textbooks can be borrowed by faculty members for a specific period. Two professional librarians and 2 non-professional staff are involved with this library. The library materials are classified according to DDC Scheme and AACR1 cataloging code for cataloging by professional staff.

ICT Facilities: The Library has no ICT facilities.

Library Website: Library website is not available as of April 24, 2021.

03. Green Life Medical College (GLMC) Library

The Green Life Medical College & Hospital started its academic activities in 2009 and it turned out to be a great success over time. This medical college is a non-government, non-profit, self-financing project and will serve humanity. The College is expanding day by day. An adjacent 15 storied building which is a part of the College is functional for running its academic activities (Green Life Medical College Hospital, 2016).

The GMC library is situated on the fourth floor of the new college building with a small collection of medical resources and the total library area is approximately 1600 sqft.

Library Resources: The Library consists of more than 50 reports, 239 loose journals, and more than 1600 medical books. The Library reading room can accommodate about 110 students at a time; students and teachers can also borrow Textbooks for use at home.

Library Services: The library offers mainly basic traditional services, including a reading room, circulation, reference, WiFi, photocopy, computer printing, and readers' guidance. General textbooks can be borrowed by faculty members for a specific period. One professional librarian and 2 non-professional staff are involved with this library. The library materials are organized according to in-house developed processes without following any standard library classification scheme and cataloging code.

ICT Facilities: The year ICT was introduced in the library is 2005. Now it has 2 computers with Internet connection and provision of Wi-Fi on the library premises. Computers, scanners, printers, and photocopiers are available in the cyber area so that the students may take reprographic services.

Green Life Medical College has a digital section as a part of its library having

Library Website: The current website of this college library is: http://www.greenlife.edu.bd/page/info/library

04. Anwer Khan Modern Medical College (AKMMC) Library

Anwer Khan Modern Medical College is one of the top private medical colleges in Bangladesh. It was established in 2008. It is situated at Road 8, Dhanmondi, Dhaka 1205, at the heart of the capital market. AKMMC is affiliated with International Medical Education Directory (IMED) since February 2015. It is recognized by BMDC, Medical Council of India (MCI), Nepal Medical Council (NMC) & World Health Organization (WHO). Anwar Khan Modern Medical College Journal is published twice a year (Anwer Khan Modern Medical College, 2021).

The AKMMC library is large and well decorated with a comfortable sitting arrangement. It has a rich collection of medical textbooks and reference books on medical science for the students and teachers. The library has also ICT facilities and a separate reading area for students as well as teachers. The library is situated on the 2nd floor of the administrative building with a good collection of medical resources and the total library area is approximately 2000 sqft.

Library Resources: The Library consists of more than 30 theses, 600 bound journals, and more than 5600 medical books. The Library reading room can accommodate about 150 students at a time; students and teachers can also borrow Textbooks for use at home.

Library Services: The library offers mainly basic traditional services, including the reading room, circulation, reference, WiFi, photocopy, computer printing, and readers' guidance. General textbooks can be borrowed by faculty members for a specific period. 2 professional librarians and 2 non-professional staff are involved with this library. The library materials are classified according to DDC Scheme and AACR2 cataloging code for cataloging by professional staff.

ICT Facilities: The year ICT was introduced in the library is 2009. Now it has 2 computers, 1 printer and 1 photocopier with Wi-Fi on the library premises.

Library Website: Library website is not available as of April 24, 2021.

05. Ibn Sina Medical College (ISMC) Library

Ibn Sina Medical College is a private medical college in Bangladesh, established in 2005, located in Kalyanpur, Dhaka. Ibn Sina Medical College is named after the famous philosopher, scientist, and physician Ibn Sina; Which was started by Ibn Sina Trust 7 In 1995, the Ibn Sina Board of Trustees planned to establish a medical college, which was implemented ten years later. The college was approved by the Bangladesh government in 2005. The academic activities of Ibn Sina Medical College were started through the admission of 50 students in the 2004-05 academic session.

The college is affiliated with the University of Dhaka and recognized by the Bangladesh Medical & Dental Council. (ISMC, 2021).

ISMC Library is airconditioned and has a total area of 1750 sqf that is situated on the 7th floor of the academic building. It has a rich collection of Reference books, Textbooks, and e-Journals. There is a separate reading area for the students as well as teachers. The library also provides Internet access. "Bangladesh Journal of Medical Science" is published by the ISMC.

Library Resources: The Library consists of more than 7 bound journals, 758 loose journals, and more than 4400 medical books. The Library reading room can accommodate about 100 students at a time; students and teachers can also borrow Textbooks for use at home.

Library Services: The library offers mainly basic traditional services, including the reading room, circulation, reference, WiFi, photocopy, computer printing, and readers' guidance. General textbooks can be borrowed by faculty members for a specific period. 2 professional librarians and 2 non-professional staff are involved with this library. The library materials are organized according to the DDC classification scheme; MeSH for subject headings but no cataloging code is followed.

ICT Facilities: The year ICT was introduced in the library is 2009. Now it has 2 computers, 1 printer and 1 photocopier with Wi-Fi on the library premises.

Library Website: The current website of this college library is: https://ismc.ac.bd/Library_and_jounal.php

06. Dhaka National Medical College (DNMC) Library

The long-expected Dhaka National Medical College started its journey in 1994. DNMC is functional under the rules and regulations set by the Bangladesh Medical and Dental Council (BM&DC), University of Dhaka, and Ministry of Health & Family Welfare, Govt. of the People's Republic of Bangladesh. Dhaka National Medical College is a non-political and non-profitable organization. Now the college has a new 11-storied academic building. In the session of 2019-2020, a total of 130 students have been admitted to the 26th batch. Already a total of 1804 graduate doctors have been passed from the college. The college is located at 53/1, Johnson Road, Dhaka-1100, Bangladesh (DNMC, 2021).

DNMC Library was established in 1994. It has rich collections of medical books and journals to support the academic activities of medical students and teachers of all disciplines. As a storehouse of knowledge, this library is considered one of the best

medical libraries in Bangladesh. The library is located on the 5th floor of the college building in approximately 8000 square floor space with two (2) reading rooms.

Library Resources: Library has a rich collection of about 6232 textbooks and reference books of original print and publishers with the latest edition. It has forty (40) local Journals and 3 International Journals for upgrading and enlargement of medical professionals. The collection of this library is increasing gradually because the library has a good relationship with top management. Hinari can be accessible from the library for accessing e-journals and e-books in health sciences.

Library Services: The library offers mainly basic traditional services, including the reading room, circulation, reference, WiFi, photocopy, computer printing and readers' guidance. General textbooks can be borrowed by faculty members for a specific time. Two professional librarians and 2 non-professional staff are involved with this library. The library materials are classified according to the NLM classification scheme and the AACR-2 cataloging code is followed.

ICT Facilities: There is a comfortable room of separate space in the library with multimedia and computers for teachers and students. It also has a Wi-Fi facility (a huge dedicate bandwidth) to facilitate academic activities and research of the students and faculty members. Five computers with internet connection facilities are provided. Modern CC cameras are available in the library with the cooperation of the ICT Cell of Dhaka National Medical College for monitoring students' activities. Bangabandhu Corner is going to be established immediately in a suitable room in the library.

Library Website: The current website of this college library is: https://www.dnmc.edu.bd/library

07. Bangladesh University of Health Sciences (BUHS) Library

Bangladesh University of Health Sciences (BUHS) was established in mid-2012 to uphold the health science academic and research activities of Bangladesh. It is the first-ever private medical university in Bangladesh. The University offers 25 undergraduate and postgraduate academic programs under four faculties. The university is located at 125/1, Darus Salam, Mirpur, Dhaka-1216, Bangladesh (Bangladesh University of Health Sciences, 2018).

BUHS Library is the heart of the university. The library has a rich collection of medical books and journals for students, faculty, and staff members of the BUHS.

The university library provides various types of information services and facilities and access to online
databases for meeting the diversified information needs of the doctors and students. The library is situated on the ground floor of an administrative building with a good collection of medical resources and the total library area is approximately 2250 sqft.

Library Resources: The Library consists of more than 305 theses, 15 bound journals,957 loose journals, 550 news clippings, and more than 2600 medical books. The Library reading room can accommodate about 50 students at a time; students and teachers can also borrow textbooks for use at home.

Library Services: The library offers mainly traditional and online services, including the reading room, circulation, reference, WiFi, photocopy, computer printing, news clippings, electronic alerts of the table of content of journals, and readers' guidance. General text books can be borrowed by faculty members for a specific period. Two professional librarians and 3 non-professional staff are involved with this library. The library materials are organized according to the NLM library classification scheme and AACR 2 cataloging code.

ICT Facilities: The year ICT was introduced in the library is 2017. Now it has 5 computers, 1 printer and 1 photocopier with Wi-Fi in the library premises. The library subscribes to 39 INASP (PERI) Consortium databases, which can be freely accessed by the library patrons. In addition, the library patrons can also freely access several international databases of journals and publications, such as PubMed/Medline, Popline, Hinari, Free Medical Books, Bioline International, etc. The library is currently using Koha for its automation activities.

Library Website: Library website is not available as of April 24, 2021.

08. Evercare Hospitals Dhaka (EHD) Library

Evercare Hospital Dhaka is managed by the Evercare Group. Evercare Hospital Dhaka is the first modern hospital in Bangladesh. So far EHD remains the only hospital in Bangladesh to hold the internationally recognized standard. The hospital is located at Plot: 81, Block: E, Bashundhara R/A, Dhaka 1229, Bangladesh (Evercare Hospital Dhaka, 2018).

Evercare Hospital Dhaka's Library is located on the 12th floor of the hospital. This library, in its newly organized structure, started operation in June 2020 to provide modern library services to clinicians. This is a modern library having internet facilities and a good sitting arrangement. The library has a moderate collection of medical books. The library keeps Evercare Hospital Dhaka's Official Journal "Pulse".

Materials in the library are arranged by subject divisional pattern, DDC scheme is followed for organizing library books. All materials are also listed on computers to ensure that the readers can select their necessary information in a very short time.

Library Resources: The Library consists of more than 300 Audio-Visual materials, 150 magazines and more than 400 medical books. The Library reading room can accommodate about 50 students at a time; students and teachers can also borrow textbooks for use at home.

Library Services: The library offers mainly traditional and online services, including the reading room, circulation, reference, WiFi, photocopy, computer printing, news clippings, electronic alerts of the table of content of journals, and readers' guidance. General textbooks can be borrowed by faculty members for a specific period. One professional librarian and 3 non-professional staff are involved with this library. The library materials are organized according to the DDC library classification scheme and AACR 2 cataloging code.

ICT Facilities: The year ICT was introduced in the library is 2020. Now it has 2 computers, 1 printer and 1 photocopier with Wi-Fi on the library premises. The library offers an internet facility.

Library Website: The current website of this hospital library is: https://www.evercarebd.com/library/

d) Specialized Medical Institutes and Their Libraries

01. icddr,b Library

icddr,b is an international health research institute, based in Dhaka, Bangladesh. For more than 60 years, it has been carrying out high-quality research activities and evidence-based interventions. The Cholera Research Laboratory (CRL), was set up in Dhaka on 5 December 1960, as the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) on 6 December 1978 (icddrb, 2021).

The icddr,b Library was established in 1962. The floor area of the library is about 6,000 sq.ft. icddr,b Library is equipped with modern ICT tools and technologies in library systems and services and has a total of 05 professional staff members. icddr,b Library has grown over the years to be one of the best medical libraries in Bangladesh. The library has rich collections in both print and e-resources, particularly; a broad range collection of print and e-journals has enriched the library significantly. At present, the Library consists of 48046 resources covering books, bound journals, reports, Audio-Visual resources, documents, and e-books. icddr,b library provides innovative library and information services to meet the information

needs of scientists and researchers. The Library utilizes the latest ICT tools and technologies in order to keep pace with the Centre's accelerated growth and development of scientific literature and finally disseminate the research findings and innovative information services to the scientific community. The Library and Information services, or the library, is fully equipped with the modern tools of information technology. At the end of December 2020, the most notable online databases cover Web of Science, GIDEON (Global Infectious Diseases and Epidemiology Online Network), JSTOR, SpringerNature, Cambridge University Press, Oxford Journals, and Up-to-Date. icddr,b Library is the heaviest user of Hinari that is accessible through the Research4Life program with free or low-cost online access to up 132,000 leading journals and books in the fields of health, agriculture, environment, applied sciences, and legal information. The Library has online access to up to 21,000 journals, up to 69,000 e-books, and up to 115 other information resources through the Hinari platform. Institutional Knowledge Repository (IKR) is the official digital repository of icddr,b using DSpace open-source software. Since 2005, icddr,b Library is engaged to manage this IKR for free online access to icddr,b publications globally and so far a total of 10098 documents have been uploaded to IKR.

Library Resources: The Library consists of more than 450 Audio-Visual materials, 2105 reports, 660 loose journals, 18450 bound journals, and more than 15300 medical books. The Library reading room can accommodate about 50 users at a time; scientists can also borrow library resources for use at home. The most notable online resources are Research4Life, PubMed, Web of Science, Cambridge Journals, Oxford Journals, Wiley Online Books, GIDEON, Indian Journals, National Geographic, EBSCO, ProQuest, Ulrich Web, and UpToDate.

Library services: The services provided by the library cover circulation service, Online Public Access Catalogue (OPAC), Web OPAC, photocopying, guidance, reference and bibliographic, internet/online (cyber corner), Online document delivery services, collaboration and partnership development, current awareness, bulletin information, referral service, Electronic Document Services, literature search, citation management, indexing, training program on literature search, manuscript approval service, Plagiarism detection for scientific writings, information literacy and reference management (EndNote) services in scholarly writings.

ICT Facilities: The propriety software named "Liberty" is currently being used for ILS of the library. The library has its Institutional Repository (IR) called IKR preserving the scientific output of icddr,b scientists. icddr,b library manages all the activities of IKR. The Library successfully implemented RFID (Radio Frequency

Identification) technology in May 2016 by which it is possible to make inventory, to track materials throughout the library efficiently, including easier and faster self-charging and discharging. There are a total of 15 computers at Cyber Corner inside the Library with broadband Internet connectivity. Liberty is used as the integrated library management software. Distance Collaboration Centre (DCC), a digital video conferencing facility, has recently been installed in the library of icddr,b. The infrastructure of DCC has been sponsored and developed by the Bangladesh Research and Education Network (BdREN), a sister concern of the University Grants Commission of Bangladesh (UGC).

Library Website: The current website of this medical library is: https://www.icddrb.org/knowledge-sharing/library

02. Bangladesh Institute of Research and Rehabilitation for Diabetes, Endocrine and Metabolic Disorders (BIRDEM) Library

BIRDEM (Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders) is a special research institute and hospital located at Shahbagh in Dhaka, was established in 1977. BIRDEM is the first institute of diabetes, endocrine, and metabolic diseases in Bangladesh.

BIRDEM Library is a standard medical and health science library in the country. It started in 1975. BIRDEM library was established in 1977 with the establishment of the Diabetic Association of Bangladesh (DAB). It is situated on a 5200 sqft. of the area on the 2nd floor of Ibrahim Memorial Diabetes Center, Shahbag, Dhaka 1000. The library is open with its 85-seating capacity on the working days from 7:30 AM to 9:00 PM.

Library Resources: The total learning resources of the library are about 12500 which include 8760 books and monographs and 3065 bound journals. The library subscribes to 40 local, 62 international journals, and 8 daily newspapers. As a resource access tool, the library uses both manual and bibliographic databases. It uses the NLM classification scheme.

Library Services: Besides the reading room services the library offers circulation facilities for its users. The library has no provision for indexing or abstracting services. The library maintains a register for incoming users. The library also provides photocopy facilities for the users.

ICT Facilities: The library has five computers and maintain library automation activities using SLiMs software in 2017. The library provides Internet browsing facilities. It holds the MEDLINE and POPLINE CD-ROM literature. Users can search

the CD-ROMs and can copy the necessary information. The library has a free access agreement to the journal articles with "PubMed"- a search engine on medical resources- on the Internet. The total manpower in the library is 9 including four professional and five non-professional staff.

Library Website: The current website of this medical library is: https://birdembd.org/?q=birdem-library

03. Bangladesh College of Physicians and Surgeons (BCPS) Library

Bangladesh College of Physicians and Surgeons (BCPS) is the management and regulatory body for postgraduate education and training in medicine in Bangladesh. The college has played a unique role in creating specialists in various branches of medical science who are working as medical teachers, consultants, and specialists. The college was the then East Pakistan branch of the College of Physicians and Surgeons (CPSP) of Pakistan.

Although the college was established in 1962, it was reorganized in 1972 by the order of the President with existing Fellows and Founding Fellows. In July 1972, the first FCPS examination was conducted in an independent country due to the dedicated efforts of the Fellows. At first, the college conducted its activities in the temporary office at Dhanmondi. In 1982, the college was shifted to its present premises at Mohakhali, Dhaka. The College now offers higher medical degrees in FCPS and MCPS in 41 and 15 subspecialties respectively.

BCPS Library offers outstanding, dynamic, and responsive library services to doctors and fellows with its rich collection and cutting-edge technologies (Bangladesh College of Physicians and Surgeons, 2021).

Library Resources: The BCPS Library has a good number of medical books, journals, and e-resources. The Library resources include books, periodicals, dissertations, theses, CD-ROMs, etc. At present, BCPS Library has access to around 5,130 books, 10,794 dissertations, 200 theses, and 80 national and international current periodicals. In addition, the library also offers access to Hinari online databases for accessing medical e-books and e-journals.

Library Services: The services provided by the library to the medical professionals of the country are information retrieval service, electronic library service, photocopying service, reference, and bibliographic service, and reading room facilities.

ICT Facilities: A total of 10 PCs are available in the BCPS library for accessing e-resources. The library has also Wi-Fi facilities. Physicians and students of the library can browse, download and print materials from the web recourses (Bangladesh College of Physicians and Surgeons, 2021).

Library Website: The current website of this medical library is: https://bcps.edu.bd/library.php

04. National Health Library and Documentation Center (NHLDC)

NHLDC of Directorate General of Health Services, Ministry of Health and Family Welfare is the National Health Library in Bangladesh. With the help of the Asia Foundation, it was established in 1974 and now is functioning in its own building at Mohakhali, Dhaka 1212. This Library aims to cope with the increasing rate of publication on health science and medical literature and to fulfill the demand of the health scientists and medical professionals of the country. The 10000 sqft space of the library building is properly decorated for 100 seated reading hall-room, circulation counter, stacks room, and administrative spaces. The library has a total of 13 staff members of which 9 professionals and 4 non-professionals.

Library Resources: The library maintains a reasonable extent a well-balanced collection of books, journals, current subscriptions, and audio-visual teaching. and research materials in the field. It also acts as a depository library of biomedical literature published in the country and compiles national bibliography of this literature. It also serves as the apex body for biomedical information networks within the country for sharing resources and further linking the country with the health literature. NHLDC has a collection of over 18,500 books, 1500 theses, and 15,000 bound journals. It receives 60 indigenous journals (90% on a complimentary basis). It has also 5,000 microfiches, 150 motion pictures, 2,590 slides, 22 tapes, 101 filmstrips, and 18 CD-ROM discs.

Library Services: A wide range of circulation, inter-library-loan, reference, and bibliographical services are available in the library. Students, faculty members, researchers, and physicians of health science institutes can borrow books for a certain period. Different categories of CAS and photocopy services are available in the library. In response to a specific request by the users, the library compiles short bibliographies and reading lists. The library sends its list of new arrivals to the selected health science institutes in the country. The library also offers Internet access, CD-ROM searching, and SDI services on a limited scale.

ICT Facilities: The library has a total of 40 PCs with printers and Internet facilities. In the past, the library initiated building its bibliographical database using CDS/ISIS. Very recently the library is trying to automate its functions using Koha Software. As a national health library, the NHLDC can play important role in accumulating, processing, preserving, and disseminating related literature in the health, population, and nutrition sector in Bangladesh.

Library Website: Library website is not available as of April 24, 2021.

05. WHO Bangladesh Library

WHO (World Health Organization) has been a core partner of the Government of Bangladesh since 1972. Bangladesh Government is receiving huge financial and administrative support from the WHO for the attainment of the highest possible level of health by all. At present, WHO Bangladesh is playing a significant role in developing the country's public health systems. The country office is situated at 10 Gulshan Avenue, Gulshan-1, Dhaka-1212, Bangladesh (WHO, 2021).

WHO Bangladesh Library is situated on the 1st floor of the office building with a small collection of medical resources and the total library area is approximately 1200 sqft. The library contains computers, a scanner, a printer, 24 hours high-speed internet access and also a photocopier so that the staff members will get all the learning facilities.

Library Resources: The Library consists of more than 2000 WHO and UN reports, and more than 5000 medical books. The Library reading room can accommodate about 20 staff at a time; they can also borrow books and reports for use at home.

Library Services: The library offers mainly basic traditional services, including the reading room, circulation, reference, WiFi, photocopy, computer printing, and readers' guidance. Only 1 non-professional staff is involved with this library. The library materials are organized according to in-house developed processes without following any standard library classification scheme and cataloging code.

ICT Facilities: The year ICT was introduced in the library is 2006. Now it has 4 computers, 1 printer and 1 photocopier with Wi-Fi on the library premises. Hinari is accessible from this library.

Library Website: Library website is not available as of April 24, 2021.

06. National Institute of Preventive & Social Medicine (NIPSOM) Library

NIPSOM is the main body in the public sector in Bangladesh. It is one of the major and first-born post-graduate institutes in public health in the Southeast Asian Region. NIPSOM was established by the Father of the Nation Bangabandhu Sheikh Mujibur Rahman in 1974; the academic program resumed in 1978. NIPSOM is affiliated with Bangabandhu Sheikh Mujib Medical University (BSMMU).

NIPSOM library was established in 1976 and situated at the Mohakhali health complex, Dhaka 1212. As an academic library of the National Institute of Preventive and Social Medicine, it is responsible for meeting the curriculum needs of its post-graduate programs and services. The library occupies about 2000 sqft of space on the 1st floor of the NIPSOM building. The library is open from 8:00 AM to 8:30 PM except for Friday and other government holidays (NIPSOM, 2020).

Library Resources: NIPSOM library has a collection of about 20,000 library resources including text and reference books, reports, thesis papers, theses, manuals, and some reference collections including "Index Medicus". The library has a good collection of foreign medical books and journals. The library also preserves the back issues of the journals which are now around 250 volumes in number.

Library Services: Around 70 faculty members and the students are enjoying open-shelf accessibility in the library. Besides the reading room services, they are privileged with photocopying and circulation services.

ICT Facilities: The library has 10 computers with Internet facilities Wi-Fi on the library premises. The library maintains a card catalog and NLM classification scheme for the organization of resources. The progress of the computerization of library activities is still in a stagnant position due to a lack of proper initiative and expert manpower. At present, the Library is run by 2 non-professional staff members. Hinari is accessible from this library.

Library Website: The current website of this medical library is https://www.nipsom.gov.bd/library/

07. Bangladesh Institute of Child Health (BICH) Library

Bangladesh Institute of Child Health (BICH) under the academic wing of DSH (Dhaka Shishu Hospital) started its journey in 1983. It is affiliated with Dhaka University, BSMMU, and BCPS. Various pediatric postgraduate courses e.g., FCPS (Fellow of the College of Physicians and Surgeons), MD (Doctor of Medicine), MS (Master in Surgery), DCH (Diploma in Child Health) are offered by BICH (Dhaka Shishu Hospital, 2017).

BICH Library is known as the modern academic library. The library was established in 1983 and situated at the Sher-e-Bagla, Dhaka 1207. As an academic library, 100-150 doctors can use the library at a time. The library occupies about 4500 sqft of space on the 3rd floor of the main building. The library is open from 8:00 AM to 9:00 PM except for Friday and other government holidays.

Library Resources: The Library consists of more than 40 bound journals, 200 loose journals, 350 theses, and more than 3000 medical books. The Library reading room can accommodate about 100 physicians at a time; they can also borrow textbooks for use at home.

Library Services: The library offers mainly traditional and online services, including the reading room, circulation, reference, WiFi, photocopy, computer printing, and news clippings. Four professional librarians and 2 non-professional staff are involved with this library. The library materials are organized according to the NLM library classification scheme and AACR 2 cataloging code.

ICT Facilities: ICT facilities have been introduced in the library in 2008. Now it has 10 computers, 1 printer and 1 photocopier with Wi-Fi on the library premises. The library offers Internet and e-resources facilities. Physicians and students can access Hinari and ScienceDirect can be made through the Library. Library users can serach the Internet by using library computers.

Library Website: Library website is not available as of April 24, 2021.

CHAPTER 6

DATA ANALYSIS AND INTERPRETATION

Chapter 6

Data Analysis and Interpretation

Analysis of data involves a thorough analysis of the data and searching for patterns of relationships that exist among data groups. Interpretation is the process of explaining the findings based on some theory. This chapter is an attempt to evaluate the existing situations in the medical libraries in terms of health information systems and services and opinions and expectations of the users regarding library resources and services that are currently being practiced in the surveyed libraries.

One of the key purposes of this study is to investigate the health information systems and services in 22 medical libraries of Bangladesh. The primary data was collected through questionnaires with a supplement of the informal interview with the Library Heads and Library Users and personal observations of the researcher during the physical visit are also applied to various aspects of library systems and services available in the surveyed libraries. This chapter interprets all the required data and presents the necessary analysis of the data for getting a solid foundation of the present state of the studied medical libraries. All the data collected have been analyzed and presented in the form of tables, figures, and charts. Appropriate statistical measures like Frequency, Percentage, Descriptive Statistics, Mean, Median, Standard Deviation, Sum, etc. have been used in data analysis. The statistical analysis was done through Statistical Packages for the Social Science (SPSS) (version 20.0) and MS Excel programs.

Therefore, this chapter is organized into two major sections:

- **SECTION – 1**: Health Information Systems and Services: Librarians' Perspective
- **SECTION – 2**: Health Information Systems and Services: Users' Perspective

SECTION – 1: Health Information Systems and Services: Librarians' Perspective

As mentioned in Chapter 1, the research study is primarily intended to cover 22 leading medical libraries in Bangladesh in order to find out the real picture of health systems and services. But while collecting data, it was found that Chittagong Medical University Library (CMUL) and Rajshahi Medical University Library (RMUL) have recently been established and library activities have not started yet. So, the researcher has excluded these two universities from the data analysis and interpretation section. As a result, a total of 20 medical libraries have been taken finally for analyzing data.

Findings and Discussion

The tables and figures presented below are based on an analysis of the responses to the questionnaires sent to the library heads and personal observations of twenty libraries.

Surveyed Medical Libraries

The list of the selected 20 medical libraries with the abbreviated forms is presented in Table 6.1

Table 6.1: List of surveyed medical libraries with abbreviated form

SL No.	Name of the Medical Libraries	Abbreviated Form*
1.	Bangabandhu Sheikh Mujib Medical University Library	BSMMUL
2.	Dhaka Medical College Library	DMCL
3.	Shaheed Suhrawardy Medical College Library	ShSMCL
4.	Sir Salimullah Medical College Library	SMCL
5.	Armed Forces Medical College Library	AFMCL
6.	Bangladesh Medical College Library	BMCL
7.	Holy Family Red Crescent Medical College Library	HFRCMCL
8.	Green Life Medical College Library	GLMCL
9.	Anwar Khan Medical College Library	AKMCL
10.	Ibn Sina Medical College Library	ISMCL
11.	Dhaka National Medical College Library	DNMCL
12.	Bangladesh University of Health Sciences Library	BUHSL
13.	Evercare Hospital Dhaka's Library	EHDL
14.	International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) Library	icddr.b L
15.	Bangladesh Institute of Research and Rehabilitation for Diabetes, Endocrine and Metabolic Disorders Library	BIRDEML
16.	Bangladesh College of Physicians and Surgeons Library	BCPSL
17.	National Health Library and Documentation Centre	NHLDC
18.	WHO Bangladesh Library	WHO,BL
19.	National Institute of Preventive & Social Medicine Library	NIPSOML
20.	Bangladesh Institute of Child Health Library	BICHL

**Abbreviated forms have been used in some Tables and Graphs for better appearance*

The required data have been collected through the questionnaire method, supplemented by informal discussions with the library heads. A questionnaire consisting of 24 major headings like General profile of the library, Library users, Human resources, Library Advisory Committee, Library space, Library divisions, Collection development, Technical processing, Library public relation and marketing, Library resources, Library services, ICT and Automation facilities, Web-based library services, Library website, Institutional Repository, Model for ILS, Library challenges and so on.

Nature of Organizations/Institutions

The 20 surveyed libraries are broadly categorized into four groups: Public, Private, International, and Autonomous. Figure 6.1 presents that, out of the 20 institutions under the study, 45% (9) institutes fall under the 'Private' type and 20% (4) organizations are exclusive "Autonomous" organizations followed by 25% (5) are under "Public" and only 2(10%) are treated as International organizations i.e. icddr,b and WHO, Bangladesh.

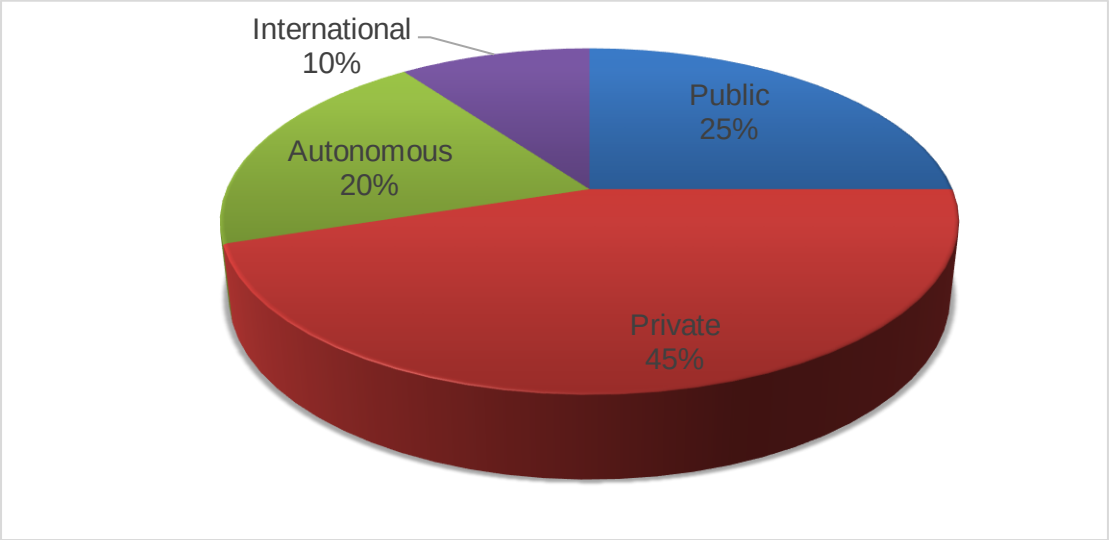


Figure 6.1: Percentage distribution of nature of organizations

General Profile of the Institutions

Table - 6.2 shows the basic information of the medical organizations related to the year of establishment and website availability. According to the Table, DMC which was established in 1946 is the oldest public medical college in the country and Anwar Khan and Green Life are the newest private medical colleges respectively both being established in 2008 and 2009. icddr,b and BCPS have also been established many years back i.e. 1962 and 1972 accordingly. In relation to website availability, all the

surveyed medical organizations have their websites apart from NHLDC. From Table - 6.2, we have concluded that icddr,b and BSMMU have grown up over the years and become mature enough in respect of facilities and services.

Table 6.2: Basic profile of the organizations

SL No.	Name of the Medical Institutions	Establishment Year	Website Availability
01.	Bangabandhu Sheikh Mujib Medical	1965	Yes
02.	Dhaka Medical College	1946	Yes
03.	Shaheed Suhrawardy Medical College	2006	Yes
04.	Sir Salimullah Medical College	1963	Yes
05.	Armed Forces Medical College	1999	Yes
06.	Bangladesh Medical College	1986	Yes
07.	Holy Family Red Crescent Medical	2000	Yes
08.	Green Life Medical College	2009	Yes
09.	Anwar Khan Medical College	2008	Yes
10.	Ibn Sina Medical College	2005	Yes
11.	Dhaka National Medical College	1994	Yes
12.	Bangladesh University of Health	2013	Yes
13.	Evercare Hospital Dhaka	2020	Yes
14.	International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b)	1962	Yes
15.	BIRDEM	1975	Yes
16.	Bangladesh College of Physicians and	1972	Yes
17.	National Health Library and	1974	No
18.	WHO Bangladesh	2005	Yes
19.	National Institute of Preventive & Social	1976	Yes
20.	Bangladesh Institute of Child Health	1983	Yes

Library Space with Seating Capacity

Table 6.3 shows that BSMMUL has the largest space for its users i.e., 228,00 square feet, and WHO Bangladesh Library has the smallest space i.e., 1200 square feet. BSMMUL has a seating capacity of 750 users, while Bangladesh University of Health Sciences Library and Evercare Hospital Dhaka's Library each have a total of 50 seats for users, and only 20 seats are available at WHO Bangladesh Library. Of public medical colleges, Sir Salimullah Medical College Library has the highest seating capacity for the students, i.e., 300.

Table 6.3: Library space and seating capacity

Name of the Medical Libraries	Total Library Space (Sft)	Users Seating Capacity
BSMMU Library	22800	750
Dhaka Medical College Library	4200	100
Shaheed Suhrawardy Medical College Library	4000	120
Sir Salimullah Medical College Library	2000	300
Armed Forces Medical College Library	5000	130
Bangladesh Medical College Library	4000	100
Holy Family Red Crescent Medical College	4500	300
Green Life Medical College Library	1600	110
Anwar Khan Medical College Library	2000	150
Ibn Sina Medical College Library	1750	100
Dhaka National Medical College Library	8000	140
Bangladesh University of Health Sciences	2250	50
Evercare Hospital Dhaka's Library	4000	50
icddr,b Library	6000	70
BIRDEM Library	5200	80
BCPS Library	3000	80
National Health Library and Documentation	10000	100
WHO Bangladesh Library	1200	20
National Institute of Preventive & Social	4000	120
Bangladesh Institute of Child Health Library	4500	150

Own Library Building

A question pertaining to the existence of own library building revealed that 80% of libraries covered in the study have their own library buildings that reflect a good infrastructure sign as shown in Table 6.4 and Figure 6.2.

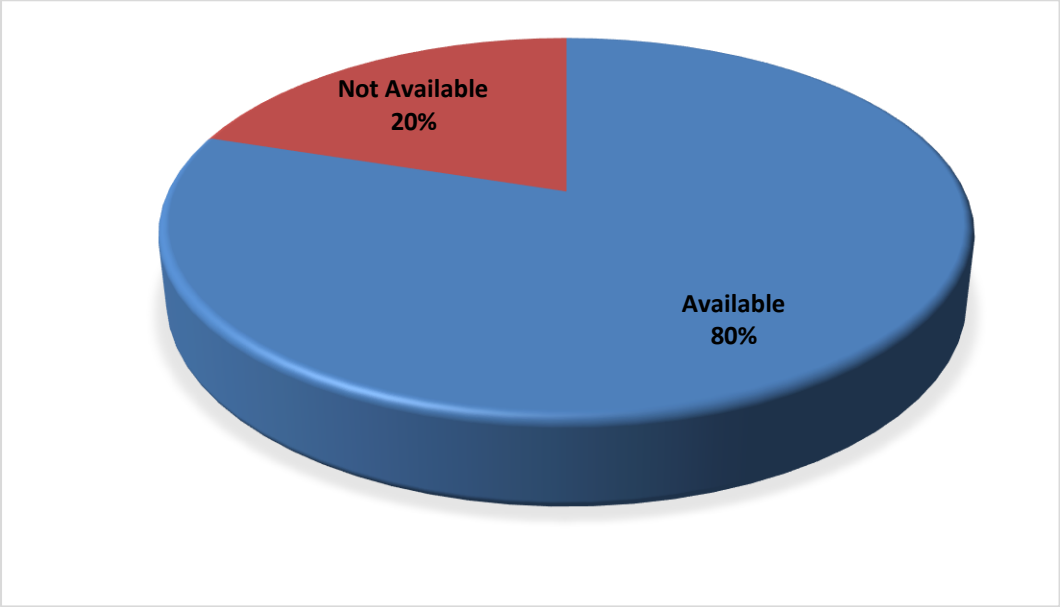


Figure 6.2: Percentage status of own library building

Table 6.4: Existence of own library building

Name of Library		Existence of Own Library Building			
		No		Yes	
	AFMC Library	0	0.0%	1	6.2%
	AKMC Library	0	0.0%	1	6.2%
	BCPS Library	0	0.0%	1	6.2%
	BICH Library	1	25.0%	0	0.0%
	BIRDEM Library	0	0.0%	1	6.2%
	BMC Library	1	25.0%	0	0.0%
	BSMMU Library	0	0.0%	1	6.2%
	BUHS Library	0	0.0%	1	6.2%
	DMC Library	0	0.0%	1	6.2%
	DNMC Library	0	0.0%	1	6.2%
	EHD Library	0	0.0%	1	6.2%
	GLMC Library	0	0.0%	1	6.2%
	HFRCMC Library	0	0.0%	1	6.2%
	icddr,b Library	0	0.0%	1	6.2%
	ISMC Library	0	0.0%	1	6.2%
	NHLDC	0	0.0%	1	6.2%
	NIPSOM Library	0	0.0%	1	6.2%
	ShSMC Library	0	0.0%	1	6.2%
	SSMC Library	1	25.0%	0	0.0%
	WHO,B Library	1	25.0%	0	0.0%

Category of Library Users

Figure 6.3 illustrates the various categories of users in surveyed libraries belonging to the highest percentage 95% falls into the "Doctor" category followed by "Student" and "Staff" fit to 90% each in which multiple answers are allowed.

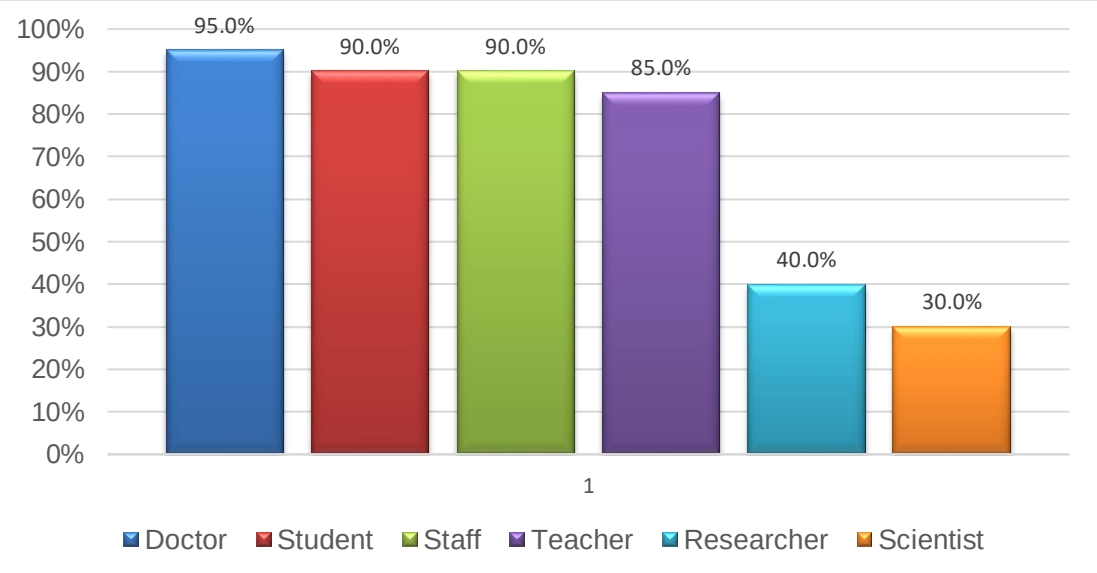


Figure 6.3: Category of library users

Approximate Number of Users Per Day

The approximate number of users of selected libraries is shown in Figure 6.4. It is observed that a good number of approximate users numbering 1000 use the BSMMU library daily whereas EHDL has a limited number of users i.e. 10 per day.

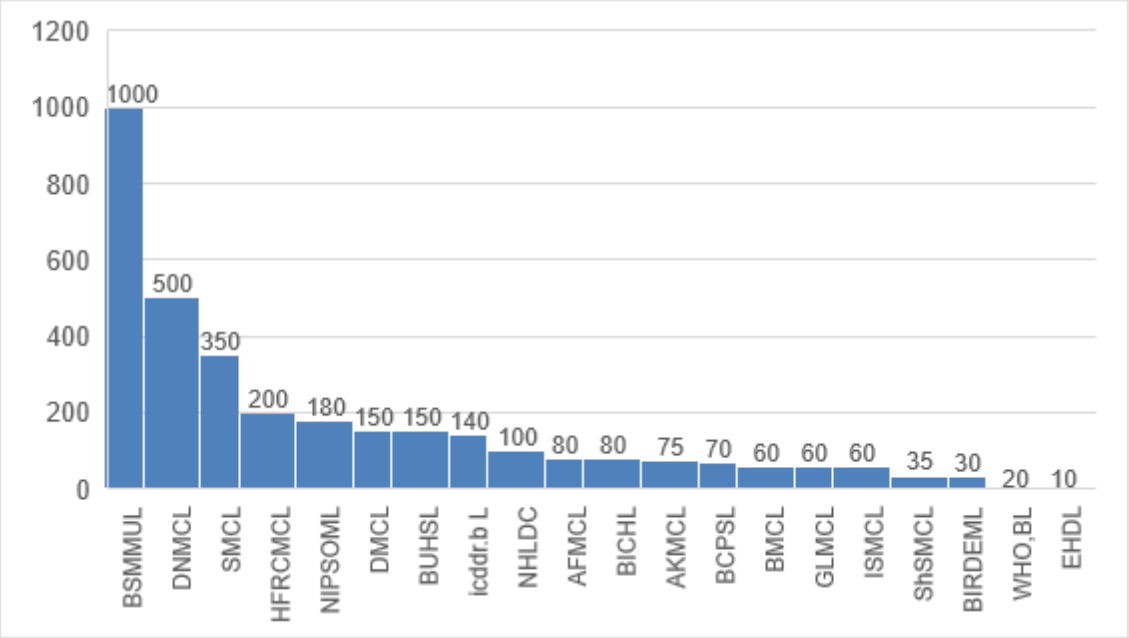


Figure 6.4: Approximate number of users

Total Number of Library Members

The total number (approximate) of library members of the investigated libraries is illustrated in Figure 6.5. It is found that the BCPS library is well ahead in terms of library membership belonging to 3,400 library members whereas only 110 library members are available in WHO, BL. There is no provision for library membership in NHLDC.

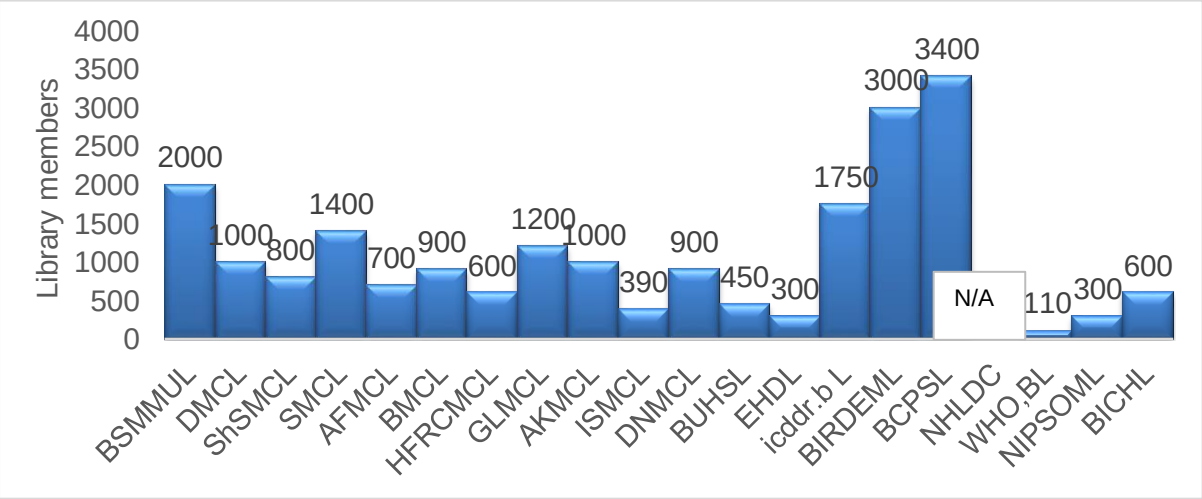


Figure 6.5: Status of library membership

Human Resources (HR) in Medical Libraries

In the modern ICT arena, human resources play a significant role in performing library activities efficiently and effectively. In this respect, the responsibilities of the "Library Head" are also vital for the overall improvement of a library. Figure 6.6 explores the top position in the medical libraries covered in the study. It is found that the position "Librarian" is available in the major 45% of libraries, but 4 libraries (20%) namely BSMMU, NIPSOM, WHO,B and ShSMC have no professional full-time librarians. The library head (In-Charge) of these libraries came from different backgrounds such as "Doctor" (in BSMMUL) and Masters (WHO, BL and ShSMCL) from other subjects, and one from NIPSOM Library holds an "HSC" degree.

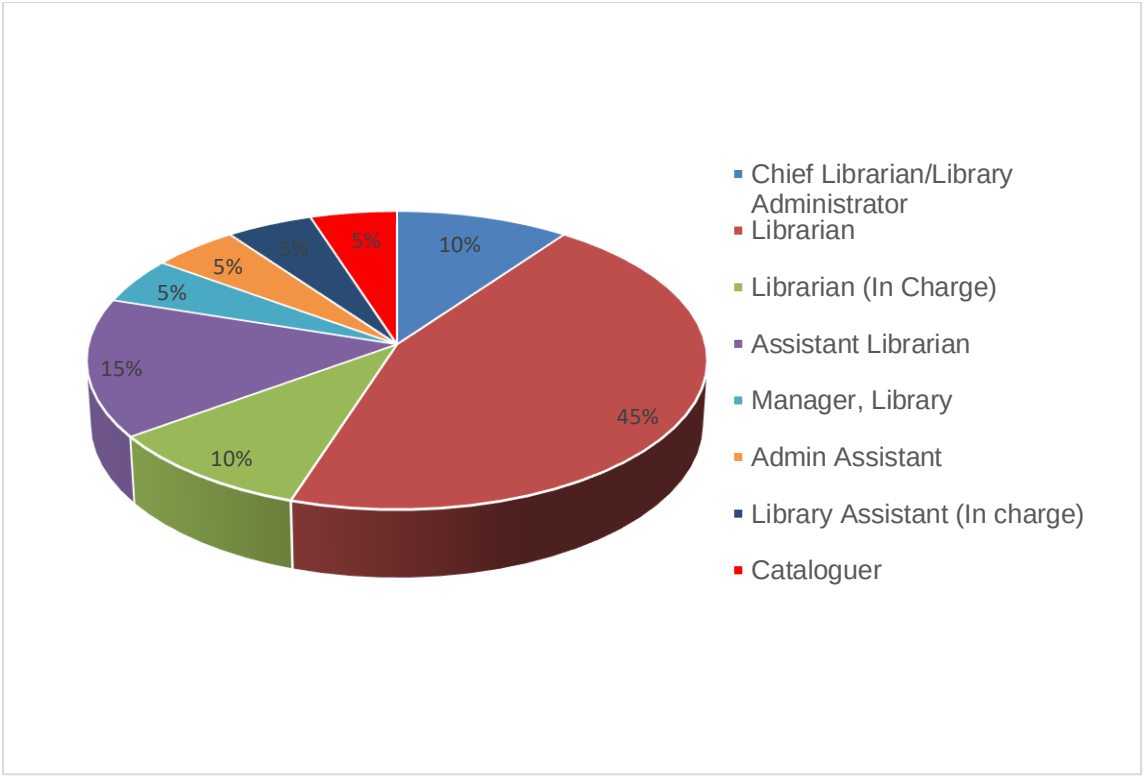


Figure 6.6: Status of library heads' designation

Total staff with IT background

Library manpower is treated as one of the core components for developing health information systems and services. The development of a library depends much on its human resources. A sufficient number of skilled and professional human resources play a vital role in the proper functioning of any library. The distribution of staff members among different service units, in most of the surveyed libraries, is not properly maintained. Most of the medical libraries are understaffed and do not have IT-experienced staff. Respondents were asked to mention the staff available in their respective libraries. Table 6.5 and Figure 6.7 below reveal data pertaining to staff with IT knowledge at the selected libraries. It shows that the medical libraries established many years back have more library personnel than the newer ones. In this case, BSMMU library has the largest number of personnel i.e. 29 persons with 4 IT knowledge whereas EHDL and WHO,BL each have the lowest number of personnel i.e. 1 person in the library, which is not a good sign for library development.

Table 6.5 Existing staff strength of the sample medical libraries

Designation	**BSMMUL**	**DMCL**	**ShSMCL**	**SMCL**	**AFMCL**	**BMCL**	**HFRCMCL**	**GLMCL**	**AKMCL**	**ISMCL**	**DNMCL**	**BUHSL**	**EHDL**	**icddr.b L**	**BIRDEML**	**BCPSL**	**NHLDC**	**WHO,BL**	**NIPSOML**	**BICHL**
Chief Librarian/Library Administrator	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-
Librarian [Full time] or [Part time]	1p	1	1p	1	-	-	1	1	1		1	1	1	1	1		-	-	-	1
Additional Librarian	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Deputy/Associate/Joint Librarian	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-
Assistant Librarian/Sr. Information	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	1	-	-	-
Assistant Librarian	2	-	-	-	-	1	-	-	1	2	1	-	-	-	1	-	-	-	-	1
Jr. Assistant librarian/ Library Officer	4	-	-	-	1		-	-	-	-	-	1	-	-	-	1	-	-	-	2
Library Assistant/Admin Assistant	4	3	2	4	1	2	-	2	-	-	-	1	-	1	2		4	1p	1p	1
Library Attendant	4	1	-	-	1	-	2	-	2	-	-	2	-		1	3	-	-	1	-
Library Administrator/Section Officer	4	2	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Others Supporting Staff	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
IT Specialist/ system administrator	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Others (please specify):	4	1	3	-	-	-	-	-	-	-	6	-	-	3	3	-	8	-	-	1
Total	**29**	**8**	**6**	**5**	**3**	**3**	**3**	**3**	**4**	**4**	**8**	**6**	**1**	**8**	**8**	**5**	**13**	**1**	**2**	**6**

'p' indicates Part Time and "-"for Not Available

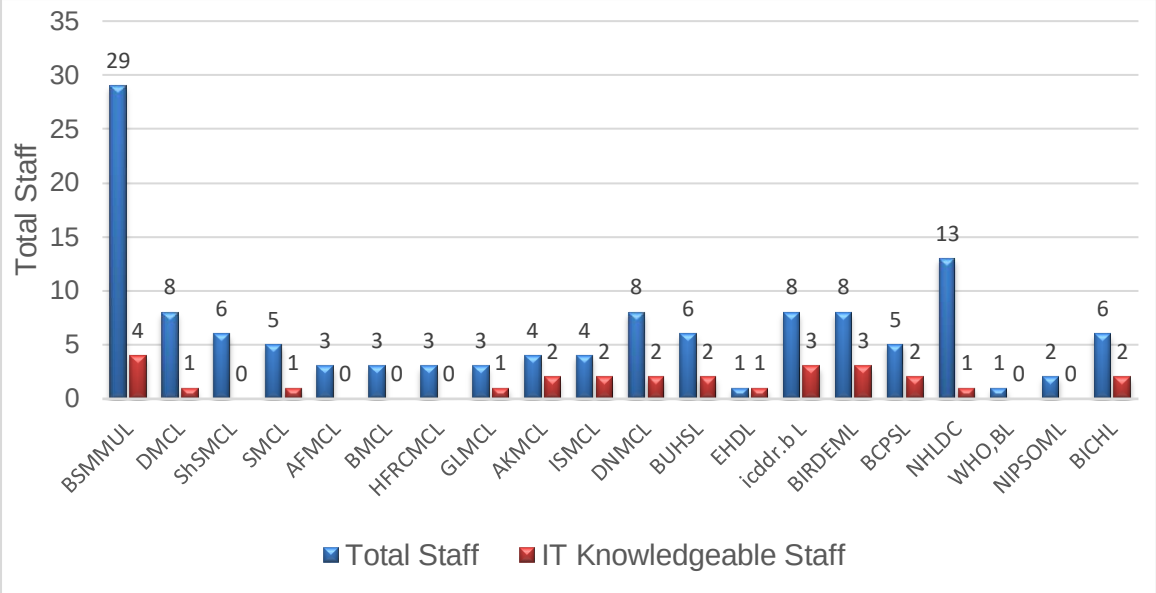


Figure 6.7: Staff strength with IT knowledge

Professional Staff in Selected Libraries

The library needs different types of professional manpower for performing various tasks regularly. It may be mentioned that the non-professional human resources mean those who do not have any basic training and education about the library system. At the time of the survey, all the surveyed libraries have more or less professional staff apart from ShSMCL, WHO,BL and NIPSOML; and the BSMMU Library has the highest number i.e. 11 of professional staff is traced from Figure 6.8.

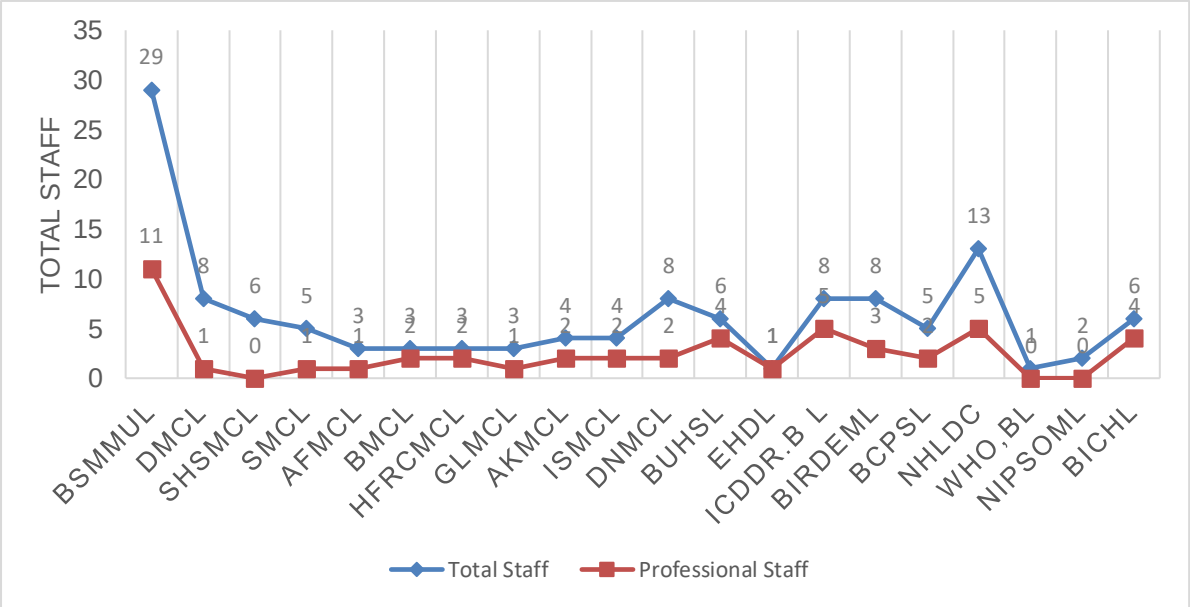


Figure 6.8: Extent of professional staff

Library Opening Hours

Table 6.6 and Figure 6.9 indicate that Shaheed Suhrawardy Medical College Library remains open for the longest periods i.e., 15 hours, as well as BSMMUL, maintains the second-longest opening period among all the sample medical libraries. The Table also indicates that 2 medical libraries have been open for 7 days. The libraries are BSMMU Library and BUHS Library.

Table 6.6: Distribution of libraries according to opening hours

Name of the Medical Libraries	Opening time	Closing Time	Duration	Open in a Week
BSMMU Library	08.00 am	09.00 pm	13.0 hour	7 Days
Dhaka Medical College Library	09.00 am	05.00 pm	08.0 hour	5 Days
Shaheed Suhrawardy Medical College Library	08.00 am	11.00 pm	15.0 hour	5 Days
Sir Salimullah Medical College Library	08.00 am	09.00 pm	13.0 hour	5 Days
Armed Forces Medical College Library	08.00 am	08.00 pm	12.0 hour	5 Days
Bangladesh Medical College Library	08.00 am	08.00 pm	12.0 hour	6 Days
Holy Family Red Crescent Medical College Library	08.00 am	08.00 pm	12.0 hour	6 Days
Green Life Medical College Library	08.00 am	10.00 pm	14.0 hour	6 Days
Anwar Khan Medical College Library	08.00 am	07.00 pm	11.0 hour	6 Days
Ibn Sina Medical College Library	08.00 am	10.00 pm	14.0 hour	5 Days
Dhaka National Medical College Library	08.00 am	06.00 pm	10.0 hour	6 Days
Bangladesh University of Health Sciences Library	09.00 am	08.00 pm	11.0 hour	7 Days
Evercare Hospital Dhaka's Library	09.00 am	05.00 pm	08.0 hour	5 Days
icddr,b Library	08.30 am	05.00 pm	08.30 hour	6 Days
BIRDEM Library	08.00 am	09.00 pm	13.0 hour	6 Days
BCPS Library	08.00 am	09.00 pm	13.0 hour	6 Days
National Health Library and Documentation Centre	09.00 am	05.00 pm	08.0 hour	5 Days
WHO Bangladesh Library	08.00 am	04.30 pm	08.30 hour	5 Days
NIPSOM Library	09.00 am	08.00 pm	11.0 hour	5 Days
Bangladesh Institute of Child Health Library	08.00 am	09.00 pm	13.0 hour	6 Days

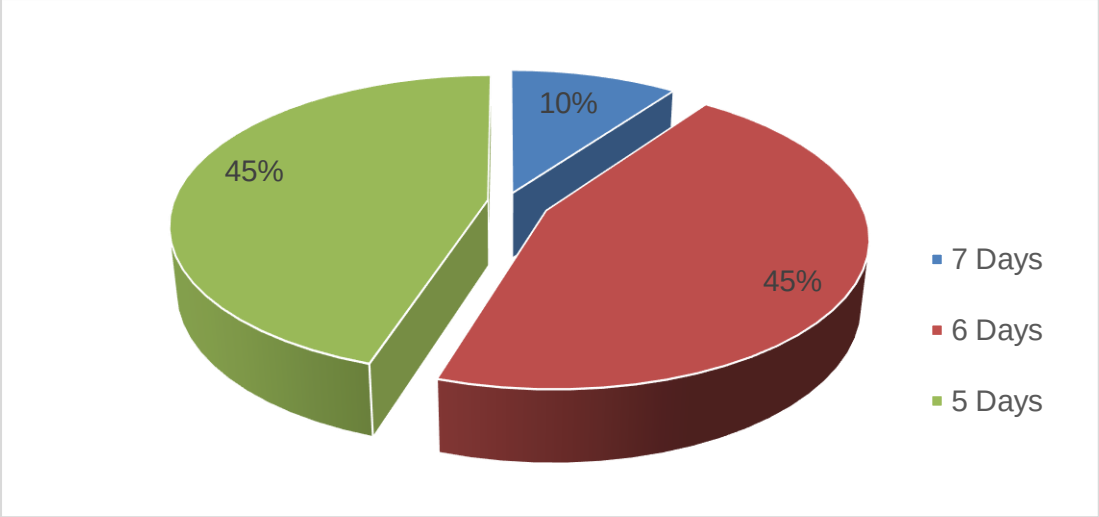


Figure 6.9: Percentage of library opening days

Library Advisory Committee

Library Advisory Committee is responsible for formulating library development plan, framing library rules and regulations and allotting funds, and checking library expenditures. Figure 6.10 illustrates the status of the Library Advisory Committee in the studied libraries in which it is observed that 75% of libraries have a "Library Advisory Committee".

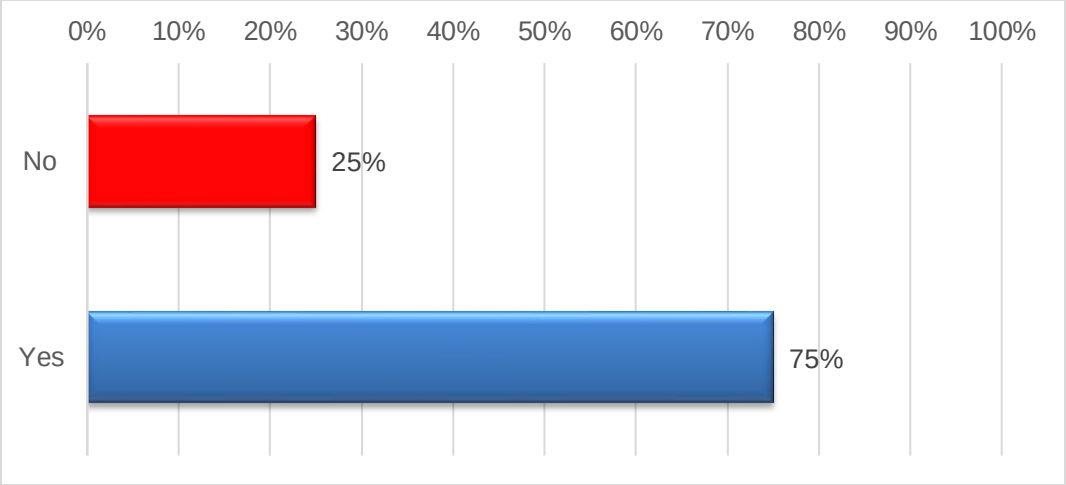


Figure 6.10: Extent of Library Advisory Committee

Functions of the Library Advisory Committee

Table 6.7 reveals that the Library Advisory Committee of all the 15 (100%) libraries are responsible for formulating library development plan followed by the functions "Framing rules and regulations for the use of library" and "Examining the proper implementation of library policy" accounting 100% and 86.7% respectively

Table 6.7: Status of the functions of the library advisory committee

Functions of Library Committee[a]	Responses		Percent of Cases
	N	Percent	
Formulating a development plan for library	15	28.3%	100.0%
Framing rules and regulations for the use of library	15	28.3%	100.0%
Examining the proper implementation of library policy	13	24.5%	86.7%
Allotment of funds and checking of library expenditure	10	18.9%	66.7%
Total	53	100.0%	353.3%

a. Dichotomy group tabulated at value 1 in which Yes=1 *[Multiple Responses Allowed]*

Adequacy for Library Space

In a medical library, adequate library space is very essential to provide various types of services to the clienteles. The overall adequacy of library space is appreciable, as reflected in Figure 6.11. It is found that, 75% of libraries have adequate space for library operations and services. Moreover, 25 percent of the libraries have inadequate space. They must arrange more library space for smooth functioning of library activities and services.

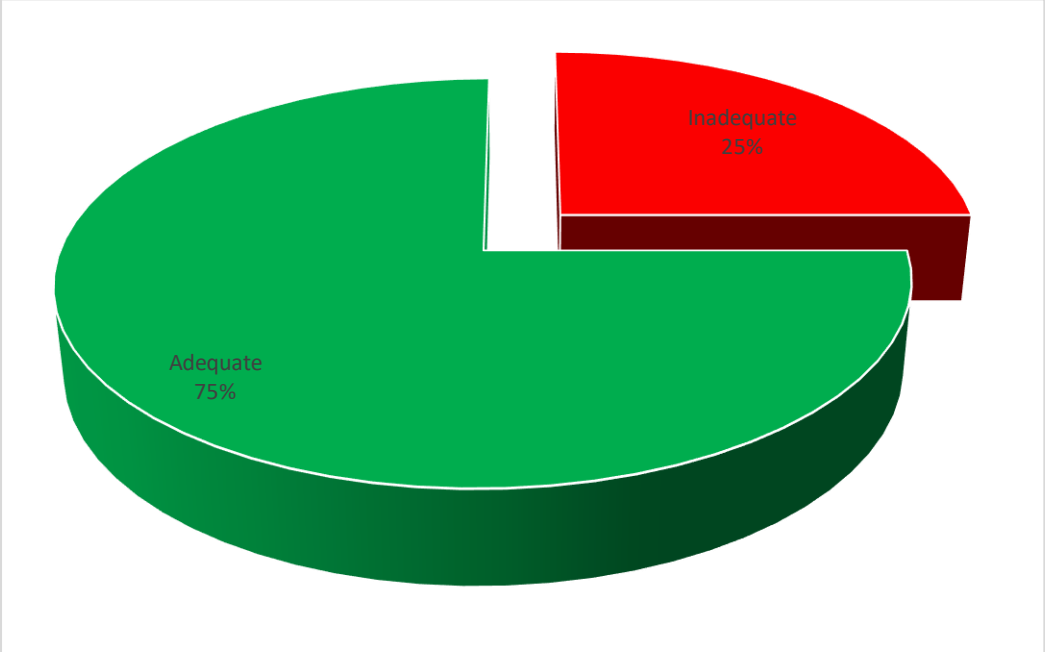


Figure 6.11: Adequacy of library space

Adequacy for Library Seats

For accommodating maximum library users inside the library, adequate library seats should be ensured. We can conclude from Figure 6.12 that an adequate number of seats are available in 70% of surveyed libraries which is treated as a good sign for managing library users. The rest 30% of libraries should take proper steps to arrange more library seats.

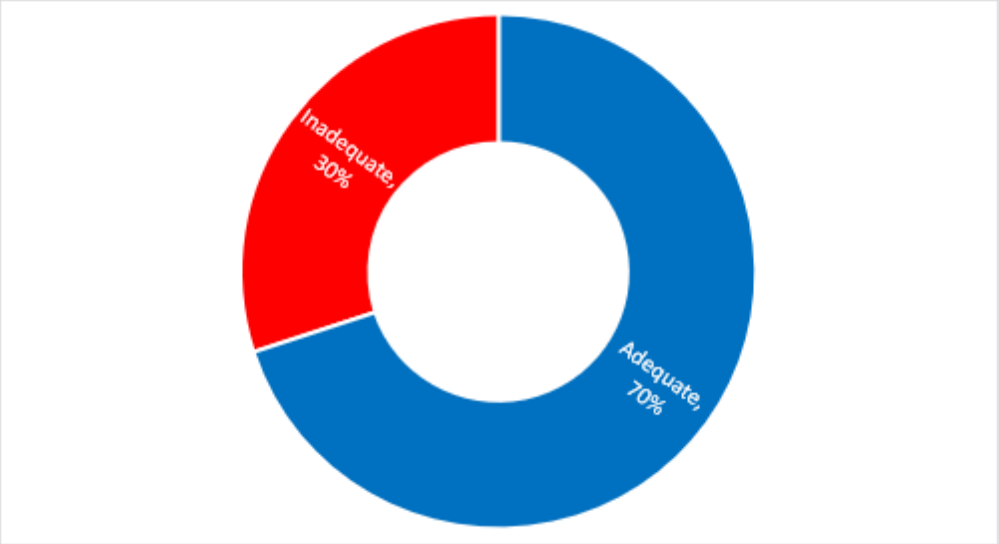


Figure 6.12: Adequacy of library seats

Research Carrels for Users

Library sound reading environment and research activities could be assured by setting up research carrels in the library. Figure 6.13 reflects that; 60% of libraries have the provision of research carrels.

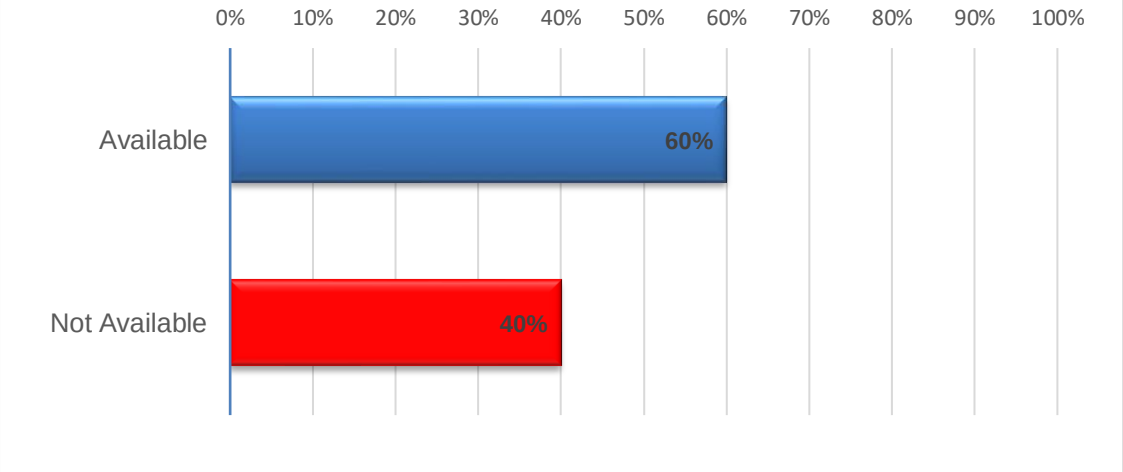


Figure 6.13: Availability of research carrels for users

Status of Library Divisions and Sections

Table 6.8 and Table 6.9 show various divisions and sections individually and percentage status accordingly to the library which are very essential to administer library functions and services efficiently. To function in library activities, basic divisions like acquisition, processing, circulation, reference, periodicals, audiovisual, reprographic, and documentation are prerequisites. SMCL, BMCL, AFMCL, GLMCL, ISMCL, EHDL, WHO,BL, NIPSOML, and BICHL have no acquisition division; SMCL, EHDL, WHO,BL, and NIPSOM have no separate circulation unit. At present, the IT section with a dedicated server/data room is much required for modernizing medical library systems and services. The above Table shows that none of the surveyed libraries have a separate IT division in the library. So proper steps must be taken for the development of the IT section linked to the library.

Table 6.8: Distribution of libraries according to library division and sections

Name of the Medical Libraries	Acquisition Section	Audio Visual Section	Processing/Technical Section	Periodical Section	Circulation/Lending Section	Administration Section	Reference Section	Textbook Section	Reprographic Section	E-resources Section	IT Division	Bangabandhu Corner
BSMMUL	1	0	1	0	1	1	1	1	1	0	0	1
DMCL	1	0	0	0	1	0	0	1	0	0	0	0
ShSMCL	1	0	0	0	1	1	0	1	1	0	0	1
SMCL	0	0	0	0	0	1	1	1	0	0	0	0
AFMCL	0	0	0	0	1	0	0	1	1	0	0	0
BMCL	0	0	0	0	1	1	0	1	1	0	0	0
HFRCMC	1	0	0	0	1	0	0	1	0	0	0	0
GLMCL	0	0	0	0	1	0	1	1	0	0	0	0
AKMCL	1	1	1	0	1	1	0	1	0	1	0	0
ISMCL	0	0	1	0	1	0	1	1	1	0	0	0
DNMCL	1	0	0	1	1	0	1	1	1	1	0	1
BUHSL	1	0	1	1	1	0	1	1	1	1	0	0
EHDL	0	0	0	0	0	1	0	0	0	0	0	0
icddr.b L	1	0	0	1	1	1	1	1	1	1	0	0
BIRDEML	1	0	0	1	1	1	1	1	1	0	0	0
BCPSL	1	0	0	1	1	1	0	1	1	0	0	0
NHLDC	1	1	0	1	1	1	0	1	1	0	0	0
WHO,BL	0	0	0	0	0	0	0	1	0	1	0	0
NIPSOML	0	1	0	1	0	1	1	1	0	0	0	0
BICHL	0	0	1	1	1	1	1	1	1	0	0	0

[1 = Available; 0 = Not Available]

Table 6.9: Existing percentage status of library sections

Status of Library Divisions[a]	Responses		Percent of Cases
	N	Percent	
Acquisition Section	11	10.6%	55.0%
Audio Visual Section	2	1.9%	10.0%
Processing/Technical Section	6	5.8%	30.0%
Periodical Section	7	6.7%	35.0%
Circulation/Lending Section	17	16.3%	85.0%
Administration Section	11	10.6%	55.0%
Reference Section	10	9.6%	50.0%
Textbook Section	19	18.3%	95.0%
Reprographic Section	13	12.5%	65.0%
E-resources Section	5	4.8%	25.0%
Bangabandhu Corner	3	2.9%	15.0%
IT Section	0	0%	0%
Total	104	100.0%	520.0%

a. Dichotomy group tabulated at value 1 in which Yes=1 Allowed] *[Multiple Responses*

Library Collection Development Policy

Library collection development policy is crucial for subscribing to and selecting the right resources for library users. 50% of libraries have a written collection development policy. Figure 6.14 shows the status of the library collection development policy in the sample libraries.

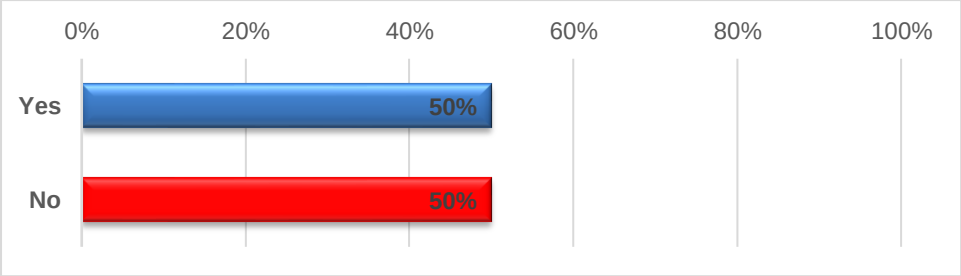


Figure 6.14: Extent of written collection development policy

Selection Policies for Acquisition

Medical libraries follow different measures for subscribing to library materials. Table 6.10 explores the policies followed in the sample libraries, in which it is pointed out that 60% of libraries followed both policies like "Users' request through e-mail/telephone" and "As per the request of the administration of the parent body/donor".

Table 6.10: Existing percentage status of library acquisition policies

Policy for acquisition[a]	Responses		Percent of Cases
	N	Percent	
User survey by the library/institution	6	22.2%	60.0%
Users' request through e-mail/telephone	5	18.5%	50.0%
Through meeting of the selection board/library committee	6	22.2%	60.0%
By the librarian from the list supplied by the book vendors	4	14.8%	40.0%
As per the request of the administration of the parent body/donor	5	18.5%	50.0%
Others	1	3.7%	10.0%
Total	27	100.0%	270.0%

a. Dichotomy group tabulated at value 1 in which Yes=1 [Multiple Responses Allowed]

Tools Used for Library Subscription

The tools used for library subscriptions vary from library to library. Table 6.11 indicates that the major 80% of libraries purchase library resources from vendors followed by the market (40%). A small percentage (20%) of libraries purchase directly from the publishers also.

Table 6.11: Existing percentage status of library acquisition tools

Selection tools for subscription[a]	Responses		Percent of Cases
	N	Percent	
Direct purchase from Publishers	4	12.1%	20.0%
Vendors	16	48.5%	80.0%
Direct purchase from market	8	24.2%	40.0%
Online purchase of Publishers' Websites	3	9.1%	15.0%
Consortium	1	3.0%	5.0%
Others	1	3.0%	5.0%
Total	33	100.0%	165.0%

a. Dichotomy group tabulated at value 1 in which Yes=1 [Multiple Responses Allowed]

Sources of Library Acquisition

Figure 6.15 reflects that the "Purchase" source is followed in all of the surveyed libraries followed by "Donation" and 'Internal Publication" which account for 80% and 85% of libraries accordingly. The exchange source is not available in any of the sample libraries.

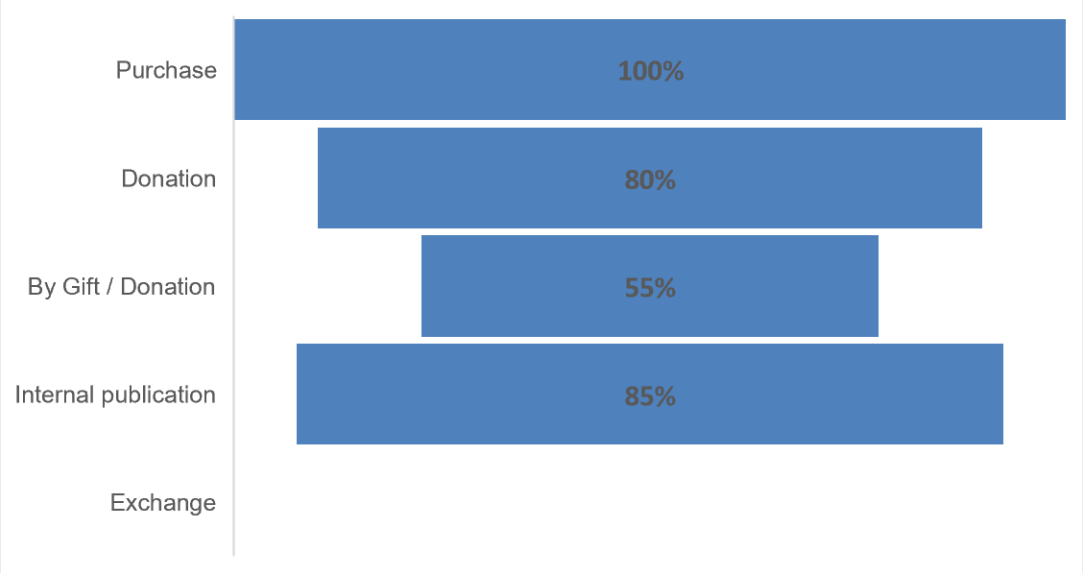


Figure 6.15: Extent of the percentage of library acquisition sources

Maintenance of Accession Register

Accession Register is a vital device for keeping track of library resources. Figure 6.16 shows the availability of the accession register. The figure clearly illustrates that 95% of sample libraries maintain the accession register. Only the WHO,B Library does not maintain an accession register.

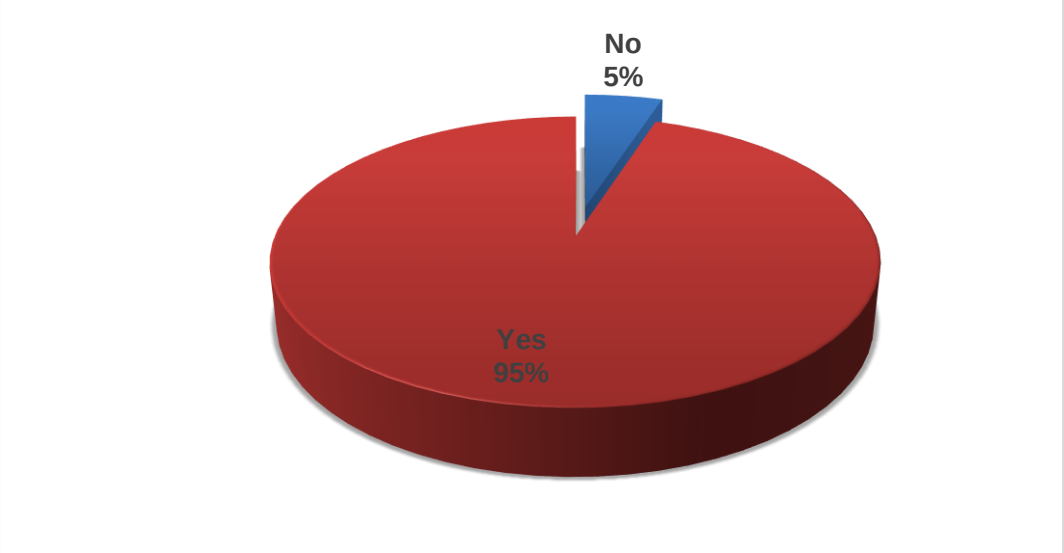


Figure 6.16: Availability of Accession Register

Accession Register Types

Table 6.12 shows the present accession register system of the sample medical libraries. The Table illustrates that most of the libraries i.e., 65% have a manual register and 30% of libraries have both manual and computerized accessioning systems. The Table indicates that medical libraries have been shifting their activities from traditional to computerized system.

Table 6.12: Distribution of libraries by accession register types

Name of the Medical Libraries	Manual Register	Both manual and computerized accessioning	Computerized accessioning	Not Available
BSMMU Library	✓	—	—	—
Dhaka Medical College Library	✓	—	—	—
Shaheed Suhrawardy Medical College Library	✓	—	—	—
Sir Salimullah Medical College Library	✓	—	—	—
Armed Forces Medical College Library	✓	—	—	—
Bangladesh Medical College Library	✓	—	—	—
Holy Family Red Crescent Medical College Library	✓	—	—	—
Green Life Medical College Library	✓	—	—	—
Anwar Khan Medical College Library	—	✓	—	—
Ibn Sina Medical College Library	✓		—	—
Dhaka National Medical College Library	—	✓	—	—
Bangladesh University of Health Sciences Library	—	✓	—	—
Evercare Hospital Dhaka's Library	✓		—	—
icddr,b Library	—	✓	—	—
BIRDEM Library	✓		—	—
BCPS Library	—	✓	—	—
NHLDC	✓	—	—	—
WHO Bangladesh Library	—	—	—	✓
National Institute of Preventive & Social Medicine Library	✓	—	—	—
Bangladesh Institute of Child Health Library	—	✓	—	—

✓ **Yes** — **No**

Library Classification Schemes

Table 6.13 shows the use of various classification schemes followed by the medical libraries of Bangladesh. The table indicates that the major 50% of libraries are following NLM Scheme for processing library materials. icddr,b Library, and BUHS Library are using both LC and NLM schemes for processing library materials and the four libraries (20%) namely DMCL, ShSMCL, GLMCL, and WHO,BL are not following any classification scheme.

Table 6.13: Distribution of libraries by classification schemes

Name of the Medical Libraries	Dewey Decimal Classification (DDC)	Colon Classification (CC)	Universal Decimal Classification (UDC)	Library of Congress Classification (LC)	National Library of Medicine Classification (N LM)	Not Available
BSMMUL	-	-	-	-	√	-
DMCL	-	-	-	-	-	√
ShSMCL	-	-	-	-	-	√
SMCL	√	-	-	-	-	-
AFMCL	√	-	-	-	-	-
BMCL	-	-	-	-	√	-
HFRCMCL	-	-	-	-	√	-
GLMCL	-	-	-	-	-	√
AKMCL	√	-	-	-		-
ISMCL	√	-	-	-	-	-
DNMCL	-	-	-	-	√	-
BUHSL	√	-	-	√	√	-
EHDL	-	-	-	-	-	-
icddr.b L	-	-	-	√	√	-
BIRDEML	-	-	-	-	√	-
BCPSL	-	-	-	-	√	-
NHLDC	√	-	-	-	-	-
WHO,BL	-	-	-	-	-	√
NIPSOML	-	-	-	-	√	-
BICHL	-	-	-	-	√	-

[√ = Available; - = Not Available]

Library Cataloguing Codes

Table 6.14 shows the use of various Cataloguing Codes followed by the medical libraries of Bangladesh. The table indicates that the major 40% of libraries are following AACR-2 code for processing library materials. icddr,b Library, and BUHS Library are using both AACR-2 and MARC 21 for processing library materials, and the 9 libraries (45%) namely DMCL, ShSMCL, AFMCL, BMCL, ISMCL, EHDL,

GLMCL, NIPSOML and WHO,BL are not following any classification schemes that reflected a very poor performance in respect to cataloging Codes. Resource Description and Access (RDA) is the widely used cataloging code for the medical libraries in the developed world, which is the successor to AACR2. It is the most modern form of cataloging e-resources in the digital world. But no surveyed libraries are following this code for processing library materials while collecting the data.

Table 6.14: Distribution of libraries by cataloguing codes

Name of the Medical Libraries	AACR-1	AACR-2	RDA	ALA	CCC	MARC-21	Not Available
BSMMUL	-	√	-	-	-	-	-
DMCL	-	-	-	-	-	-	√
ShSMCL	-	-	-	-	-	-	√
SMCL	√	-	-	-	-	-	-
AFMCL	-	-	-	-	-	-	√
BMCL	-	-	-	-	-	-	√
HFRCMCL	-	-	-	-	-	-	-
GLMCL	-	-	-	-	-	-	√
AKMCL	-	√	-	-		-	-
ISMCL	-	-	-	-	-	-	√
DNMCL	-	√	-	-	-	-	-
BUHSL	-	√	-		-	√	-
EHDL	-	-	-	-	-	-	√
icddr.b L	-	√	-		-	√	-
BIRDEML	-	√	-	-	-	-	-
BCPSL	-	√	-	-	-	-	-
NHLDC	√	-	-	-	-	-	-
WHO,BL	-	-	-	-	-	-	√
NIPSOML	-	-	-	-	-	-	√
BICHL	-	√	-	-	-	-	-

[√ = Available; - = Not Available]

[AACR-1 (Anglo-American Cataloguing Rules-1); AACR-2 (Anglo-American Cataloguing Rules-2); RDA (Resource Description and Access); ALA (American Library Association) Code; CCC (Classified Catalogue Code); MARC-21 (MAchine-Readable Cataloging)]

Standard Subject Headings List

Figure 6.17 explores the various subject heading lists followed by the medical libraries of Bangladesh. The figure indicates that 45% of libraries do not follow any Subject Headings List.

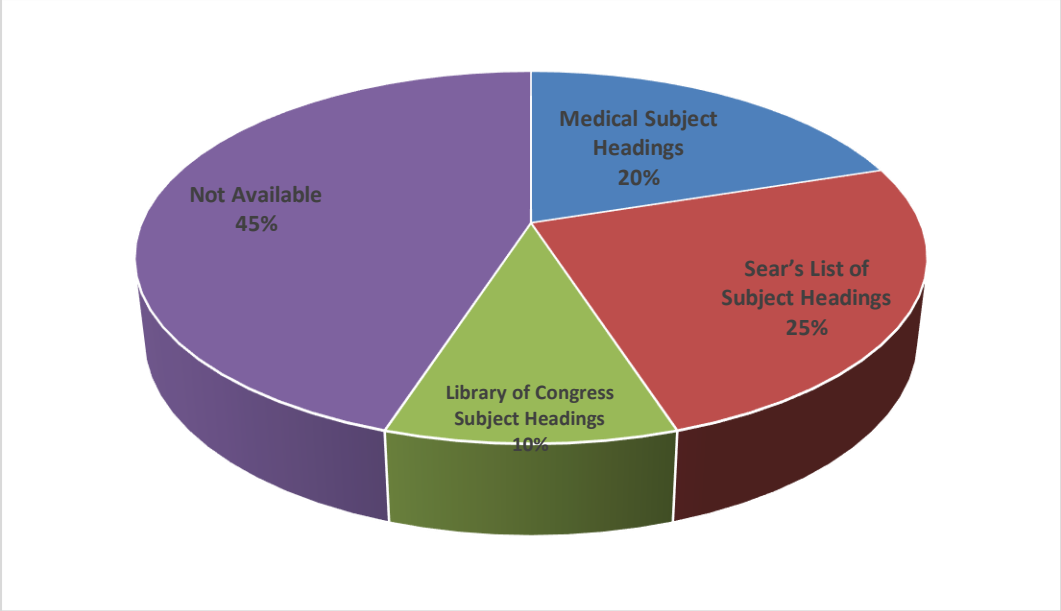


Figure 6.17: Usage status of Subject Heading Lists

Library Cataloguing Forms

Figure 6.18 shows the present cataloging forms of the sample medical libraries. The Figure illustrates that most of the 75% of libraries do not have any cataloguing forms. Only icddr,b Library and BSMMU Library have developed OPAC.

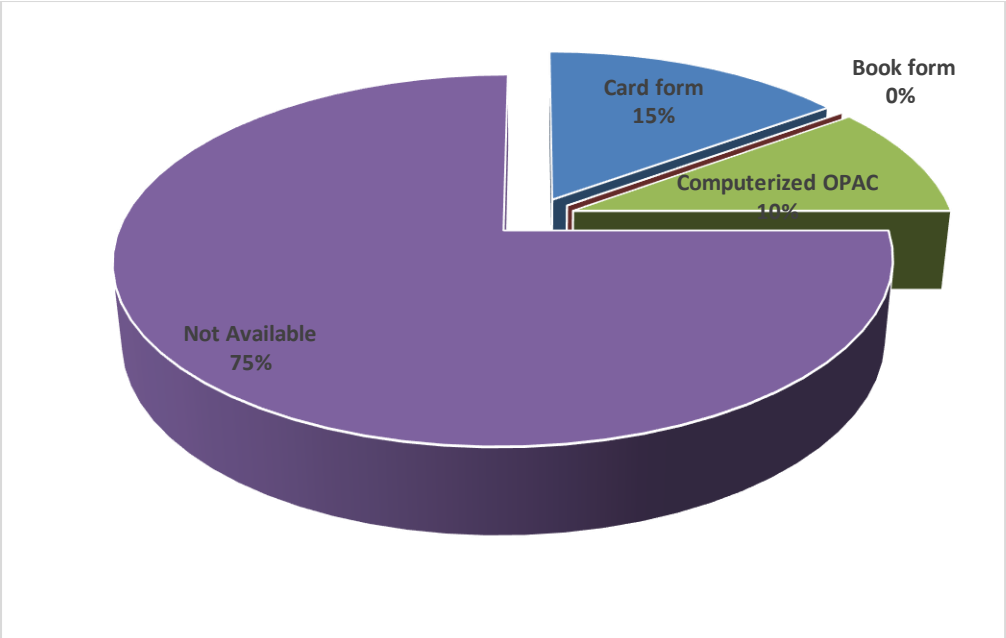


Figure 6.18: Availability of Cataloguing Forms

Library Access System

Figure 6.19 illustrates the access system of the medical libraries of Bangladesh. The Table indicates that 55% of the libraries have an open access system, whereas 20% of libraries have a closed access system, and 25% of libraries have both systems.

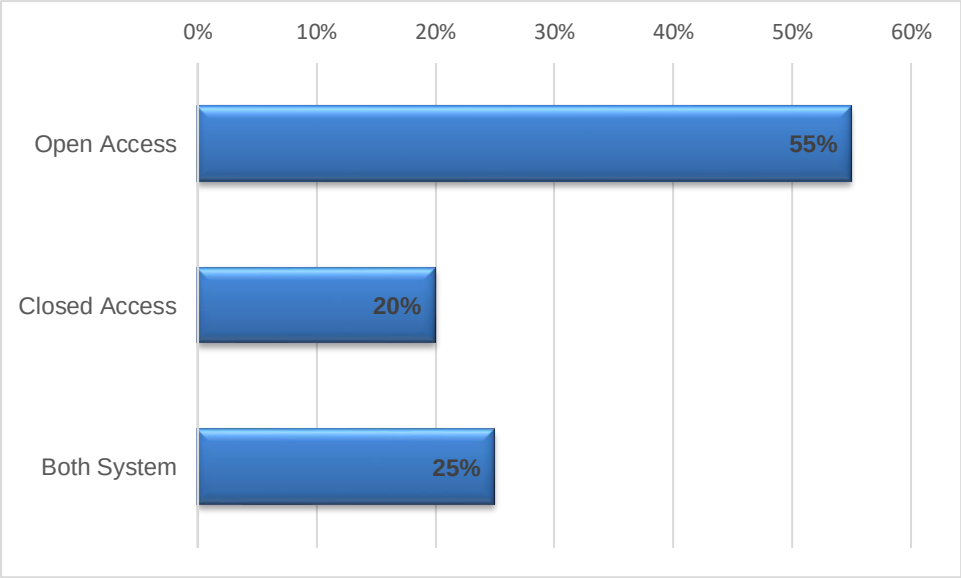


Figure 6.19: Status of library access system

Public Relations Policy

Public relations policy is vital for marketing information products and services. Table 6.15 explores that 60% of libraries have public relations policy.

Table 6.15: Extent of public relations policy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	8	40.0	40.0	40.0
	Yes	12	60.0	60.0	100.0
	Total	20	100.0	100.0	

Sources of Library Marketing

The surveyed libraries have developed various mechanisms for marketing the information products and services to the users. Table 6.16 reveals that 58.3% of studied libraries have reached their information products to the users through display boards followed by 33.3% of libraries applying library websites.

Table 6.16: Extent of library marketing sources

Types of information products[a]	Responses		Percent of Cases
	N	Percent	
Through display board	7	26.9%	58.3%
Web Portal	2	7.7%	16.7%
Automatic E-mail Alert	3	11.5%	25.0%
Using Telephone	3	11.5%	25.0%
Using Social Networking	1	3.8%	8.3%
E-mail	3	11.5%	25.0%
Library website	4	15.4%	33.3%
Printed Documents	2	7.7%	16.7%
Mailing Group	1	3.8%	8.3%
Total	26	100.0%	216.7%

a. Dichotomy group tabulated at value 1 in which Yes=1 *[Multiple Responses Allowed]*

Library Print Resources

Library print resources like books, periodicals, and theses have a huge impact on accelerating the academic activities of medical libraries. These are also important sources for upgrading knowledge and health information both for physicians and medical students. Table 6.17 and Figure 6.20 illustrate the status of library print resources of the sample medical libraries individually and the total collections respectively. Indeed, there is wider availability is observed of printed books, journals/magazines, audio-visual materials, and reports in the medical libraries of Bangladesh. The table indicates that the BSMMU library has the largest print collection i.e. 39,621 followed by the icddr,bL, and DMCL with 38,175 and 36,750 respectively.

Table 6.17: Distribution of libraries by print resources

Name of the Medical Libraries	Books	Theses/ Dissertation	Reports	Loose Journals	Magazines	Bound Journals	Audio-Visual	News Clippings	Total
BSMMUL	26907	2731	0	2400	1583	5200	800	0	39621
DMCL	34500	1700	0	550	0	0	0	0	36750
ShSMCL	9500	0	100	600	0	0	0	0	10200
SMCL	36000	114	200	250	0	0	0	0	36564
AFMCL	13665	0	0	70	0	0	30	0	13765
BMCL	7700	0	0	2000	100	200	20	0	10020
HFRCMCL	2500	0	0	800	0	1500	0	0	4800
GLMCL	1600	0	50	250	0	0	0	0	1900
AKMCL	5600	0	30	0	0	600	250	0	6480
ISMCL	4400	0	0	760	0	7	0	0	5167
DNMCL	4954	0	0	30	0	0	0	0	4984
BUHSL	2600	305	150	957	100	15	0	150	6977
EHDL	400	0	0	0	300	0	150	0	850
icddr.b L	15300	360	210	660	850	18450	450	0	38175
BIRDEML	8760	405	0	450	270	3065	0	0	12950
BCPSL	5130	10994	0	80	0	2500	2000	0	20704
NHLDC	18500	1500	0	300	10	14500	0	0	34810
WHO,BL	5000	0	200	0	0	0	0	0	7000
NIPSOML	16000	3500	100	200	50	0	0	0	19850
BICHL	3000	350	200	30	40	20	0	0	3640
Total	222016	21959	628	10387	3303	46057	3700	1500	315207

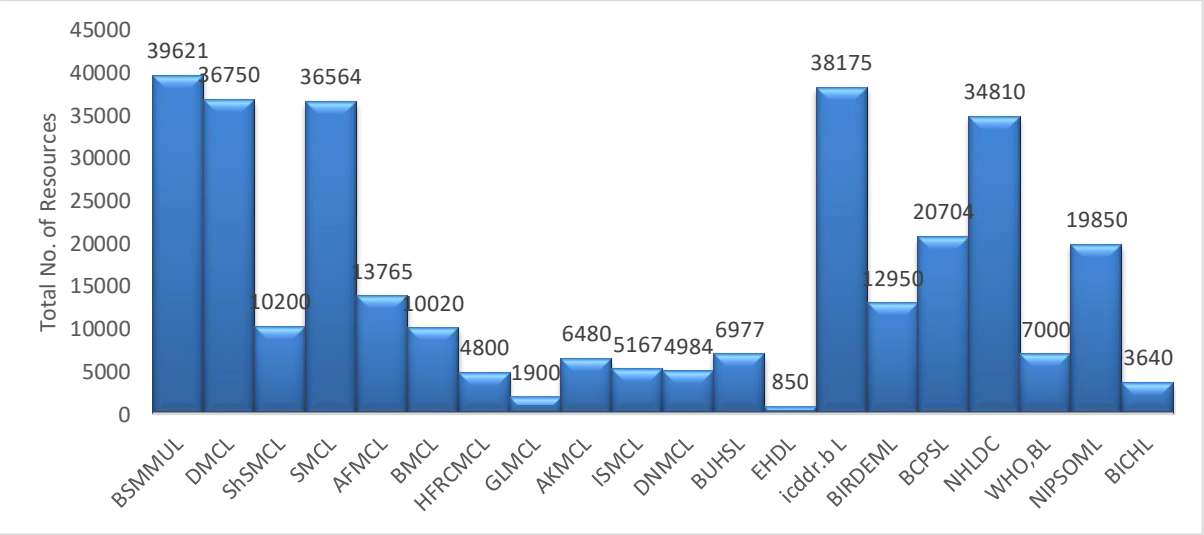


Figure 6.20: Total print resources of the studied libraries

Figure 6.21 and Figure 6.22 also explore that icddr,b Library and NHLDC have a rich collection with respect to Bound Journals. The resource 'Books" are still dominating the library print resources compared to total resources in the surveyed libraries i.e. 70%.

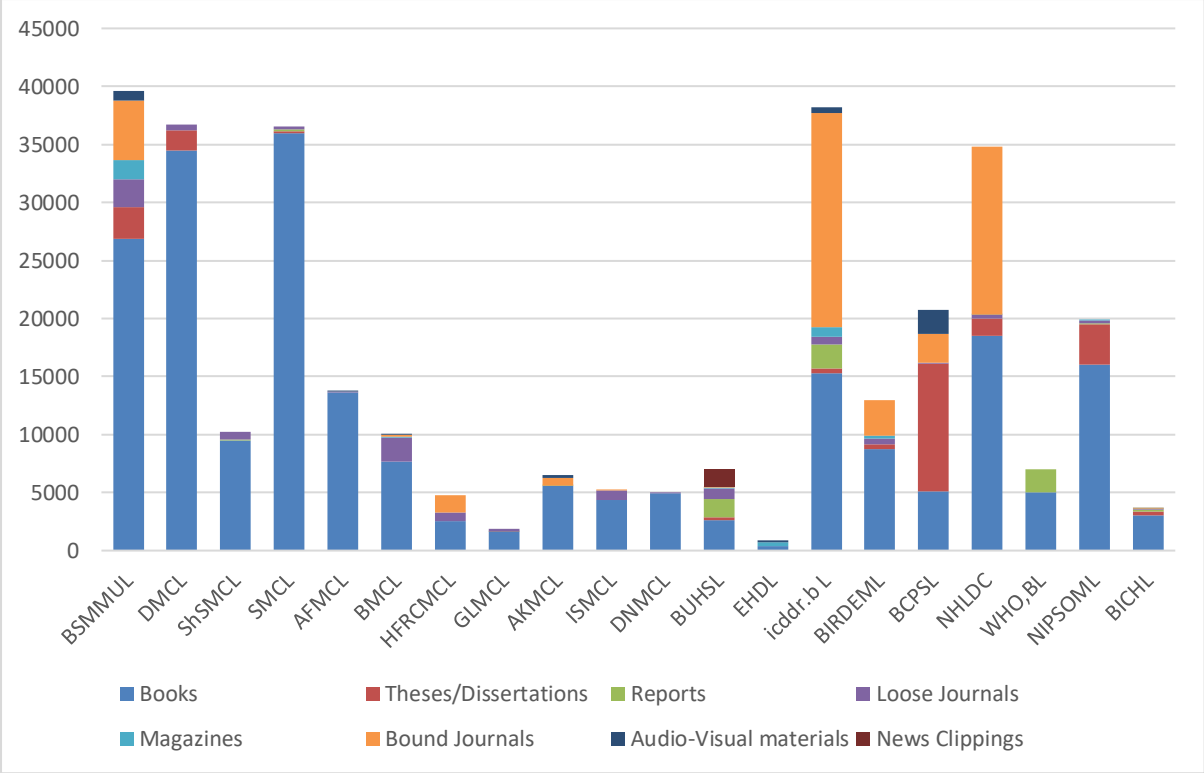


Figure 6.21: Library print resources of the sample libraries

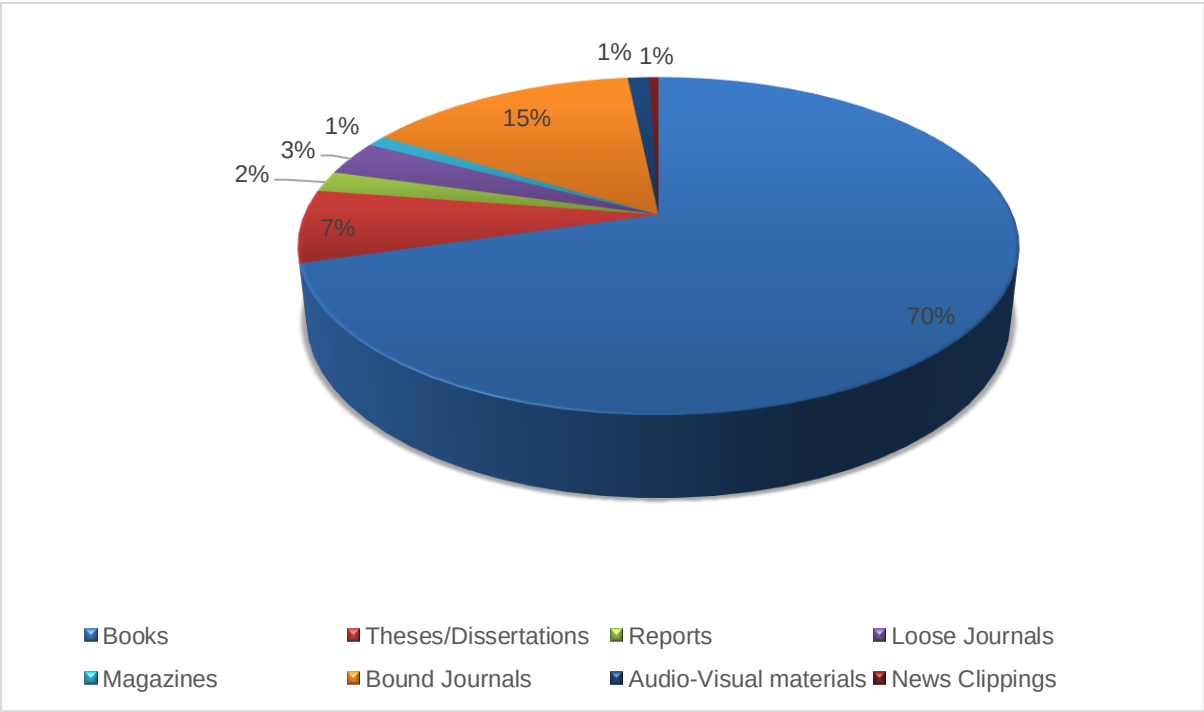


Figure 6.22: Percentage distribution according to resource types

Library Online Resources/E-resources

In this present technology-based library environment, there is an increasing demand for Library Online Resources/E-resources. The fast-growing usage of electronic resources has severely impacted medical libraries. The well-known e-Resources include e-journals, e-books, e-theses, e-reports, e-newspapers, etc. providing an excellent opportunity for accessing health information. In this study, an attempt has been made to perceive the real scenario of subscribed and registered electronic resources in the libraries covered in the survey. All the surveyed libraries apart from 3 libraries namely Shaheed Suhrawardy Medical College Library, Ibn Sina Medical College Library, and Evercare Hospital Dhaka's Library informed that they are subscribing/registering to various e-resources and online databases. Research4Life platform (Hinari, AGORA, OARE, ARDI, GOALI) along with other Open-access databases like PubMed, BMC (BioMed Central), PMC (PubMed Central), and DOAJ mainly reinforce the usage of e-resources in the medical libraries in Bangladesh. Table 6.18 and Table 6.19 furnish library-wise digital collections and the total number of e-resources accordingly. Figure 6.23 and Figure 6.24 also illustrate the picture of accessible subscribed/registered e-resources/online databases of surveyed libraries. It is observed that the said 3 studied libraries are in a poor state since they do not belong to any sort of digital collections. The study covers only the registered and subscribed online resources. Open access databases and e-resources have been excluded from this study. It is a very frustrating observation that the said 3 libraries are not currently subscribing to any types of e-resources but are also not registered in the Research4Life program.

In this digital world, e-books are playing a significant role in academic and research activities. Library users have also preferred e-books compared to print books. Table 6.18 shows that the surveyed libraries apart from the said 3 libraries have access to e-books through the Research4Life platform. Only icddr,b and BCPS libraries are subscribing to Wiley Online Books. The major subscribed e-book databases like Springer E-Books, EBSCO e-Books, SAGE e-Books, and ProQuest Ebrary are not subscribed by any of the studied libraries.

It is found from the above table that the icddr,b library is in an advanced position in relation to the accessible online resources since various valuable online databases like Web of Science, UlrichWeb, Cambridge, Oxford, JSTOR, GIDEON, National Geographic Virtual Library, Indian Journals, EBSCO Discovery Library Search, Springer e-journals, Cochrane Library, etc. are accessible from this Library.

Table 6.18: Distribution of libraries according to online databases

Database Name	BSMMUL	DMCL	ShSMCL	SMCL	AFMCL	BMCL	HFRCMCL	GLMCL	AKMCL	ISMCL	DNMCL	BUHSL	EHDL	icddr.b L	BIRDEML	BCPSL	NHLDC	WHO,BL	NIPSOML	BICHL
JSTOR	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-
Emerald	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oxford	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	√	-	-	-	-
ASM Journals		-	-	-	-	-	-	-	-	-	-	-	-	√	-		-	-	-	-
Springer e-journals	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	√	-	-	-	-
Indian Journals	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	√	-	-	-	-
Cochrane Library	√	√	-	√	√	√	√	√	√	-	√	√	-	√	√	√	√	√	√	√
Hinari-Health	√	√	-	√	√	√	√	√	√	-	√	√	-	√	√	√	√	√	√	√
AGORA	√	√	-	√	√	√	√	√	√	-	√	√	-	√	√	√	√	√	√	√
OARE-	√	√	-	√	√	√	√	√	√	-	√	√	-	√	√	√	√	√	√	√
ScienceDirect e-journals	√	√	-	√	√	√	√	√	√	-	√	√	-	√	√	√	√	√	√	√
ProQuest	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-
EBSCOhost	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-
Cambridge	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-
Embase	√	√	-	√	√	√	√	√	√	-	√	√	-	√	√	√	√	√	√	√
ARDI-	√	√	-	√	√	√	√	√	√	-	√	√	-	√	√	√	√	√	√	√
GOALI-Law	√	√	-	√	√	√	√	√	√	-	√	√	-	√	√	√	√	√	√	√
Web of Science	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-
ClinalKey	√	√	-	√	√	√	√	√	√	-	√	√	-	√	√	√	√	√	√	√
Scival	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Scopus	√	√	-	√	√	√	√	√	√	-	√	√	-	√	√	√	√	√	√	√
Ulrichsweb	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-
UptoDate	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-
Wiley e-Books	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	√	-	-	-	-
ScienceDirect e-Books	√	√	-	√	√	√	√	√	√	-	√	√	-	√	√	√	√	√	√	√
Springer e-Books	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EBSCO e-Books	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SAGE e-books	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ProQuest ebrary	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Others	-	-	-	-	-	-	-	-	-	-	-	-	-	√	-	-	-	-	-	-

[√ = Available; - = Not Available]

Table 6.19: Matrix of subscribed/registered e-resources of surveyed libraries

Name of the Libraries	e-journals	e-books	online databases	e-reports	e-theses	e-encyclopedias	e-dictionaries	e-newspapers	Total
BSMMUL	55549	111480	11	222	0	0	0	49	167311
DMCL	55549	111480	11	0	0	0	0	22	167062
ShSMCL	0	0	0	0	0	0	0	0	0
SMCL	55549	111480	11	0	0	0	0	11	167051
AFMCL	55549	111480	11	0	0	0	0	11	167051
BMCL	55549	111480	11	0	0	0	0	12	167052
HFRCMCL	55549	111480	11	0	0	0	0	13	167053
GLMCL	55549	111480	11	0	0	0	0	40	167080
AKMCL	55549	111480	11	0	0	0	0	43	167083
ISMCL	0	0	0	0	0	0	0	0	0
DNMCL	55549	111480	11	0	0	0	0	40	167091
BUHSL	55549	111480	11	0	0	0	0	34	167074
EHDL	0	0	0	0	0	0	0	0	0
icddr.b L	65415	111480	41	1650	0	0	0	45	178631
BIRDEML	55549	111480	15	0	0	0	0	22	167066
BCPSL	65415	111480	17	235	0	0	0	40	177187
NHLDC	55549	111480	11	0	0	0	0	34	167074
WHO,BL	55549	111480	18	350	0	0	0	22	167419
NIPSOML	55549	111480	11	0	0	0	0	14	167054
BICHL	55549	111480	11	0	0	0	0	11	167051
Total	686320	1337760	179	2457	0	0	0	394	2027121

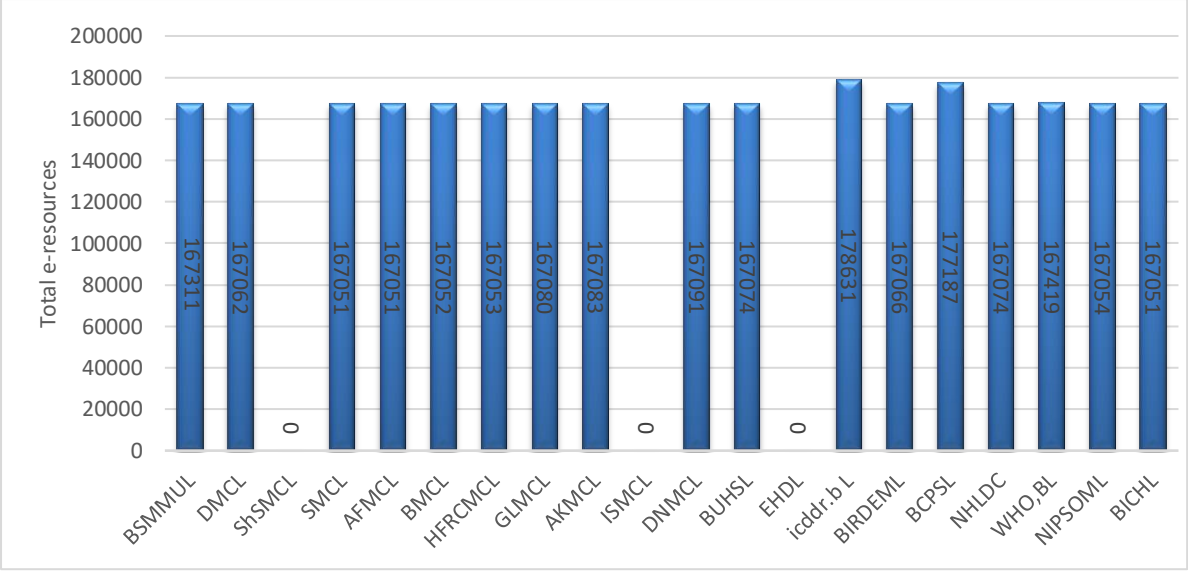


Figure 6.23: Total subscribed/registered accessible e-resources of surveyed libraries

Figure 6.23 and Figure 6.24 explore library-wise total e-resources and types of e-resources that are currently accessible from the studied libraries respectively. It is found that all the surveyed libraries have the facilities of e-resources apart from three libraries i.e., Shaheed Suhrawardy Medical College Library, Ibn Sina Medical College Library and Evercare Hospital Dhaka's Library. icddr,b and BCPS libraries have access to the highest number of e-resources standing for 178631 and 177187 accordingly. The surveyed libraries have more access to e-books compared to e-journals through the Research4Life program and individual subscribed sources (Figure 6.24).

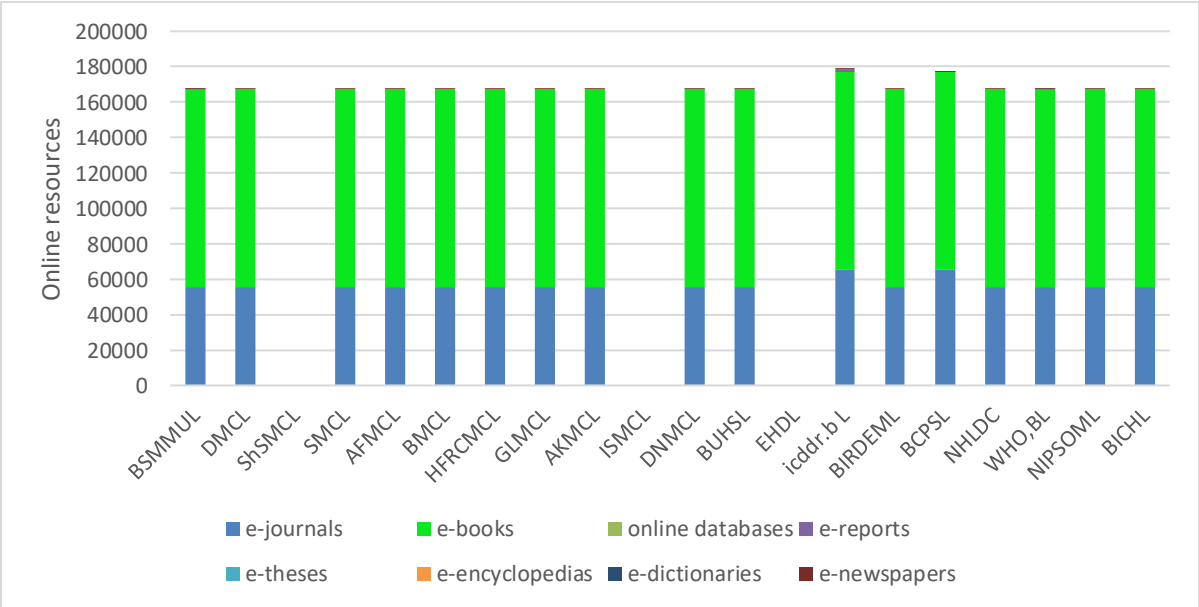


Figure 6.24: Status of subscribed/registered e-resources of surveyed libraries

Access to Hinari

Hinari is the one of most resourceful and valuable e-resources platforms for developing countries like Bangladesh with zero/no-cost access to up to 21,000 e-journals, and up to 69,000 e-books. In addition, 115 other information resources are also available through the Hinari program benefiting thousands of health professionals and in turn, contributing to improving world health. Bangladesh is one of the most popular countries in the world in terms of registered institutions that are using Hinari. The program popularized the use of e-resources in many medical libraries in Bangladesh where paid digital subscriptions were not possible since 2003. Access to peer-reviewed scientific publications for health researchers in Bangladesh is mainly available through Hinari with e-journals, e-books, and other reference sources. It is significant to note that, till now all 100% of surveyed libraries are fully dependent on Hinari for accessing online medical e-resources. In view of this, the researcher has explored the total number of surveyed libraries that are registered in Hinari shown in Figure 6.25, and found that 85% of libraries are registered in this program.

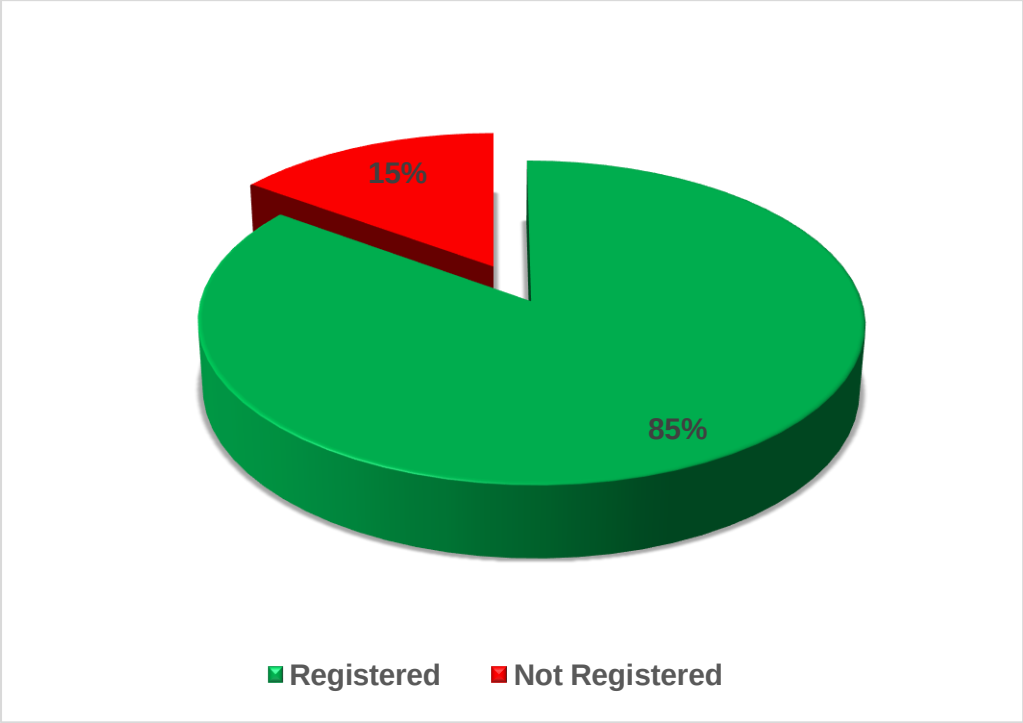


Figure 6.25: Status of Hinari access to studied libraries

Online Health Databases

Online databases are broadly two types i.e.- (i) Full-Text databases- This form of the database contains the whole content of an article, book chapter, thesis chapter, reports, Govt documents, latest information on a particular subject, news, analysis, reviews and so on (ii) bibliographic databases which contain only certain bibliographic information about the article like title, author details, publication date, page numbers, etc.). The facilities of bibliographic databases cover updated information, filtering of results, advanced search options, and search customization. The findings of Figure 6.26 indicate that Hinari, AGORA, OARE, ARDI, GOALI are dominating online databases in all surveyed libraries apart from Shaheed Suhrawardy Medical College Library, Ibn Sina Medical College Library, and Evercare Hospital Dhaka's Library. It is also observed that the studied libraries apart from icddr,b library are showing poor performance in respect to subscribing the databases like Emerald, Springer e-Books, Springer e-journals, SAGE e-journals, JSTOR, EBSCO e-Books, SAGE e-Books, ProQuest Ebrary, Scival, Web of Science, UpToDate, Cambridge, Oxford and so on. Medical libraries should give more emphasis on subscribing to core health online databases for physicians and scientists. Medical libraries in the developed world are investing a huge amount in subscribing to online databases as the publishing pattern of the leading publishers is shifting from print to online resources. The studied libraries along with other medical libraries in Bangladesh should join the two available consortia in Bangladesh for accessing more online databases with a limited cost, first one is LiCOB (Library Consortium of Bangladesh) developed in 2007, coordinated by BAS (Bangladesh Academy of Sciences). At present, there are more than 53 organizations in Bangladesh working with this Consortium. The second Consortium UGC Digital Library (UDL) guided by Bangladesh University Grants Commission and funded by the World Bank launched in 2012 in order to make electronic resources subscriptions easily available for the libraries of Bangladesh. Increasingly, the medical library facilitates access to a wide range of online resources alongside access to its owned or licensed collections. Among the surveyed libraries, only the icddr,b Library and BCPS Library are members of these two consortia.

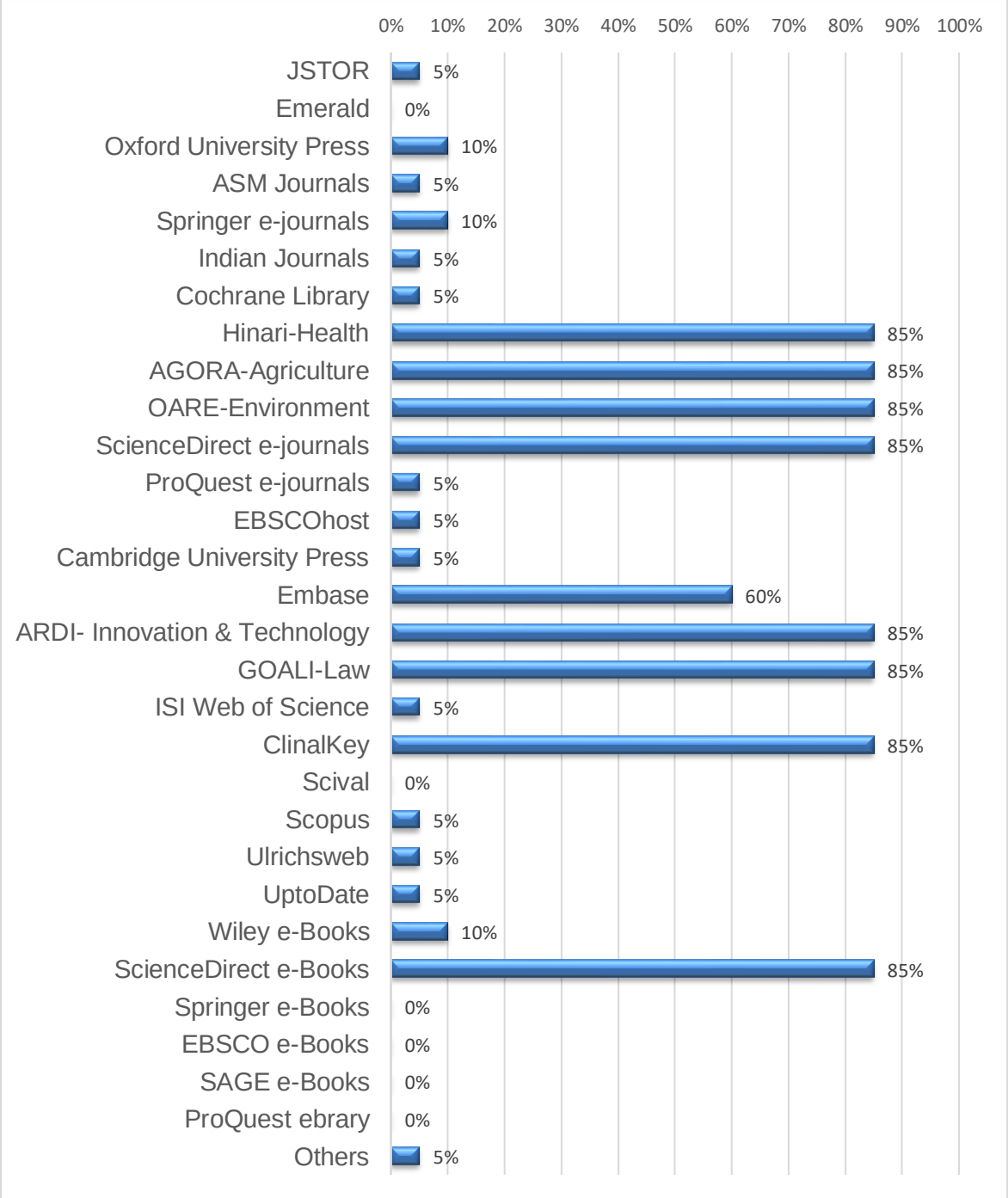


Figure 6.26: Online databases access status of the sample libraries

Preference for Information Sources

A large number of information sources are available in medical libraries like textbooks, reference books, local journals, foreign journals, theses, online resources, and so on. Table 6.20 and Figure 6.27 show the widely used library resources as evaluated by the library heads of the surveyed libraries. Twenty-one information sources are identified and the respondents are asked to rate those sources on a five-point Likert type scale of 1 to 5 (Never to Almost Always). Thus, for each source, the scores are obtained, and

importance levels are ranked based on Sum, Mean and Standard Deviation (SD). The scores and percentage level of preference are presented in Table 5.20 and Figure 5.26 in where 'Text books' has the highest mean value of 4.90 and the Standard Deviation belongs to .308 comprising rank 1 followed by 'Reference books' and 'General books' with the mean value of 4.10 and 3.65 and their SD is 1.021 and 1.226 belong to rank 2 and 3 accordingly.

Table 6.20: Preference of usage of information sources

	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
Text books	20	4	5	98	4.90	.308	.095
Reference books	20	2	5	82	4.10	1.021	1.042
General books	20	1	5	73	3.65	1.226	1.503
Foreign journals	20	1	5	71	3.55	1.234	1.524
Bangladeshi journals	20	2	5	69	3.45	.887	.787
Newspapers	20	1	5	68	3.40	1.536	2.358
Online databases	20	1	5	66	3.30	1.593	2.537
Theses/Dissertations	20	1	5	57	2.85	1.785	3.187
e-books	20	1	5	55	2.75	1.682	2.829
Research reports	20	1	5	53	2.65	1.785	3.187
Library website	20	1	5	52	2.60	1.789	3.200
e-theses	20	1	5	51	2.55	1.572	2.471
e-journals	20	1	5	51	2.55	1.504	2.261
Audio visual materials	20	1	5	45	2.25	1.552	2.408
Indexing and abstracting sources	20	1	5	40	2.00	1.622	2.632
Web based resources	20	1	5	40	2.00	1.589	2.526
Popular magazines	20	1	5	37	1.85	1.226	1.503
Hand books	20	1	5	36	1.80	1.361	1.853
Bibliographic database on CD-ROM	20	1	5	33	1.65	1.182	1.397
Manuals	20	1	5	30	1.50	1.000	1.000
Yearbooks	20	1	4	28	1.40	.821	.674
Valid N (listwise)	20						

[Importance Level: 5=Almost always; 4=Usually; 3=Sometimes; 2=Rarely; 1=Never]

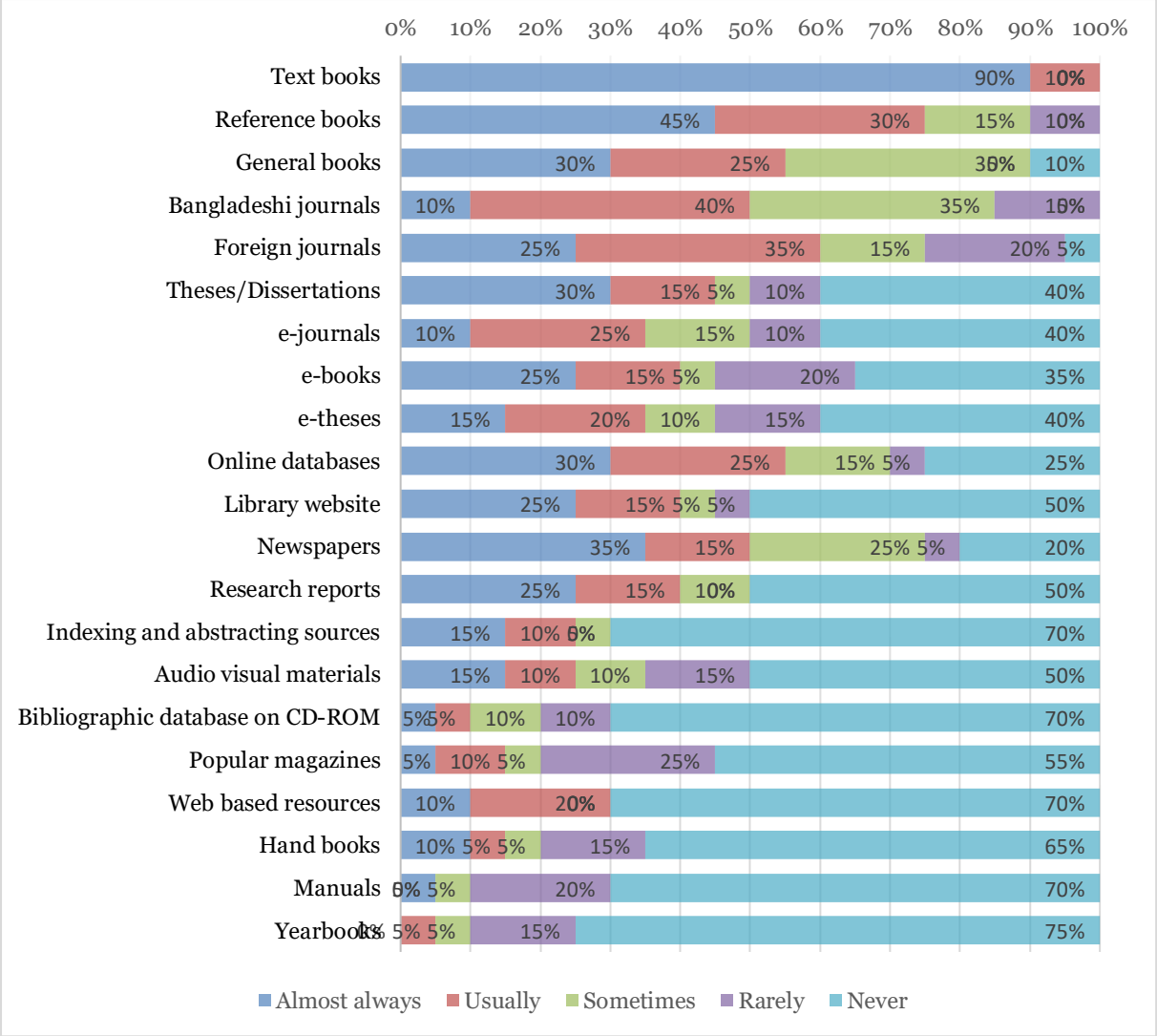


Figure 6.27: Percentage level of usage of information sources

Library and Information Services

Library and information services may take the form of providing the users with desired information services for meeting the information needs. In the study questionnaire, the library heads were asked about the available library services in their libraries. The services provided by the sample libraries can be seen at a glance in Table 6.21 and Figure 6.28. The Table shows various library service patterns in the medical libraries. There are various kinds of services available in health libraries in Bangladesh. Among them, the major patterns are Circulation service, Current Awareness Service, Referral Service, Indexing and Abstracting Services, Bibliographical service, Online database searching, Reference service, E-alert services, Online literature searching, Translation service, CD-ROM Searching, Selective Dissemination of Information (SDI), Photocopying and printing services, Internet browsing, etc. The below table illustrates the availability and non-availability of major library services. The Table indicates that the major library

services are available in all types of libraries whereas some newer library services are not available in the major studied libraries. So we conclude that modern library systems and services are so much essential in the medical libraries of Bangladesh. It is significant to note from Table 6.21 and Figure 6.28 that 'Reading room service' and 'Circulation service' are provided by all the surveyed libraries.

Table 6.21: Status of existing library services

Library Services[a]	Responses		Percent of Cases
	N	Percent	
Reading Room Service	20	13.1%	100.0%
Circulation service	20	13.1%	100.0%
Current Awareness Service	8	5.2%	40.0%
Referral service	13	8.5%	65.0%
Indexing and Abstracting Services	6	3.9%	30.0%
Bibliographical service	2	1.3%	10.0%
On-line database searching	4	2.6%	20.0%
Reference service	12	7.8%	60.0%
E-alert services	2	1.3%	10.0%
Online literature searching	7	4.6%	35.0%
Translation service	1	0.7%	5.0%
CD-ROM Searching	2	1.3%	10.0%
Selective Dissemination of Information (SDI)	4	2.6%	20.0%
Photocopying and printing services	14	9.2%	70.0%
Internet browsing	16	10.5%	80.0%
Article Indexing	4	2.6%	20.0%
News-clipping service	1	0.7%	5.0%
Inter-library loan service	2	1.3%	10.0%
Citation analysis service	2	1.3%	10.0%
Information literacy service	3	2.0%	15.0%
E-mail service	9	5.9%	45.0%
Others	1	0.7%	5.0%
Total	153	100.0%	765.0%

[a]Dichotomy group tabulated at value 1 in which Yes=1 *[Multiple Responses Allowed]*

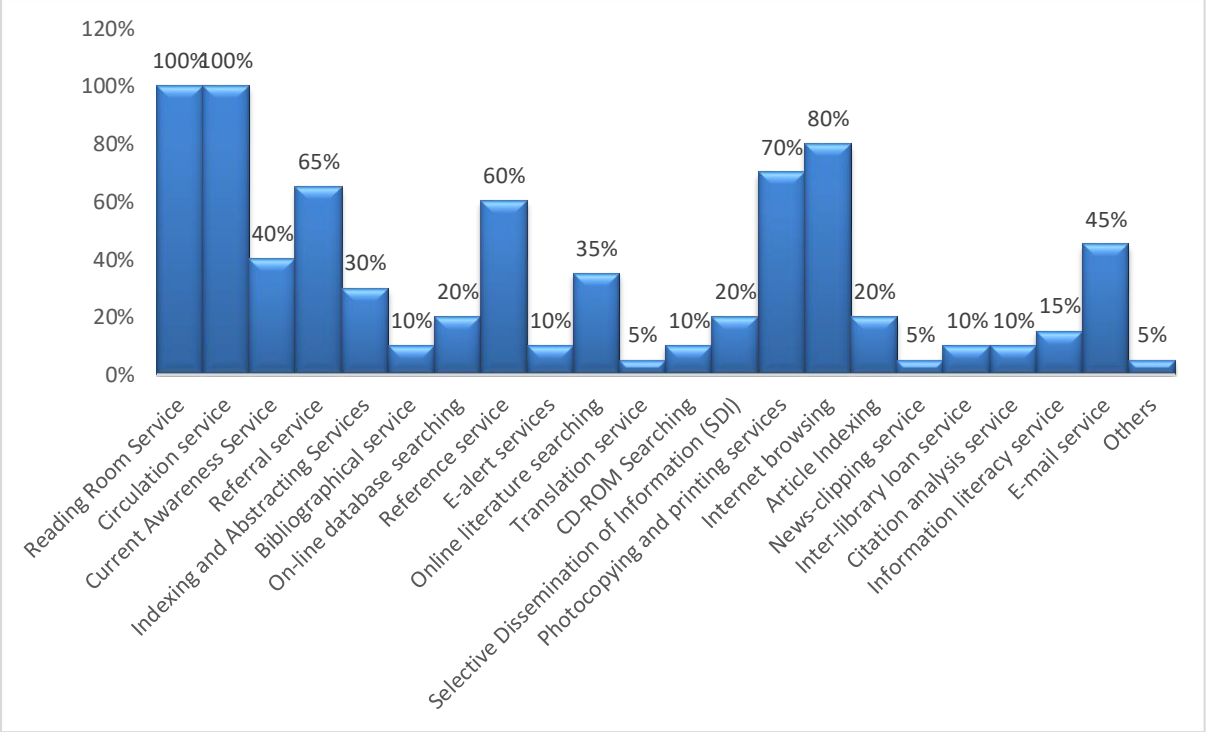


Figure 6.28: Percentage level of provided library services

Web-based Library Services

Web-based Library Services are the new dimensions for medical libraries for providing value-added information services and resources to users in a speedy manner through the applications of the Internet and web technologies. In this web era, web-based library services have become dynamic compared to static traditional library services. Web-based Library Services are often used interchangeably as Electronic Library Services, Internet Library Services, or Digital Library Services. The library website is designed for providing various web-based library services. The several forms of these services include access to online journals, electronic document delivery services, Web-based reference tools, search multiple catalogs (federated search), Electronic SDI services, online reservation facilities, electronic reference services, and Ask-A-Librarian etc. The study data (Figure 6.29 and Table 6.22) show that 100% of sample libraries have been able to provide WiFi and Internet Services in their libraries; others cover 15% each for Online e-Journal Service, Online Database Service and Online E-Book services. It is also found that other web-based library services like OPAC, Web OPAC, Online renewal service, Institutional Repository (IR)/Digital Repository (DR) service, Online SDI service, Online reservation, Library Services through Social Networking Sites, Electronic Document Delivery service, Mobile-based services, Remote Access Service, RFID-based services, etc. are not provided on a significant level.

Table 6.22: Extent of Web-based library services

Web based Library Services[a]	Responses		Percent of Cases
	N	Percent	
OPAC	3	3.5%	15.0%
Web OPAC	2	2.3%	10.0%
Online renewal service	2	2.3%	10.0%
Institutional Repository (IR)/Digital Repository (DR) service	1	1.2%	5.0%
Online SDI service	1	1.2%	5.0%
Online reservation	1	1.2%	5.0%
Library Services through Social Networking Sites	2	2.3%	10.0%
Electronic Document Delivery service	2	2.3%	10.0%
Mobile-based services	1	1.2%	5.0%
Remote access service	1	1.2%	5.0%
RFID-based services	1	1.2%	5.0%
Wifi service	20	23.3%	100.0%
Virtual reference service	1	1.2%	5.0%
Distance learning service	1	1.2%	5.0%
Internet service	20	23.3%	100.0%
Intranet service	3	3.5%	15.0%
Electronic Thesis and Dissertations (ETD) service	2	2.3%	10.0%
CD-ROM/DVD read/search service	2	2.3%	10.0%
E-CAS (Current Awareness Service)	2	2.3%	10.0%
Electronic Conferencing Services	1	1.2%	5.0%
Research Data Services	1	1.2%	5.0%
Systematic Review service	1	1.2%	5.0%
Webometric Analysis service	1	1.2%	5.0%
Online Literature Searching service	2	2.3%	10.0%
Evidence-Based Practice (EBP) service	1	1.2%	5.0%
Plagiarism detection service	1	1.2%	5.0%
E-indexing and abstracting service	1	1.2%	5.0%
Online e-Journal Service	3	3.5%	15.0%
Online e-Book Service	3	3.5%	15.0%
Online Database Service	3	3.5%	15.0%
Total	86	100.0%	430.0%

a. Dichotomy group tabulated at value 1 in which Yes=1 *[Multiple Responses Allowed]*

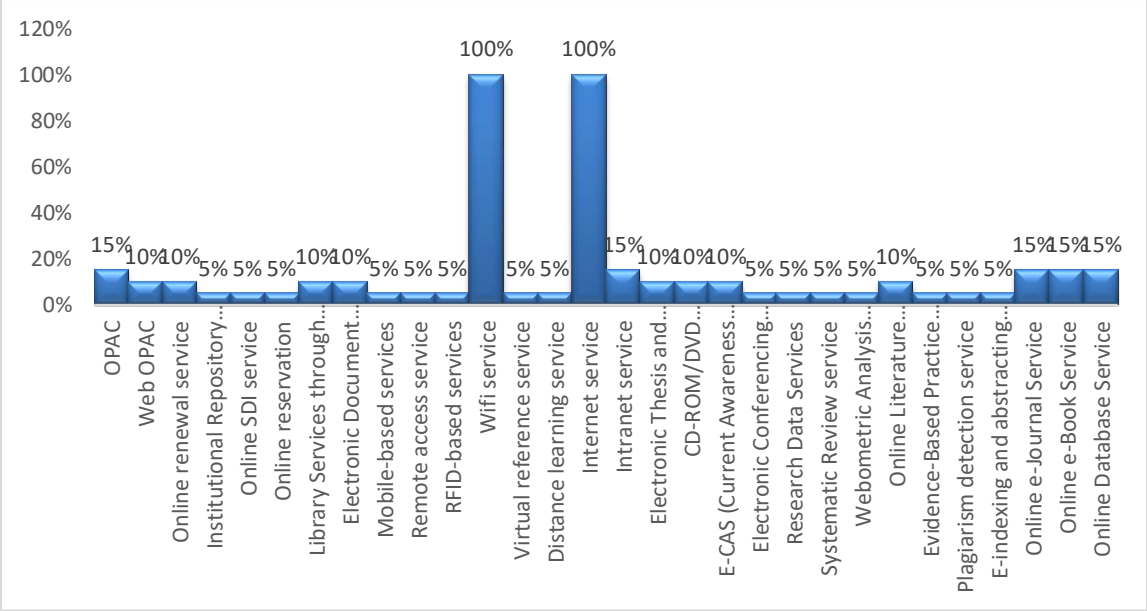


Figure 6.29: Percentage level of Web-based library services

Library Access/Web tools for library services

Library Access/Web tools like MyAthens, RemoteXs, EBSCO Discovery Search, VuFind, Joomla, RSS Feeds, etc are essential for improved library services. Figure 6.30 explores that MyAthens, EBSCO Discovery Library Search, RSS Feeds, Social Networking (e.g., LinkedIn, Facebook), Ulrichsweb: Global Serials Directory are used in 16%-33% of surveyed libraries.

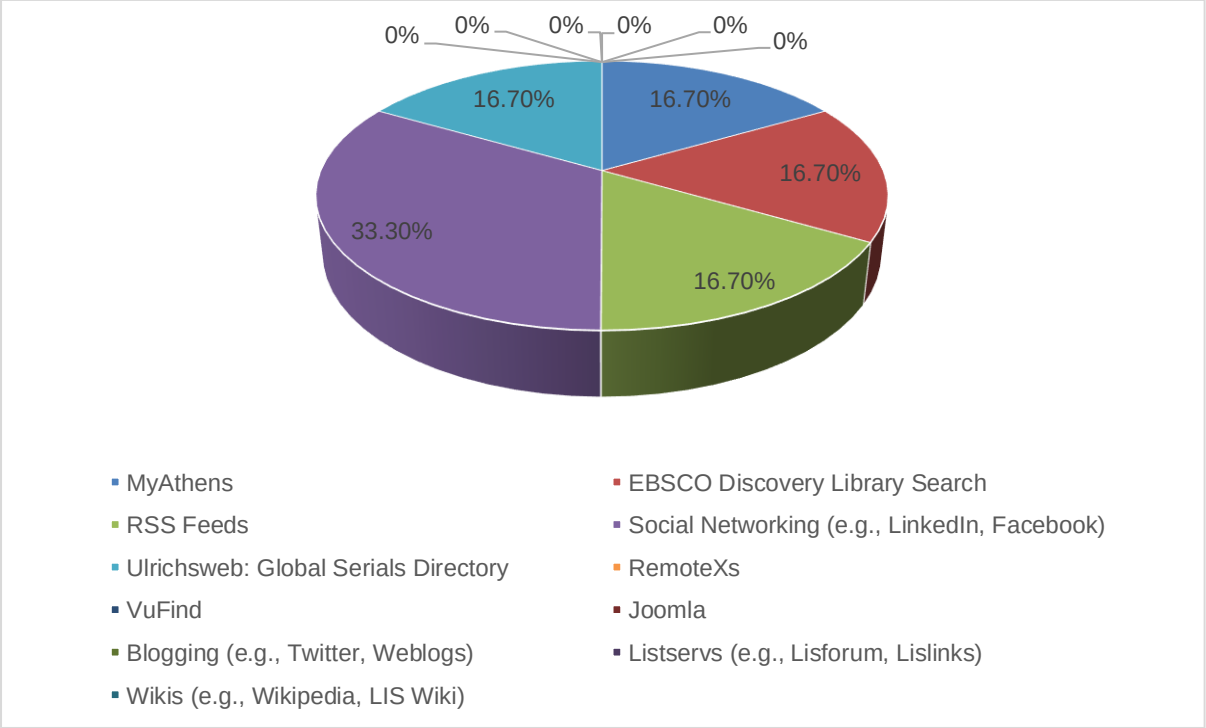


Figure 6.30: Percentage status of Web tools

Library Products

Library products are used for informing the library users about the library's news, development activities, new additions, library catalogs, library databases, and so on. Table 6.23 shows that 31.2% of libraries generate a 'Library Annual Report'.

Table 6.23: Status of library products

Availability of Library Products[a]	Responses		Percent of Cases
	N	Percent	
Library Catalogues	4	25.0%	50.0%
Library Annual Report	5	31.2%	62.5%
Library Manual	1	6.2%	12.5%
List of Additions	3	18.8%	37.5%
Indexing and Abstracting Journals	2	12.5%	25.0%
Specialized Databases	1	6.2%	12.5%
Total	16	100.0%	200.0%

a. Dichotomy group tabulated at value 1 in which Yes=1 *[Multiple Responses Allowed]*

Reference Management Software

Reference management software is essential for managing references in a manuscript and avoiding plagiarism. A researcher must properly acknowledge all the contributions that he/she has cited in his/her manuscript. It is found from Figure 6.31 that only 5% library is using EndNote software followed by 15% of libraries for Zotero and the rest 80% of libraries are not using any referencing software.

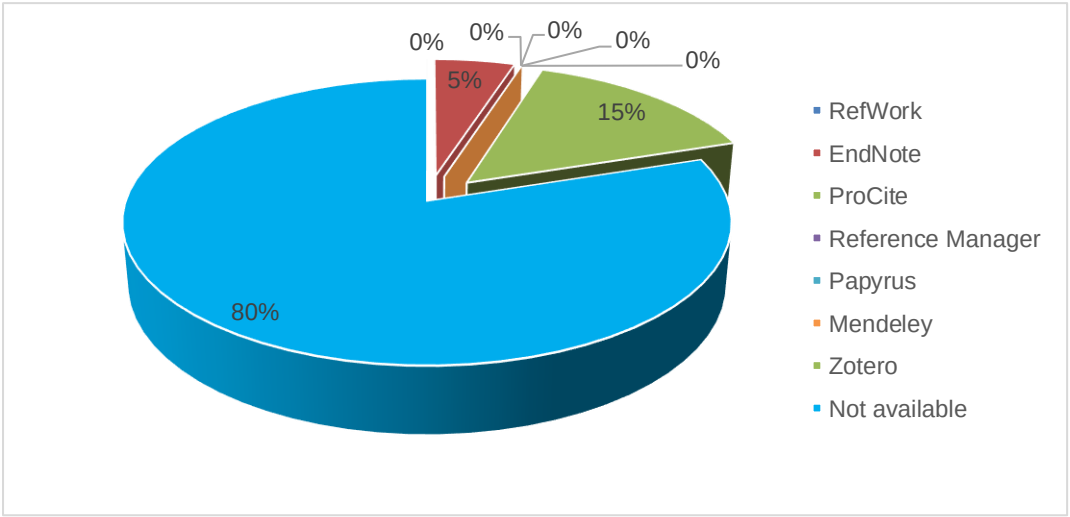


Figure 6.31: Status of reference management software

Plagiarism Detecting Software

Plagiarism Software is essential for avoiding text similarity. Figure 6.32 shows that only one (5%) library is currently using iThenticate for detecting plagiarism and 95% of libraries are not using any sort of plagiarism software.

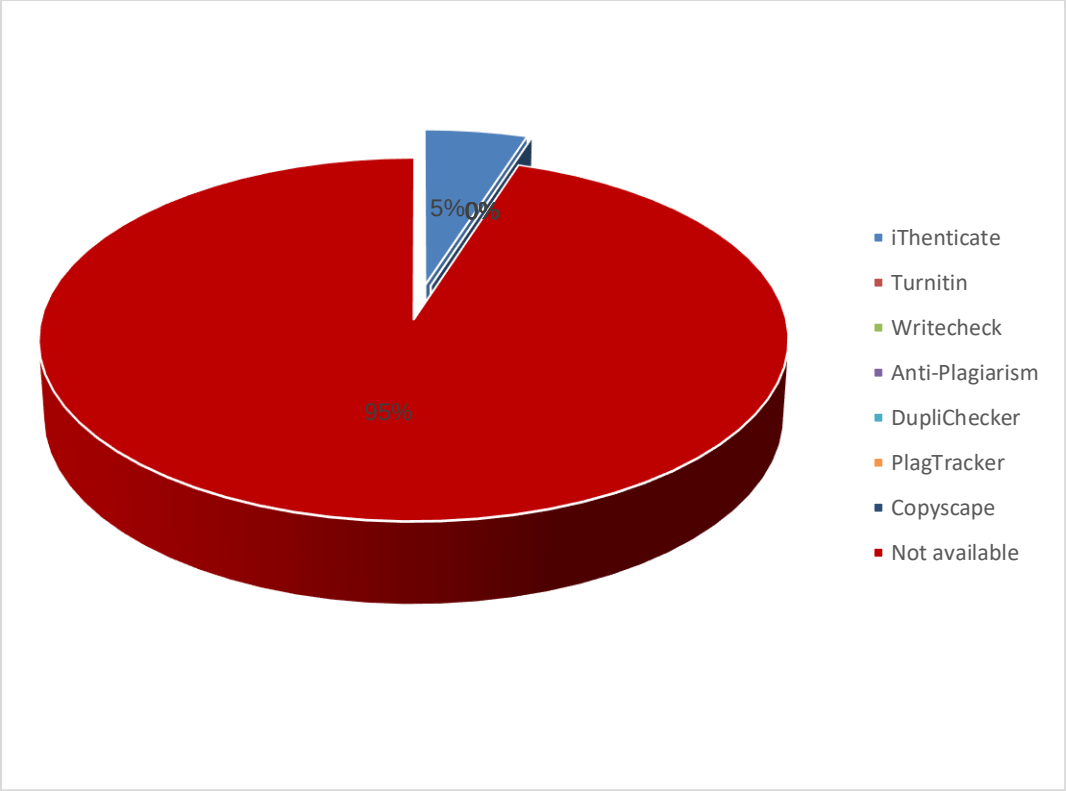


Figure 6.32: Availability of plagiarism software

ICT Facilities in the Library

The emergence of Information and Communication Technologies (ICTs) poses an excellent opportunity for libraries to create new pathways for library systems and services. In this modern library environment, the application of ICT in library operations and activities cannot be over-emphasized. ICT-based library facilities are much required for speedy library activities and services. ICT is an indispensable tool for managing library operations smoothly. So it is essential to identify the ICT facilities in the studied medical libraries. Table 6.24 reveals that 80% of surveyed libraries have some sort of ICT facilities and also shows the inception year of ICT in the respective library, it is observed that icddr,b library first started ICT and automation facilities in 1987, and the BIRDEM Library in 1991.

Table 6.24: Distribution of libraries by ICT facilities

Name of the Medical Libraries	Availability of ICT facilities	ICT inception Year
BSMMU Library	Yes	2010
Dhaka Medical College Library	No	N/A
Shaheed Suhrawardy Medical College Library	Yes	2017
Sir Salimullah Medical College Library	No	N/A
Armed Forces Medical College Library	Yes	2006
Bangladesh Medical College Library	Yes	1996
Holy Family Red Crescent Medical College Library	No	N/A
Green Life Medical College Library	Yes	2020
Anwar Khan Medical College Library	Yes	2009
Ibn Sina Medical College Library	No	N/A
Dhaka National Medical College Library	Yes	2015
Bangladesh University of Health Sciences Library	Yes	2017
Evercare Hospital Dhaka's Library	Yes	2020
icddr,b Library	Yes	1987
BIRDEM Library	Yes	1991
BCPS Library	Yes	2004
NHLDC	Yes	2003
WHO Bangladesh Library	Yes	2006
National Institute of Preventive & Social Medicine	Yes	2020
Bangladesh Institute of Child Health Library	Yes	2008

Library Automation Status

'Library Automation' is treated as the most vital part of modern libraries' information systems development, organization, management, and services. Modern library systems and services can't be imagined without automation. Library automation is the application of computers and ICTs to routine library housekeeping operations such as Administrative functions, Acquisition functions, Processing, Circulation, Reference services, Documentation functions, Serials control, Preparing in-house databases and so on. When all the basic functions of a library are performed with ICTs, they are called the automated library and those that perform a few library functions with computers are called partly/semi-automated library. Table 6.25, Figure 6.33 and Figure 6.34 show the automation status and types of automation software used in the studied medical libraries of Bangladesh. According to the Table, BSMMU Library, Anwar Khan Medical College Library and icddr,b Library have been found as an automated library, whereas BUHS, BCPS, BIRDEM and NHLDC libraries are semi-automated. The rest 65% of libraries are manually operated. It indicates that automation of medical libraries has been started on a limited scale in Bangladesh recently.

Table 6.25: Distribution of libraries by automation facilities

Name of the Medical Libraries	Status of automation	Nature of software	Name of Software
BSMMU Library	Fully	Open-source	SLiMs
Dhaka Medical College	Not automated	Not Available	Not available
Shaheed Suhrawardy	Not automated	Not Available	Not available
Sir Salimullah Medical	Not automated	Not Available	Not available
Armed Forces Medical	Not automated	Not Available	Not available
Bangladesh Medical College	Not automated	Not Available	Not available
Holy Family Red Crescent Medical College Library	Not automated	Not Available	Not available
Green Life Medical College	Not automated	Not Available	Not available
Anwar Khan Medical College	Fully	In house	Others
Ibn Sina Medical College	Not automated	Not Available	Not available
Dhaka National Medical	Not automated	Not Available	Not available
Bangladesh University of	Partially	Open-source	KOHA
Evercare Hospital Dhaka's	Not automated	Not Available	Not available
icddr,b Library	Fully	Commercial	Liberty
BIRDEM Library	Partially	Open - source	SLiMs
BCPS Library	Partially	In house	Others
NHLDC	Partially	Open-source	KOHA
WHO Bangladesh Library	Not automated	Not Available	Not available
NIPSOM Library	Not automated	Not Available	Not available
Bangladesh Institute of Child Health Library	Not automated	Not Available	Not available

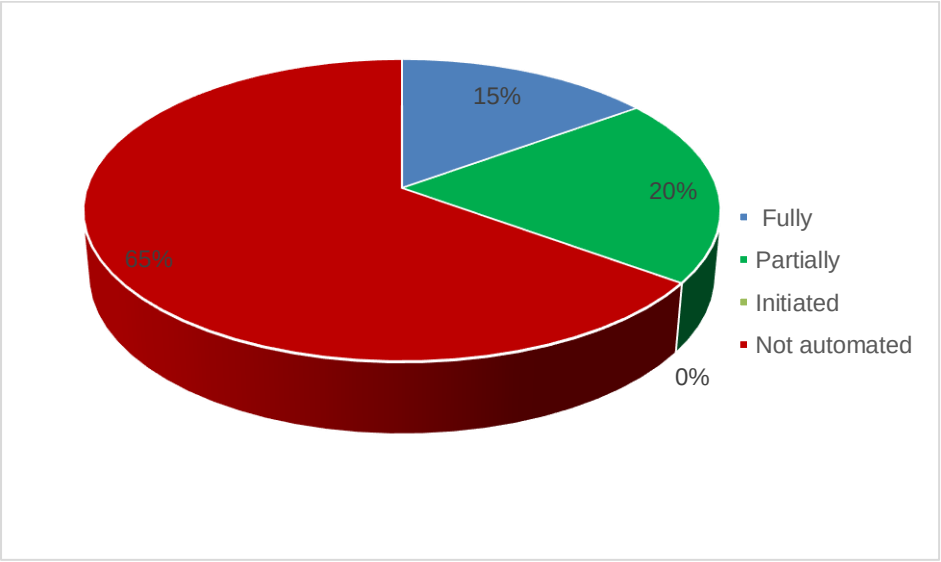


Figure 6.33: Percentage status of library automation

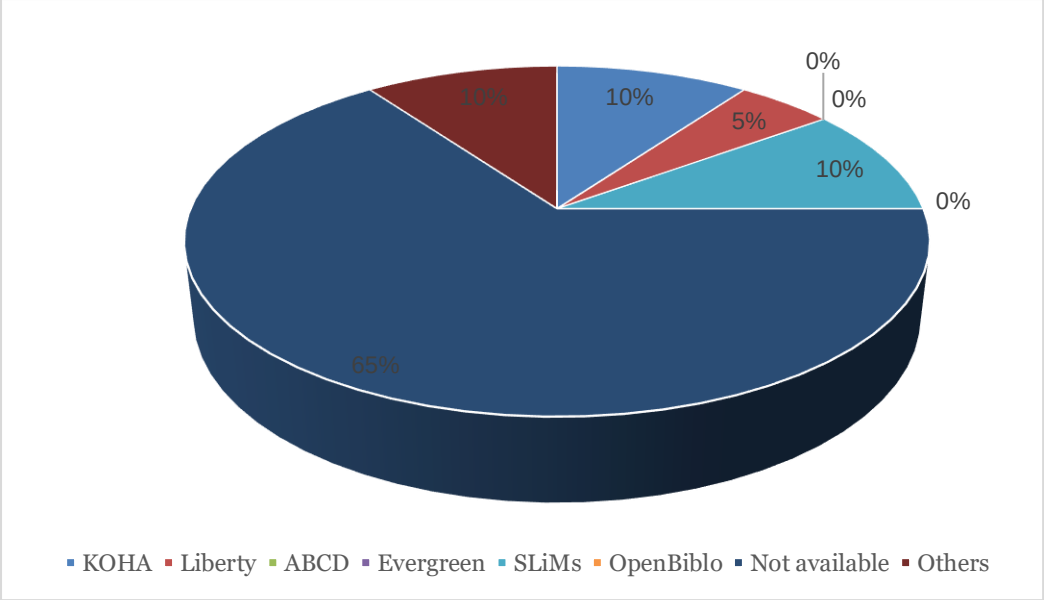


Figure 6.34: Status of automation software of the surveyed libraries

It is significant to note from Figure 6.34 that, Koha and SLiMs software are used in 10% of each of the automated libraries (n=7) and 65% of libraries are not using any sort of automation software.

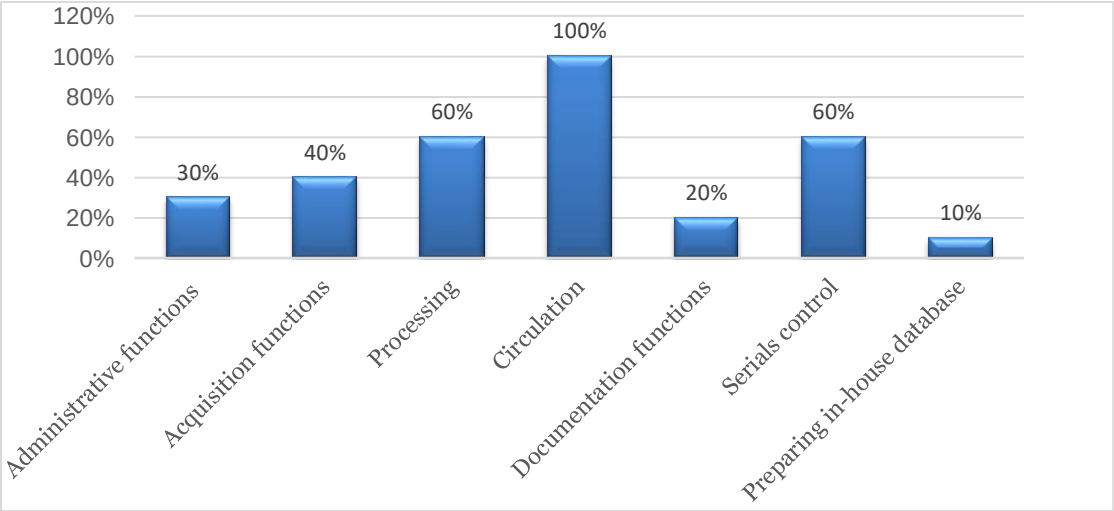


Figure 6.35: Status of automation areas of the surveyed libraries

Figure 6.35 shows the functions and activities that are performed with automated systems by the sample medical libraries. The Figure illustrates clearly that no surveyed library has been performing all the activities/functions with an automated system. Among the sampled libraries that have automation facilities, 100% (n=7) libraries have been performing 'Circulation' functions with the automated system, 60% for Processing, 60% for 'Serial control' functions and 40% for 'Acquisition' functions (Multiple Responses allowed).

Internet Facilities and Library Website

Modern medical libraries must have Internet Facilities and Library Website for introducing value-added innovative library services for users. In order to measure the service quality in the sample medical libraries, it is imperative to investigate the present state of Internet facilities and Library Websites in the medical libraries. Table 6.26 explores the basic information regarding total Internet-connected PCs, Internet users and types of Internet connection and found that BSMMU has the largest number of Internet-connected computers i.e., 80 but Holy Family Red Crescent Medical College Library has not any net-connected PCs. 65% of surveyed libraries don't charge for using the Internet and almost 75% of studied libraries have both Broadband and WiFi types of Internet connection.

Table 6.26: Distribution of libraries by Internet facilities

Name of the Medical Libraries	Net-connected PCs	Charge for Internet	Net users per day	Types of Internet connection
BSMMU Library	80	Yes	370	Broadband +WiFi
Dhaka Medical College Library	1	No	6	Broadband
Shaheed Suhrawardy Medical College Library	5	No	2	Broadband
Sir Salimullah Medical College Library	1	No	5	Broadband
Armed Forces Medical College Library	20	No	10	Broadband +WiFi
Bangladesh Medical College Library	5	No	20	Broadband +WiFi
Holy Family Red Crescent Medical College Library	0	No	0	N/A
Green Life Medical College Library	2	No	12	Broadband
Anwar Khan Medical College	2	No	150	Broadband +WiFi
Ibn Sina Medical College Library	2	No	20	Broadband +WiFi
Dhaka National Medical College Library	5	No	15	Broadband +WiFi
Bangladesh University of Health Sciences Library	5	No	30	Broadband +WiFi
Evercare Hospital Dhaka's Library	2	No	15	Broadband +WiFi
icddr,b Library	27	No	60	Broadband +WiFi
BIRDEM Library	5	Yes	12	Broadband +WiFi
BCPS Library	10	Yes	5	Broadband +WiFi
NHLDC	35	Yes	10	Broadband +WiFi
WHO Bangladesh Library	4	Yes	5	Broadband +WiFi
NIPSOM Library	10	No	23	Broadband +WiFi
Bangladesh Institute of Child Health Library	10	Yes	40	Broadband +WiFi

Library Website and Intranet

Library Websites and Intranet play a significant role in providing modern library services and accessing to e-resources. Table 6.27, Table 6.28, and Table 6.29, below explore the availability of library webpage and library intranet of surveyed libraries. 55% of surveyed libraries have library webpages linked to individual institution's homepage and 5% of library webpages are not functional while conducting the survey. Regarding Intranet, only 10% of libraries belong to this credit for accessing e-resources. Table 6.28 also explores that 70% of libraries have more than 6 MBPS net connection speed. Table 6.30 suggests that 85% of libraries have electronic security systems.

Table 6.27: Status of the library website

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	8	40.0	40.0	40.0
	Yes	11	55.0	55.0	95.0
	Not Functionable	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Table 6.28: Status of Intranet access

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	18	90.0	90.0	90.0
	Yes	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Table 6.29: Bandwidth of library Internet

Internet speed		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	>1.0 to <=2.0 Mbps	1	5.0	5.0	5.0
	>2.0 Mbps to <=4.0 Mbps	1	5.0	5.0	10.0
	>4.0 Mbps to <=6.0 Mbps	3	15.0	15.0	25.0
	>6.0 Mbps and above	14	70.0	70.0	95.0
	Not Available	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Table 6.30: Status of electronic security system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	3	15.0	15.0	15.0
	Yes	17	85.0	85.0	100.0
	Total	20	100.0	100.0	

Library Webpage Contents

As mentioned earlier, though 55% (n=11) surveyed libraries have a webpage, only basic information about the libraries is available on these websites while Web OPAC is available on only 5% of library webpages, as shown in Figure 6.36 (Multiple Responses allowed).

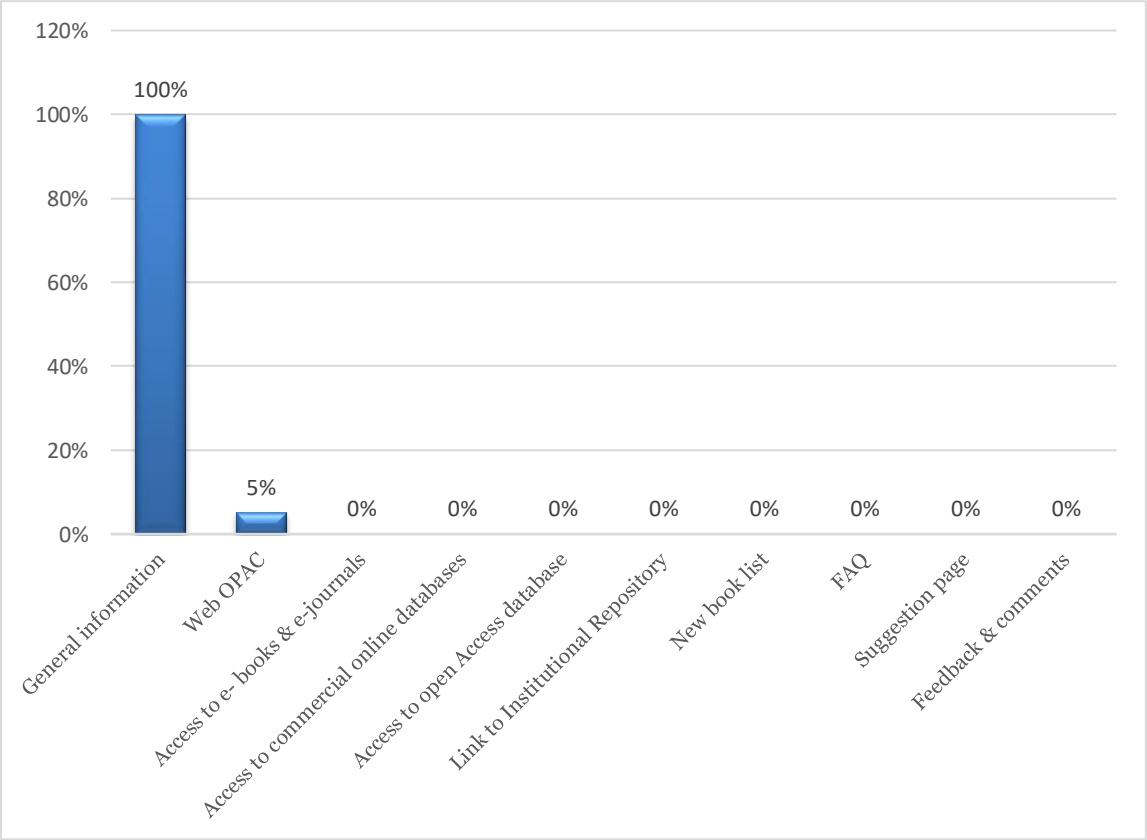


Figure 6.36: Availability of library webpage contents

Preference for Browser Software

Figure 6.37 illustrates that all library heads under the survey (n=20, 100%) have opined that Mozilla Firefox is the most effective browser for retrieving web-based information for users followed by Chrome and Edge accounting for 65% and 45% respectively (Multiple responses allowed).

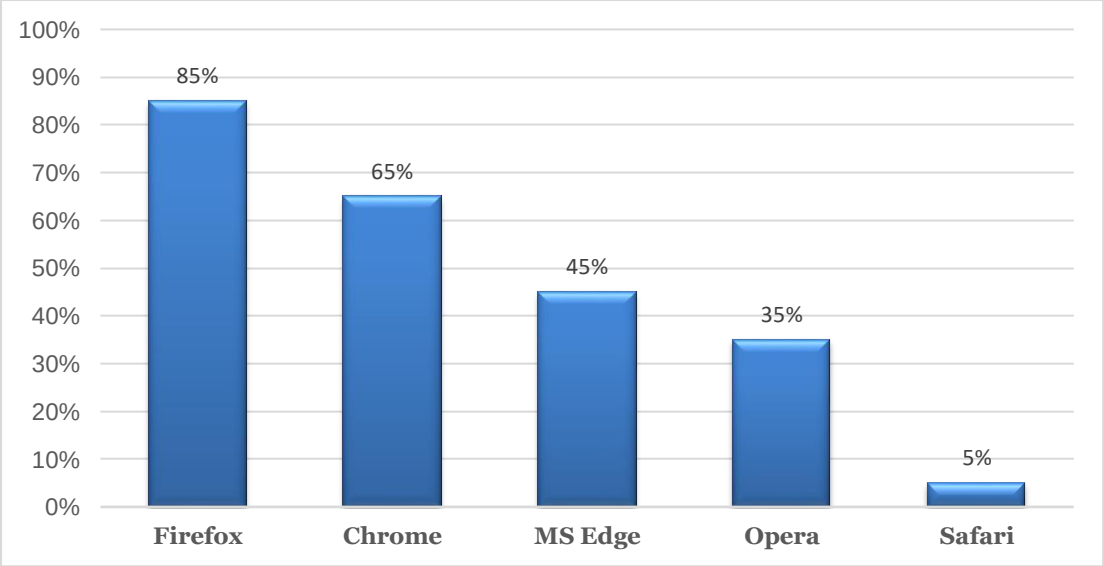


Figure 6.37: Percentage of browser software usage

Preference for Search Engine

Figure 6.38 shows that all library heads under survey (n=20, 100%) given priority on "Google" ranked 1st position as the most essential search engine for retrieving web-based information for users followed by Yahoo and MSN chrome accounting 2nd and 3rd respectively (Multiple responses allowed).

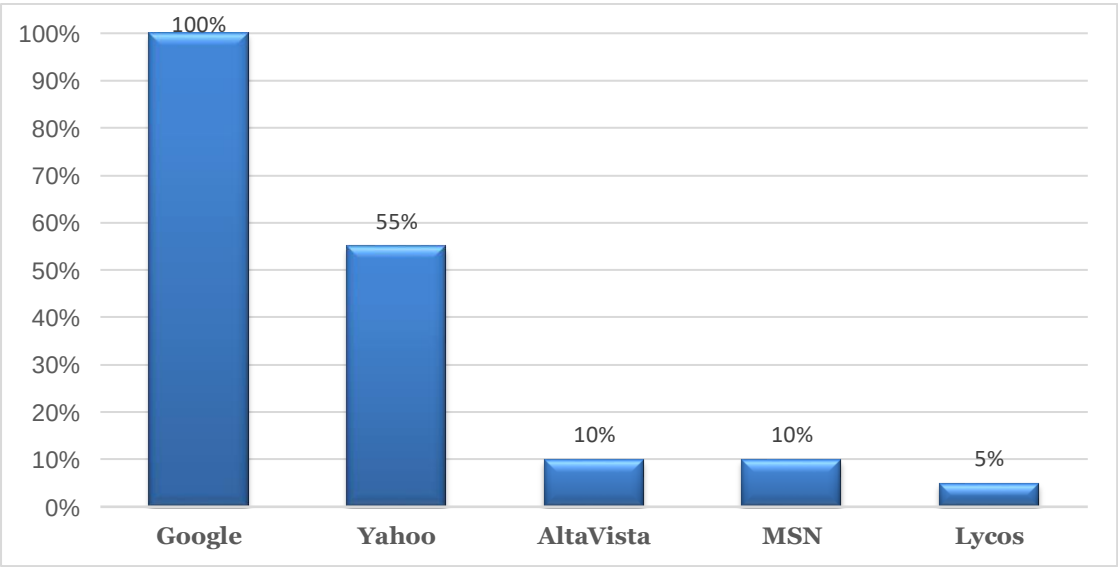


Figure 6.38: Trends of using search engines by the library heads

Library Security System

Figure 6.39 revealed that electronic access door is available in the BCPS library, the icddr,b library has the provision of RFID and CC camera, and only the BSMMU library takes the credit for Electronic Surveillance System. CC camera and Smoke Detector System are available in 85% and 30% of libraries respectively (Multiple responses allowed).

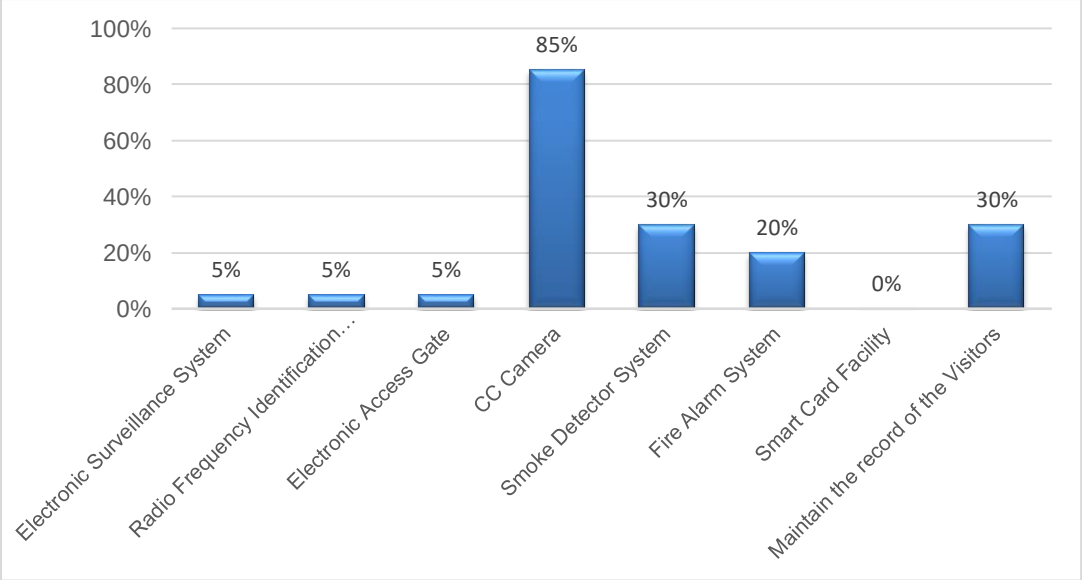


Figure 6.39: Trends in library security system

ICT Equipment and Modern Technology

The effectiveness of health information systems depends on a strong ICT infrastructure which comprises providing the latest ICT equipment. The studied medical libraries are observed to be moderately equipped with the required number of computers and other IT devices apart from DMCL, SMCL, ISMCL, HFRMCL, and EHD libraries. Table 6.31 and Figure 6.40 reveal that a total of 242 computers are available in the surveyed libraries. Server counts of only 13, followed by Scanners, Photocopiers, and Routers belong to 21, 20 and 23 accordingly. BSMMU, icddr,b and NHLDC libraries are in an advanced position in terms of ICT equipment. The findings reveal that there is an urgent need for more ICT equipment, especially for SMCL and DMC libraries in the long run to get the benefits of information and communication technologies. It is concluded that Internet connection is available in all the surveyed libraries. This is a positive sign in the growth of ICT in medical libraries.

Table 6.31: List of modern technology and equipment

Name of the Medical Libraries	Servers	Computers	Scanners	Photocopiers	Printers	Laptop	WiFi Routers	Projector	CCTV camera	Television	Others	Total
BSMMUL	2	80	2	2	1	0	4	0	10	0	6	107
DMCL	0	1	0	1	1	0	0	0	0	0	0	3
ShSMCL	0	5	0	0	1	0	0	0	4	0	0	10
SMCL	0	1	0	0	1	0	0	0	0	0	0	2
AFMCL	0	20	1	1	1	0	0	0	4	0	0	27
BMCL	0	5	0	1	2	0	0	0	6	0	0	14
HFRCMC	1	0	0	0	0	0	0	0	4	0	0	5
GLMCL	1	2	1	2	1	1	2	1	1	2	1	15
AKMCL	1	2	1	1	1	0	1	1	1	1	0	10
ISMCL	0	2	0	0	0	0	1	0	4	0	0	7
DNMCL	0	5	1	2	0	0	3	1	6	0	0	18
BUHSL	1	5	1	0	1	0	1	0	0	0	0	9
EHDL	1	2	1	1	1	0	0	1	0	0	0	7
icddr.b L	2	30	3	3	7	5	5	2	8	1	0	66
BIRDEML	0	8	1	1	3	0	2	0	0	0	0	15
BCPSL	1	10	1	1	1	0	2	0	4	0	0	20
NHLDC	1	40	5	3	5	0	2	1	6	0	0	63
WHO,BL	1	4	1	0	1	0	0	0	0	0	0	7
NIPSOML	1	10	0	0	1	0	0	0	4	0	0	16
BICHL	0	10	2	1	1	0	0	1	1	0	0	16
Total	13	242	21	20	30	6	23	8	63	4	7	437

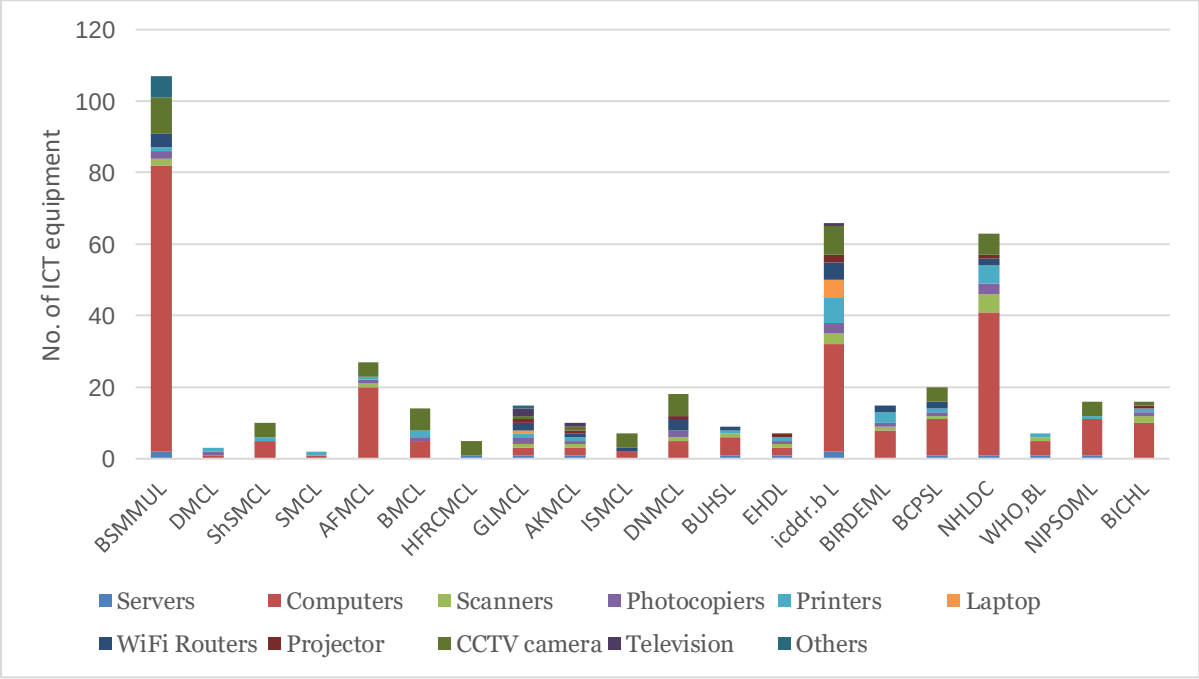


Figure 6.40: Proportion of ICT equipment of surveyed libraries

Digitized collections of the libraries

It is observed that the surveyed have not a good collection of their own digitally created resources (Journal articles, Books/book chapters, Reports/Protocols, Photographs, Maps, Thesis/ Dissertations, Newspapers, and Government publications). It is observed that the icddr,b library digitizes a good number of documents i.e., 8741 followed by BCPS and NHLDC, which have 5,000 and 230 digitized theses respectively as explored in Figure 6.41. The remaining 80% of libraries are in a poor state in terms of digitizing their resources.

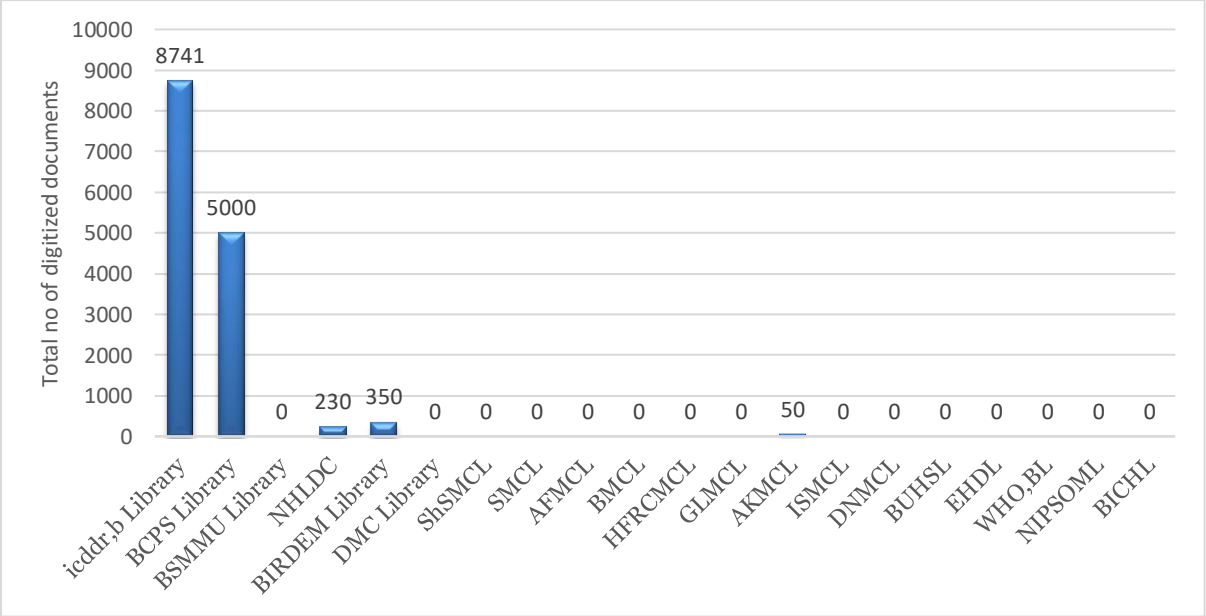


Figure 6.41: Library-wise digitized collections

Measuring Usage of e-resources

Measuring e-resources is vital to know the usage matrix and convince higher authorities to subscribe to the e-resources for the medical library. The below measures are useful for libraries to measure the usage of e-resources:

- COUNTER – Counting Online Usage of Networked Electronic Resources
- ICOLC – International Coalition of Library Consortia
- ISO – International Organization for Standardisation
- NISO – National Information Standards Organization
- SUSHI: Standardized Usage Statistics Harvesting Initiative

Table 6.32 shows the availability of e-resources measurement methods in the sample libraries. It is found that only the icddr,b library among the sample libraries uses COUNTER Method for tracing the usage of e-resources.

Table 6.32: Status of usage of Electronic Resources Methods

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	19	95.0	95.0	95.0
	Yes	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Digital Library/IR Software

Open-source digital library software namely DSpace is used in almost 30% of libraries that are currently involved with some sort of digitized or Institutional Repository activities as traced in Figure 6.42. 20% of libraries have not decided yet about digital library software and no digital software is available in 50% of libraries.

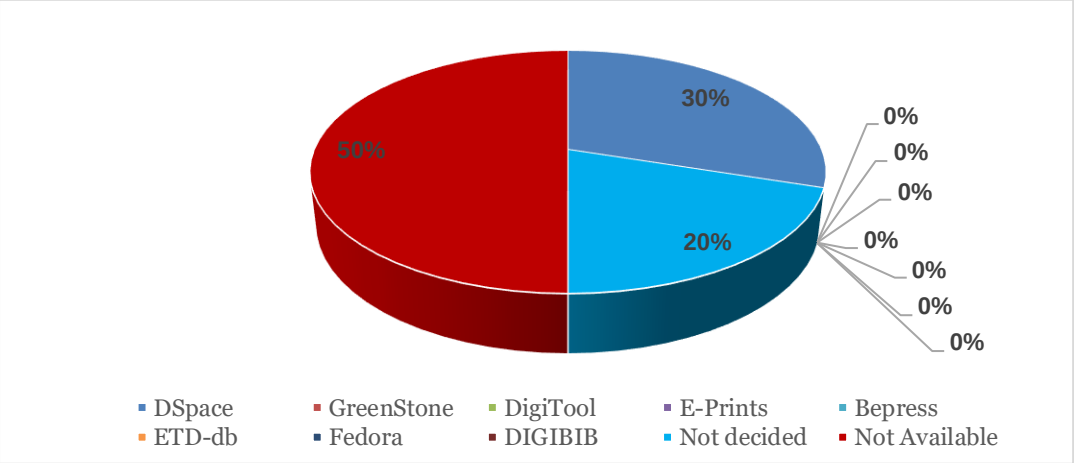


Figure 6.42: Extent of using digital library/IR software

Status of Institutional Repository (IR)

Institutional Repository is an online repository for preserving and accessing scientific outputs, journal articles, reports, news, and technical papers including unpublished materials. The resources that are preserved in IR are generally open-access. Currently, the best method for the medical libraries of Bangladesh to preserve their digital collections/digital information resources is through developing an "Institutional Repository". But a very poor trend has been observed for the surveyed in developing IR which is apparent in Figure 6.43. Out of 20 respondents, only the icddr,b library is well advanced in developing IR.

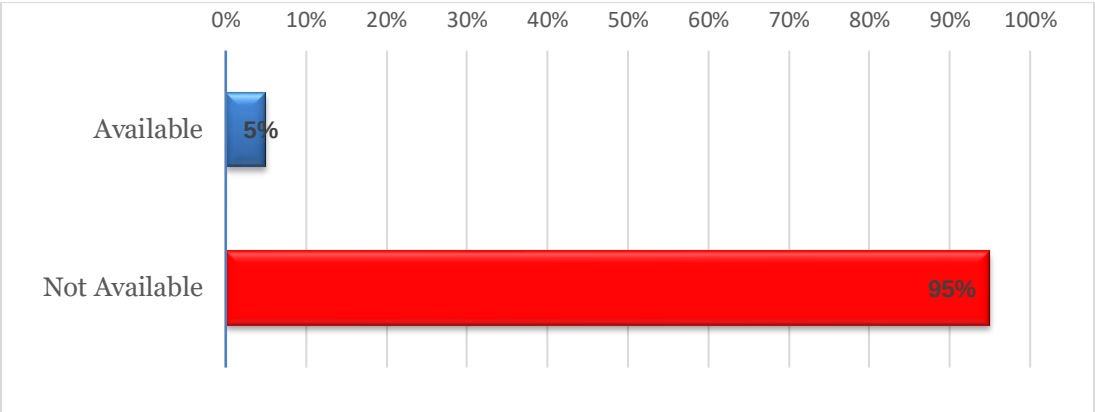


Figure 6.43: Status of Institutional Repository (IR) of selected libraries

OpenDOAR Status

As mentioned earlier, icddr,b library has so far developed its IR with a huge collection of resources among the studied libraries. OpenDOAR (Directory of Open Access Repositories) enlists the icddr,b IKR. OpenDOAR is the quality-assured, global Directory of Open Access Repositories, that monitors IR activities globally. The remaining medical libraries should take proper initiatives to develop IR for showcasing the scientific outputs globally.

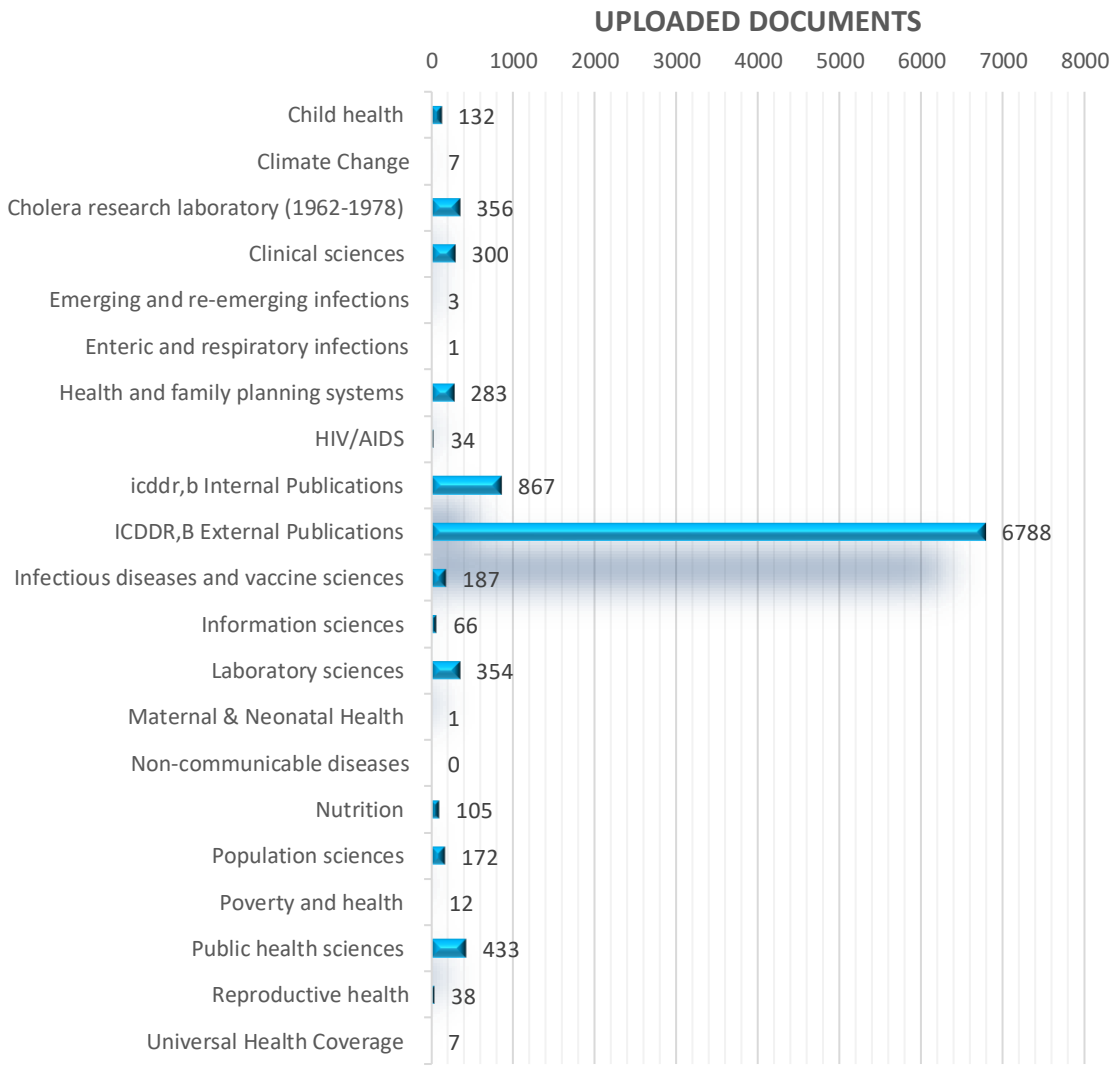
Table 6.33: IR enlisted status with OpenDOAR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	19	95.0	95.0	95.0
	Yes	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

icddr,b Library IKR

Dspace, open-source software has been used for developing the icddr,b Institutional Knowledge Repository (IKR) since 2005. It adds a new value of icddr,b for sharing the icddr,b scientific works to the maximum number of researchers worldwide. Figure 6.44 illustrates the status of several uploaded documents to icddr,b IKR (http://dspace.icddrb.org/jspui/) as of 22 June, 2021, and unfolds that so far a total 10,098 documents have been uploaded.

Figure 6.44:Total uploaded documents of icddr,b IR



Performance of Library

Figure 6.45 explores the overall responses regarding library performance and shows that about 40% of the libraries evaluated the library performance as “Fair” and 35% of the libraries said that their facilities are “Very Poor”. Only 5% of surveyed libraries evaluated their library performance as “Excellent”. Followed by only 20% of libraries evaluated as “Good”.

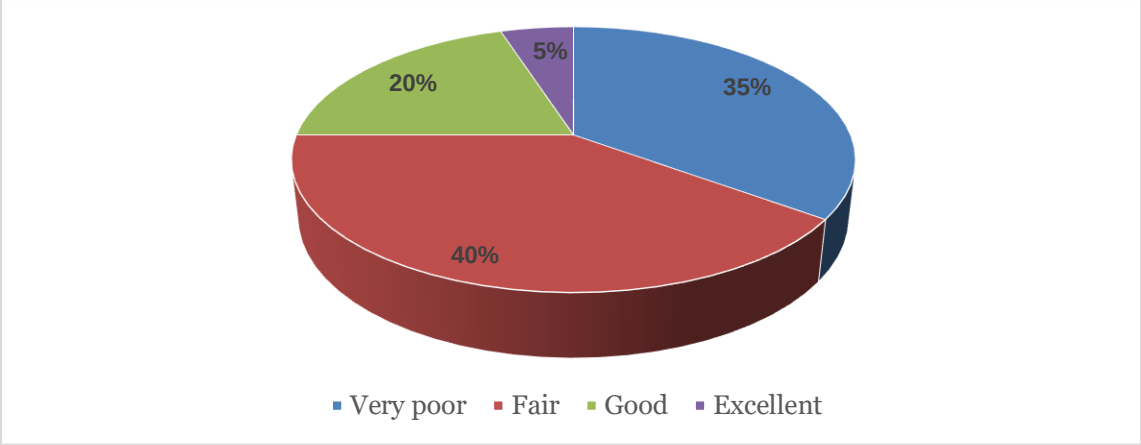


Figure 6.45: Evaluation of library performance

Library Consortium/Co-Operation/Resource Sharing

Library consortium/co-operation/resource sharing is essential for the medical libraries of Bangladesh for sharing/purchasing resources in a cost-effective manner for accessing more e-resources. It is found in Table 6.34 that only 10% of libraries are members of a consortium. In this case, only the icddr,b and BCPS libraries are the members of LiCOB (Library Consortium of Bangladesh) and UDL (UGC Digital Library). Besides the icddr,b Library is also a member of BdREN (Bangladesh Research and Education Network).

Table 6.34: Membership status of e-resource consortium

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	18	90.0	90.0	90.0
	Yes	2	10.0	10.0	100.0
	Total	20	100.0	100.0	

Table 6.35: Plan of becoming a member of the consortium

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	3	15.0	16.7	16.7
	Yes	15	75.0	83.3	100.0
	Total	18	90.0	100.0	
Missing	System	2	10.0		
Total		20	100.0		

To know the future intention of the libraries that are not joined to any consortium, a question was asked to the librarians about their plan to be a member of a consortium and found that 75% (n=18) of libraries have a plan to do that (Table 6.35).

Budget Status for 2019-2020

Modern library systems and services demand considerably high investments in ICT infrastructure, subscription of library resources, database creation, software development, new personnel recruitment, library website development, Integrated Library System development, IR development, staff training/promotion, and overall, all the development activities of the library. Keeping this in mind an attempt has been made in this study to find out the budgetary allocations for the studied libraries. Since the budget data is sensitive and many sample libraries have declined to provide detailed information according to Budget Heads, therefore the institutional and establishment cost of the sample libraries could not be analysed in this study due to the unavailability of information. Hence, in place of the actual monetary allocation details, this study has only covered the total amount of budget for purchasing books, periodicals, and e-resources for the financial year 2019-2020. It is found from Table 6.36 and Figure 6.46 that, Shaheed Suhrawardy Medical College Library allocates the highest budget among all libraries for purchasing books, periodicals, and e-resources for the financial year 2019-2020 i.e. 80 lac taka followed by BSMMU and icddr,b Library that stand for 75 lac and 68 lac respectively.

Table 6.36: Budget summary of the libraries for books, periodicals, and e-resources

Name of the Medical Libraries	**Budget of Books, Periodicals, and e-resources in Taka**
BSMMU Library	7500000
Dhaka Medical College Library	3500000
Shaheed Suhrawardy Medical College Library	8000000
Sir Salimullah Medical College Library	6500000
Armed Forces Medical College Library	2000000
Bangladesh Medical College Library	900000
Holy Family Red Crescent Medical College Library	300000
Green Life Medical College Library	400000
Anwar Khan Medical College Library	500000
Ibn Sina Medical College Library	1800000
Dhaka National Medical College Library	500000
Bangladesh University of Health Sciences Library	800000
Evercare Hospital Dhaka's Library	500000
icddr,b Library	6800000
BIRDEM Library	4000000
BCPS Library	4000000
NHLDC	1500000
WHO Bangladesh Library	N/A*
NIPSOM Library	500000
Bangladesh Institute of Child Health Library	300000

* *Not provided the data*

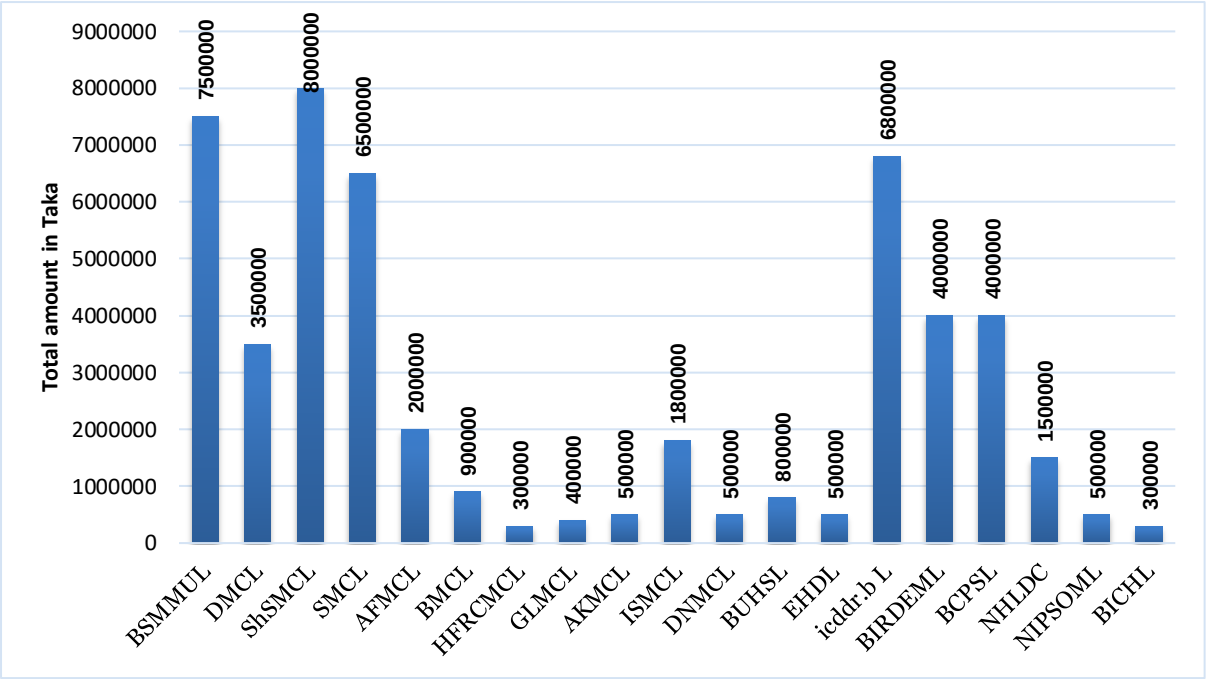


Figure 6.46: Budget proportion of the libraries for books, periodicals and e-resources

Sources of Library Funding

The fund is one of the important factors by which a library can survive. Smooth library functioning depends upon the adequate fund. Figure 6.47 shows that 45% of each selected libraries have taken funds both from their own parent body and Govt. sources. Only 10% of libraries get financial support from 'Foreign Aids".

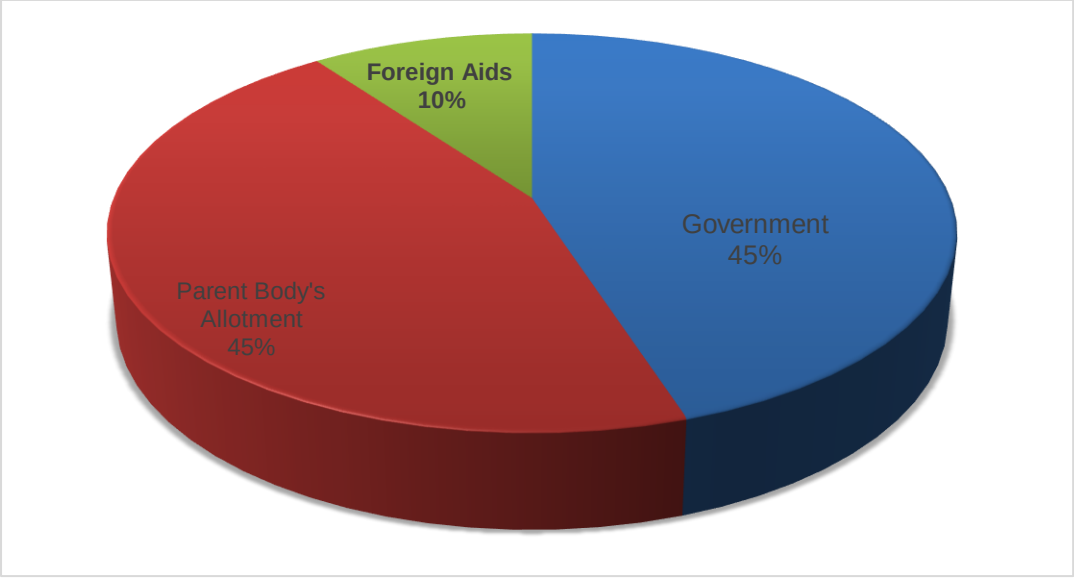


Figure 6.47: Proportion of library funding

Impacts of ICTs in Library

Modern ICTs have a great influence on every segment of library activity. The impacts of ICT on library like the promotion of library services, improved job satisfaction, more e-resources usage, duplication of efforts, better coverage of resource sharing and networking, marketing of information products, and the gateway of global information resources are most mentionable here. Table 5.37 and Figure 5.46 show the various impacts of ICT as evaluated by the library heads of the surveyed libraries. Eighteen indicators are identified and the respondents are asked to rate those on a five-point Likert type scale of 1 to 5 (Strongly disagree to Strongly agree). Thus, for each indicator, the scores are obtained, and importance levels are ranked based on Sum, Mean and Standard Deviation (SD). The scores and percentage level of preference are presented in Table 6.37 and Figure 6.48 where 'Creates the awareness about library' has the highest mean value of 4.90 and the Standard Deviation belongs to .308 comprising Rank 1 followed by 'Increases job satisfaction of Library staff' and 'ICT improves easy access to online library resources' with an equal mean value of 4.75 and their SD is .444 belong to rank 2 jointly and 'Improves the quality of library services' placed the 3rd position.

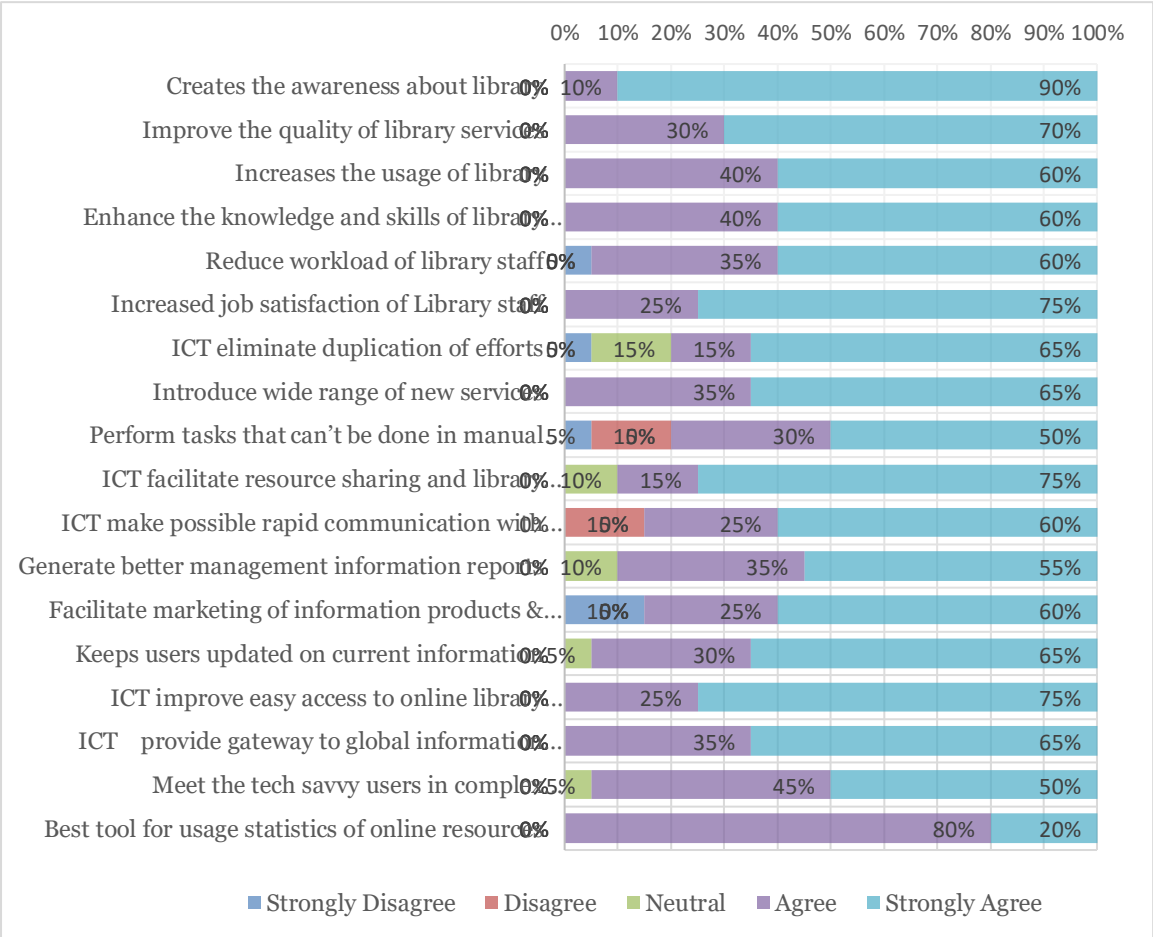


Figure 6.48: Percentage level of ICT impacts by library heads

Table 6.37: Evaluation of ICT impacts by library heads

Indicators	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
Creates the awareness about library	20	4	5	98	4.90	.308	.095
Increases job satisfaction of Library staff	20	4	5	95	4.75	.444	.197
ICT improves easy access to online library resources	20	4	5	95	4.75	.444	.197
Improves the quality of library services	20	4	5	94	4.70	.470	.221
ICT provides gateway to global information resources	20	4	5	93	4.65	.489	.239
ICT facilitates resource sharing and library networking	20	3	5	93	4.65	.671	.450
Introduces wide range of new services	20	4	5	93	4.65	.489	.239
Enhances the knowledge and skills of library professionals	20	4	5	92	4.60	.503	.253
Keeps users updated on current information	20	3	5	92	4.60	.598	.358
Increases the usage of library	20	4	5	92	4.60	.503	.253
Meet the tech savvy users in complex information needs	20	3	5	89	4.45	.605	.366
Reduce workload of library staff	20	1	5	89	4.45	.945	.892
Generates better management information reports	20	3	5	89	4.45	.686	.471
ICT eliminates duplication of efforts	20	1	5	87	4.35	1.089	1.187
ICT make possible rapid communication with other libraries	20	2	5	86	4.30	1.081	1.168
Best tool for usage statistics of online resources	20	4	5	84	4.20	.410	.168
Facilitates marketing of information products & services	20	1	5	83	4.15	1.424	2.029
Perform tasks that can't be done in a manual system	20	1	5	81	4.05	1.276	1.629
Valid N (listwise)	20						

[Scale: 5=Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree,1=Strongly Disagree]

Skills/Competencies of Library Staff

Smooth library functioning depends largely on skilled library staff. In the present study, the investigator tries to identify the level of skills as evaluated by the respective library heads, and the results are shown in the Table 6.38 which indicates 'Communication with

Vendors/publishers/aggregators and 'ILS management' with a Mean score .2.20 and 2.05 ranked 1st and 2nd position accordingly.

Table 6.38: Competency ranking of the library staff

Competencies	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
Communication with Vendors/publishers/aggregators	20	1	5	44	2.20	1.399	1.958
ILS management	20	1	5	41	2.05	1.276	1.629
Online medical databases	20	1	5	41	2.05	.999	.997
Development of Institutional Repository (IR)	20	1	5	38	1.90	1.165	1.358
System Administration and Maintenance	20	1	4	38	1.90	1.071	1.147
Maintenance of Library Website	20	1	5	37	1.85	1.089	1.187
Electronic Resource Management (ERM)	20	1	4	36	1.80	.951	.905
Licensing	20	1	4	36	1.80	.951	.905
Installation and customization of software	20	1	4	34	1.70	.923	.853
Web page design	20	1	4	33	1.65	.813	.661
Valid N (listwise)	20						

[Scale:5= Excellent, 4=Very Good, 3=Good, 2=Poor, 1=Don't Know]

Future Library Plans

Future library plans of library heads for overall modernization of library services are shown in Figure 5.48 and found that 85% of heads of libraries have the willingness to do that.

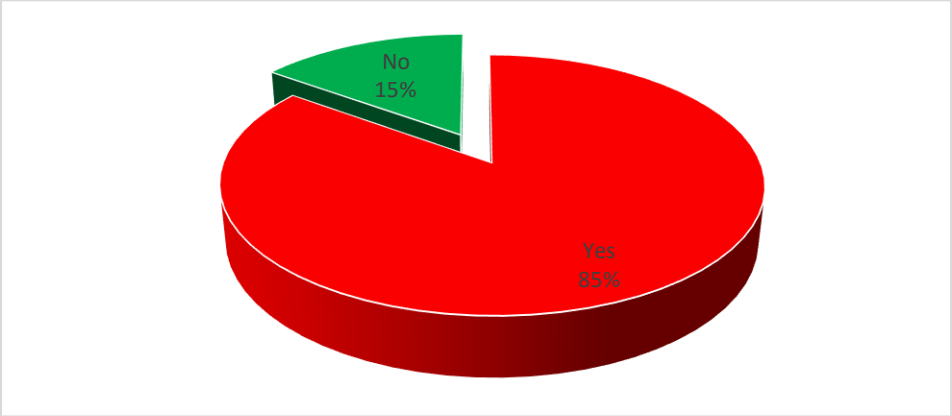


Figure 6.49: Percentage level of future library plans by library heads

Librarians of the sample medical libraries were asked to give their rankings to support a wider range of library development activities. Fourteen major library action plans were identified, and a five-point 'Likert Scale' was used to measure the most common action plans.

Table 6.39: Opinion of librarians regarding developed library services

Action plans	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
Educate the users on online information literacy	20	5	5	1005.00	.000		.000
Developing Institutional Repository	20	5	5	1005.00	.000		.000
Digitization of unique materials in the library	20	5	5	1005.00	.000		.000
Library plans to automate all its functions	20	4	5	98	4.90	.308	.095
Providing access to Electronic Journals	20	4	5	97	4.85	.366	.134
Provide Electronic Document Delivery / Full text services	20	4	5	97	4.85	.366	.134
Plan to have Campus wide Local Area Network	20	4	5	95	4.75	.444	.197
Create & provide access to library web page	20	4	5	93	4.65	.489	.239
Want to be a part of consortia	20	4	5	93	4.65	.489	.239
Become a part of national and international library networks	20	4	5	90	4.50	.513	.263
Improve online access time with high-speed connectivity	20	4	5	89	4.45	.510	.261
Provide access to electronic resources through Internet	20	4	5	88	4.40	.503	.253
Web-based access to catalog	20	4	5	88	4.40	.503	.253
Cataloguing of digital resources	20	3	5	86	4.30	.865	.747
Valid N (listwise)	20						

[Scale: 5=Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree,1=Strongly Disagree]

Table 6.39 reveals that Educate the users on online information literacy, Developing Institutional Repository, and Digitization of unique materials in the library combinedly ranked 1st with a mean score of 5.00 and Sum 100. 'Library plans to automate all its functions' ranked as 2nd with (mean score=4.90) and (standard deviation=.308). Other issues concerning the library plans for better services with a Mean score=>3.00 include: Providing access to Electronic Journals, Provide Electronic Document Delivery / Full-

text services, Plan to have Campus-wide Local Area Network, Create & provide access to the library web page.

Recommendations for Integrated Library and Information System

The heads of the sample medical libraries were asked to give their preferences on 26 indicators for transforming their libraries for Integrated Library and Information System in the future. Twenty-six indicators are identified and the respondents are asked to rate those sources on a five-point Likert type scale of 1 to 5 ((Strongly disagree to Strongly agree). Table 6.40 and Figure 6.50 reveal that the Library should follow the standard for its various functions; Use standard software for its automated functions; Develop and implement an integrated library information system jointly ranked as 1st with a mean score of 4.95 and Sum 99. 'Implement of RFID system ' ranked 2nd with (mean score=4.85) and (standard deviation=.489). Other issues concerning the model library system with a Mean score=>3.00 include: Create a rich learning environment for library users; Provide online OPAC access to library users; Develop Institutional Repository for global access; Develop Digital Library System; Library should have trained manpower for all ICT applications; Enhance the staff skills in modern library tools and technologies; Provide web-based library services.

Table 6.40: Recommendations of library heads for Integrated Library System

Indicators	N	Sum	Mean	Std. Deviation	Variance
Library should follow the standard for its various functions	20	99	4.95	.224	.050
Use standard software for its automated functions	20	99	4.95	.224	.050
Develop and implement an integrated library information system	20	99	4.95	.224	.050
Implement of RFID system	20	97	4.85	.489	.239
Create a rich learning environment for library users	20	96	4.80	.410	.168
Provide online OPAC access to library users	20	96	4.80	.410	.168
Develop Institutional Repository for global access	20	96	4.80	.410	.168
Develop Digital Library System	20	95	4.75	.550	.303
Library should have trained manpower for all ICT applications	20	95	4.75	.550	.303
Enhance the staff skills in modern library tools and technologies	20	94	4.70	.470	.221
Provide web-based library services	20	93	4.65	.587	.345
Formation of library networking and resource sharing	20	93	4.65	.587	.345
Create demand for online access to other databases	20	92	4.60	.503	.253
Follow definite market research strategies	20	92	4.60	.598	.358
Develop and implement mobile-based library services	20	89	4.45	.510	.261
Library should automate all library housekeeping functions	20	89	4.45	.510	.261
Training of end users in the search of online databases	20	88	4.40	.503	.253
Library should have required infrastructure for ICT applications	20	88	4.40	.503	.253
Digitization of library materials	20	88	4.40	.821	.674
Online access to e-resources through library website	20	87	4.35	.745	.555
OPAC Compatibility with Z 39.50 & other communications standards	20	86	4.30	.571	.326
Design and develop of library website	20	86	4.30	.470	.221
Library should have high speed data network connectivity	20	86	4.30	.470	.221
Need based information services for particular user community	20	85	4.25	.444	.197
Develop Knowledge Management System	20	85	4.25	.851	.724
Join the library consortium	20	72	3.60	.598	.358
Valid N (listwise)	20				

[Scale: 5=Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree,1=Strongly Disagree]

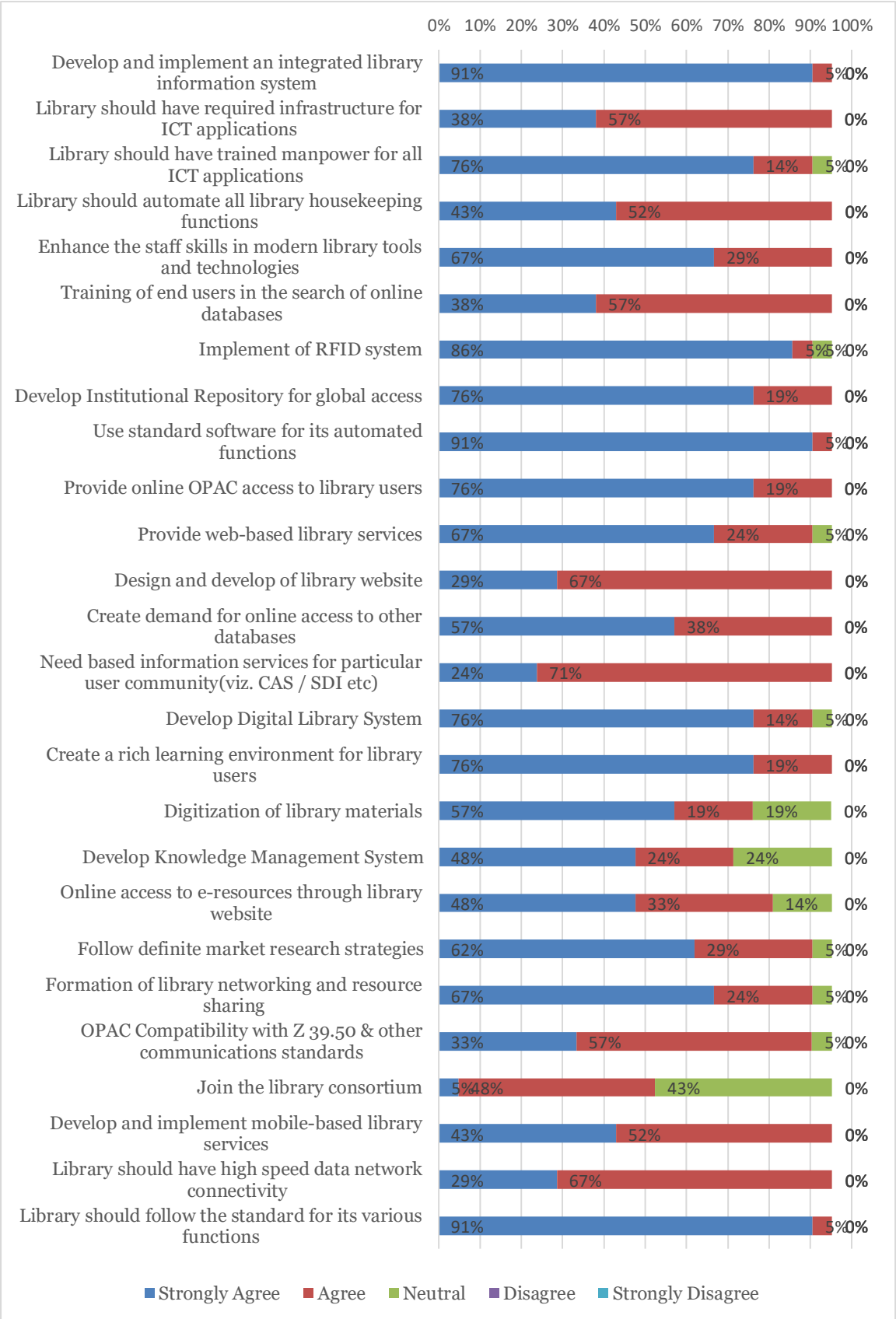


Figure 6.50: Evaluation percentage for Integrated Library System

Challenges Involved in Modern Library System

The library heads were requested about the challenges faced in developing a successful health library system. The researcher has identified a total of 17 core challenges regarding medical libraries of Bangladesh and they were listed and the respondents were asked to rate those challenges on a five-point Likert type scale of 1 to 5 (Not Important to Extremely Important). Thus, for each challenge, the scores were obtained, and Mean and SD, and importance levels were computed.

Table 6.41: Ranking order of challenges for modern library system

Challenges	N	Sum	Mean	Std. Deviation	Variance
Lack of modern library software	20	96	4.80	.523	.274
Lack of ICT resources to modernize library services	20	95	4.75	.550	.303
Inadequacy of ICT facilities	20	92	4.60	.681	.463
Lack of IT staff	20	92	4.60	.754	.568
Lack of professional staff	20	87	4.35	.988	.976
Lack of sufficient budget	20	85	4.25	1.293	1.671
Lack of ICT infrastructural facilities	20	85	4.25	1.118	1.250
Ignorance of the authorities about library and its services	20	85	4.25	1.020	1.039
Lack of government concentration	20	81	4.05	1.356	1.839
Lack of training to make staff efficient	20	81	4.05	.759	.576
Lack of knowledge about latest tools and technologies in library field	20	80	4.00	.858	.737
Lack of National Policy for medical libraries in Bangladesh	20	79	3.95	.759	.576
Inadequate salaries for library personnel	20	77	3.85	1.424	2.029
Administrative bureaucracy complexity	20	75	3.75	1.164	1.355
Low speed of internet connection	20	73	3.65	1.226	1.503
Lack of library separate building and architectural plan	20	66	3.30	1.455	2.116
Valid N (listwise)	20				

[Scale: 5=Extremely Important, 4=Very Important, 3=Important, 2= Somewhat Important, 1=Not Important]

The scores are presented in Table 6.41 and Figure 6.51 where 'Lack of modern library software' has the highest mean value of 4.80 and the Standard Deviation belongs to .523 comprising Rank 1 followed by 'Lack of ICT resources to modernize library services' with the mean value of 4.75 and SD is .550 belong to rank 2 and 'Inadequacy of ICT facilities' and 'Lack of IT staff' placed jointly the 3rd position.

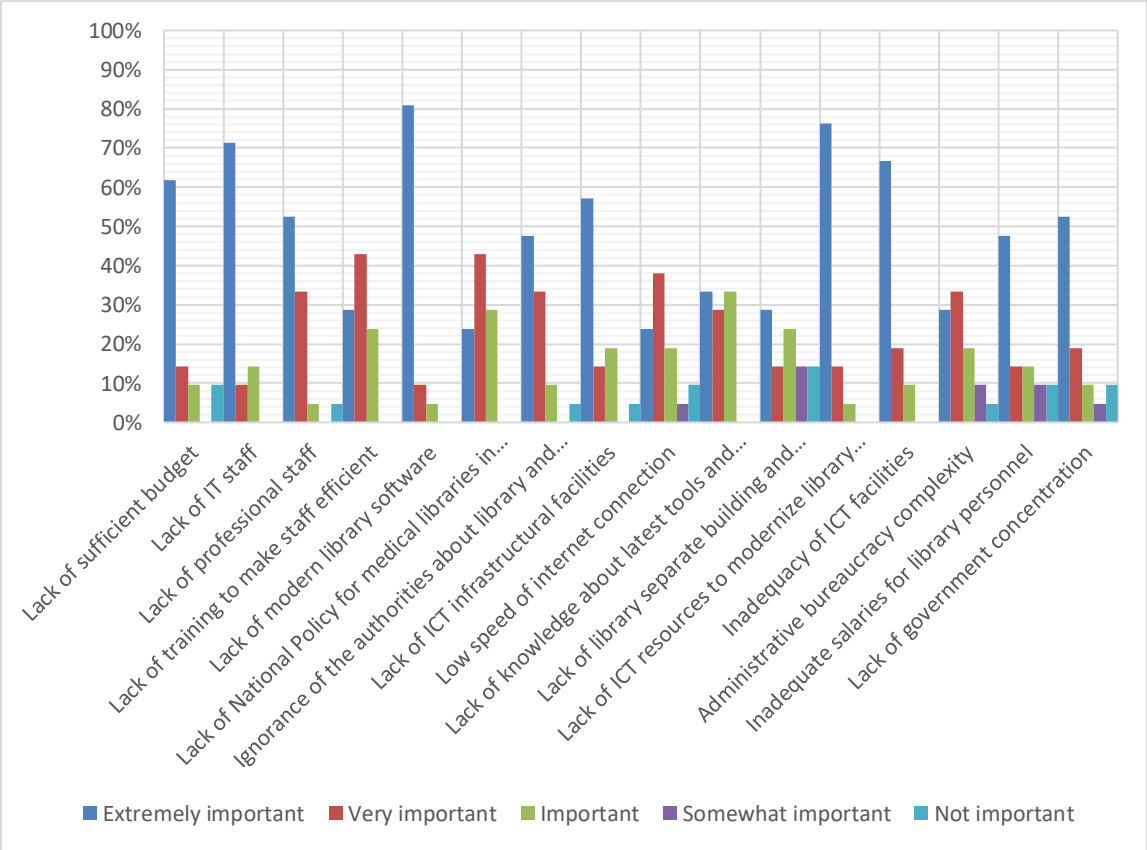


Figure 6.51: Rating percentage involved in library challenges

SECTION – 2: Health Information Systems and Services: Users' Perspective

The responses received from the users have been analyzed and interpreted in Section-2 of the study titled *Health Information Systems and Services in Medical Libraries of Bangladesh*. The users' level survey plays a significant role to examine the present condition and prospects of the selected medical libraries of Bangladesh. The responses received from the users also evaluate the extent and effectiveness of the information systems and services regarding user perspectives. Mean, Standard Deviation (SD), Sum, Percentage, Pie chart, Column chart, Bar chart, Area Chart, Table, etc have been used for data analysis. As mentioned earlier, a total of 20 medical libraries have been selected for the data analysis section. A total of 500 questionnaires were administered to the users among the selected medical libraries.

The responses received from the sample users have been analysed under the following headings:

i. Demographic Information;
ii. Use of library;
iii. Library building/space;
iv. Library services;
v. ICT enabled services
vi. Usage of library e-resources
vii. Usage of online databases
viii. Preference of search engine
ix. Library problems
x. Suggestions for library improvement

Demographic Information

Response Rate

The researcher has administered a total of 500 questionnaires to the medical students, scientists, physicians, faculties, researchers, and staff members of twenty medical libraries selected for the study. Out of 500 questionnaires, a total of 412 completed and filled-up questionnaires were collected with a good response rate of 82.4%.

Table 6.42: Status of the respondents

Total Number of Questionnaires	Received Back	Missing	Percentage
500	412 (82.4%)	88 (17.6%)	100%

Table 6.42 indicates that 82.4% of the total questionnaires have been returned which shows a good response from the respondents. The strength of any research largely depends on the good response from the respondents and the study found a good response rate.

The twenty surveyed medical institutions have been broadly categorized into three types viz. Public, Private, and Specialized. The details of the distribution analysis according to medical library types are presented in Figure 6.52. Of the three types, 35.92% of questionnaires were returned from private institutions while 32.52% and 31.55% of questionnaires were returned from specialized and public institutions accordingly.

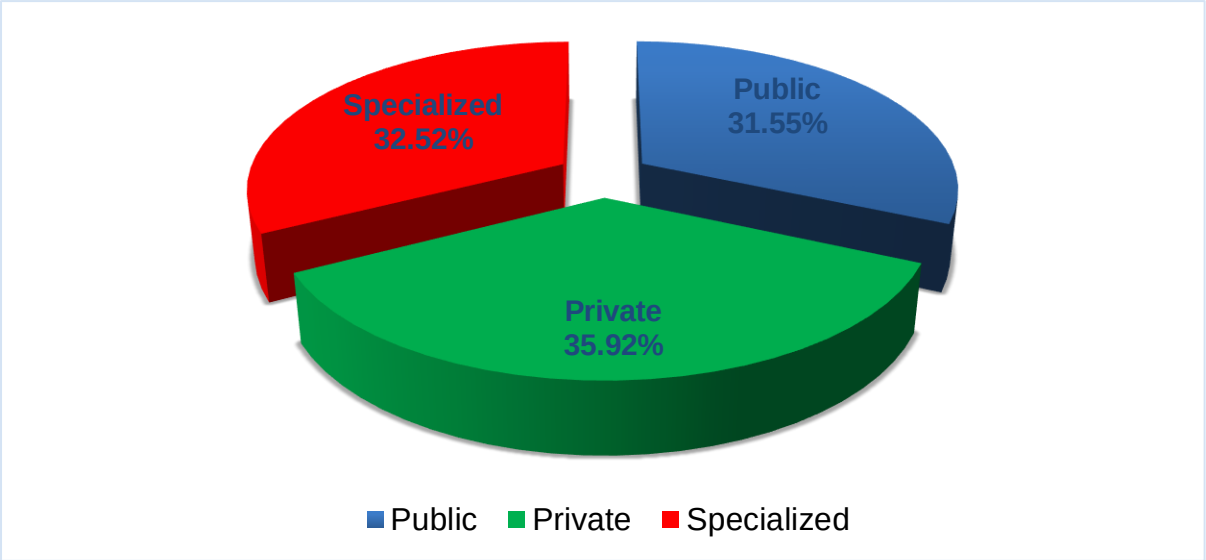


Figure 6.52: Percentage distribution of questionnaires by institution types

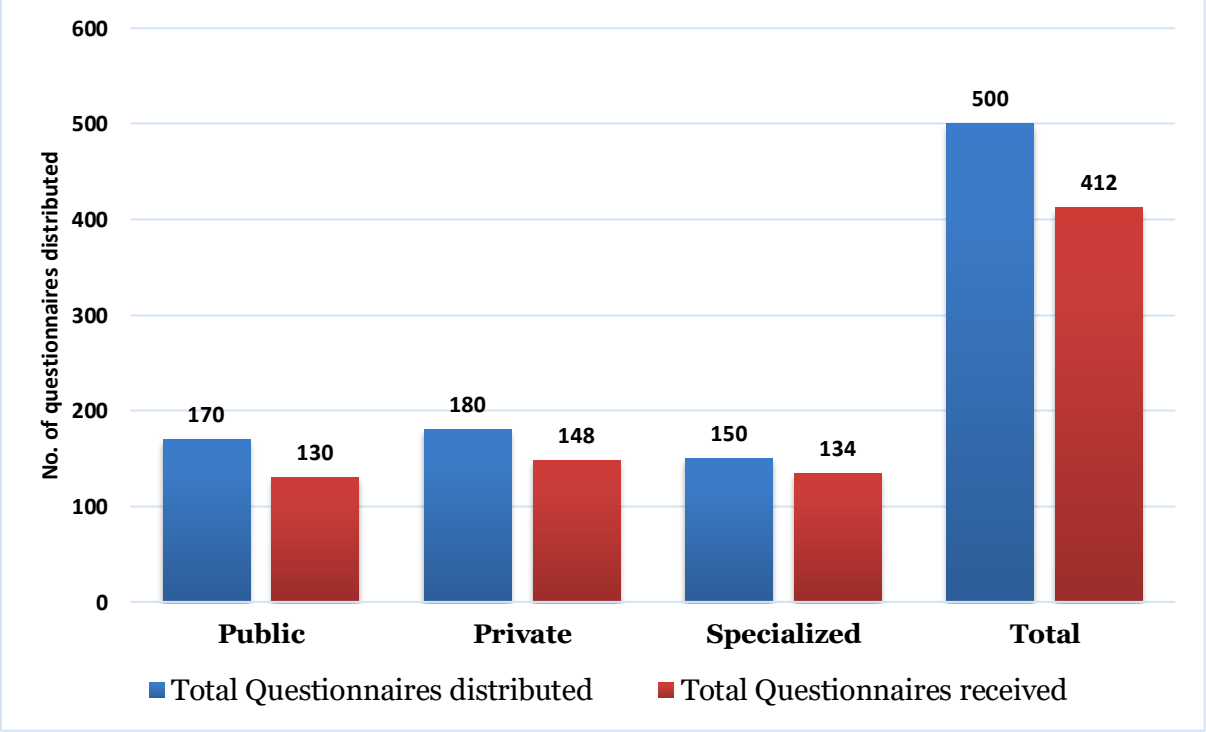


Figure 6.53: Total questionnaires distribution and received status by organization types

Out of the 3 types of medical organizations, private medical organizations have the largest responses standing for 148 followed by public and specialized institutions 130 and 134 respectively as explored in Figure 6.53.

Gender of the Respondents

The data collected is presented in Figure 6.54 shows that in terms of gender, 209 (50.7.4%) of the respondents are male and 203 (49.3%) are female.

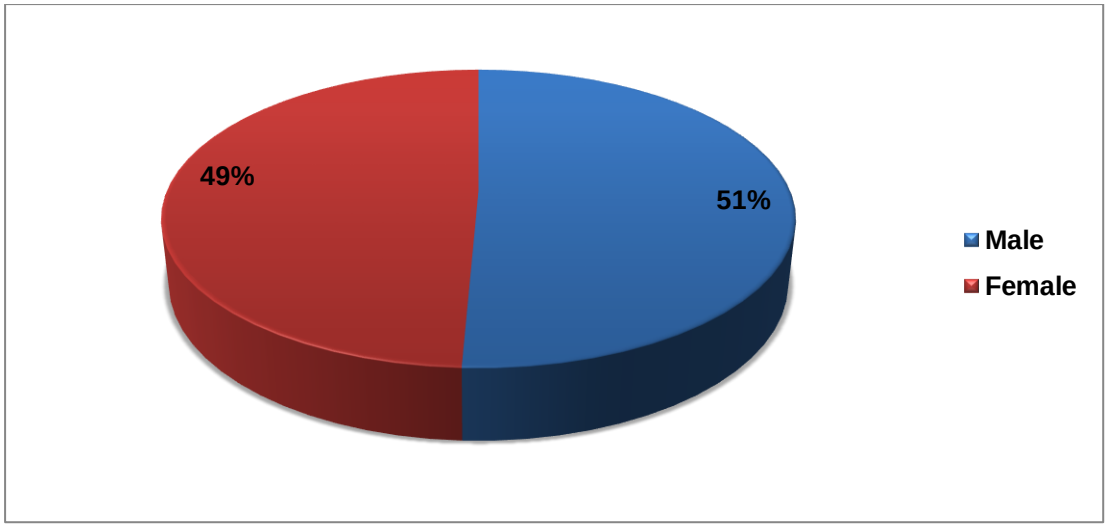


Figure 6.54: Percentage of gender of the respondents

Age of the Respondents

The Age-wise distribution of respondents is shown in Table 6.43. The age of the surveyed libraries' respondents is arranged in different age groups. It is clear from the table that the majority of the respondents numbering 202 (49%) are in the age group of 26 – 35 years followed by 26.7% in the group of 21-25. A few respondents accounting for 3 (.7%) are in the age group of 56-65 years. The table clearly shows that users in the age group between 26-35 are the highest.

Table 6.43: Frequency of age group of the respondents

Age group		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21-25	110	26.7	26.7	26.7
	26-35	202	49.0	49.0	75.7
	36-45	64	15.5	15.5	91.3
	46-55	33	8.0	8.0	99.3
	56-65	3	.7	.7	100.0
	Total	412	100.0	100.0	

User Types

The type of respondents is taken as one of the variables for studying health information systems in medical libraries in the study. The category-wise breakup of responses is shown in Table 6.44. It is observed from the table that the majority of the respondents numbering 185 (44.9%) are Doctors, whereas 125 respondents representing 30.3 percent are students and the researcher represents 40 (9.7%).

Table 6.44: Frequency of category of the respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Teacher	23	5.6	5.6	5.6
	Doctor	185	44.9	44.9	50.5
	Researcher	40	9.7	9.7	60.2
	Student	125	30.3	30.3	90.5
	Scientist	3	.7	.7	91.3
	Staff	33	8.0	8.0	99.3
	Others	3	.7	.7	100.0
	Total	412	100.0	100.0	

Academic Qualifications

The qualifications of the respondents are shown in Figure 6.55, which provides detailed information about the educational qualifications of the respondents. It is found that the maximum number of respondents are from the 'MBBS' group i.e., 224 (54.40%) followed by the group 'Others' numbering 37 (9%).

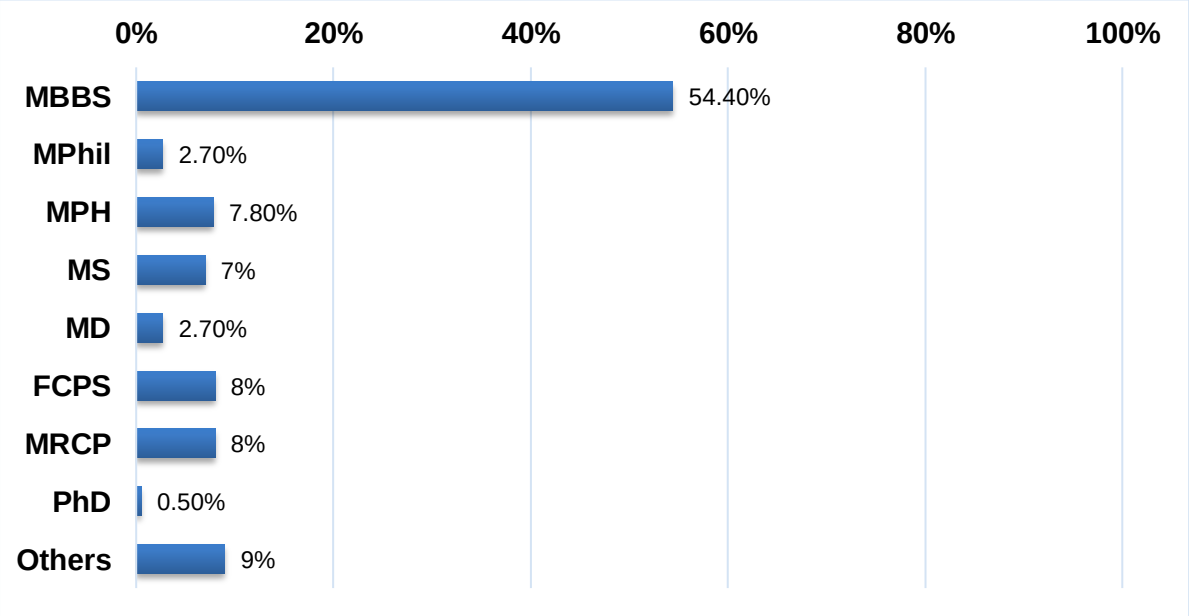


Figure 6.55: Academic qualifications of the respondents

Purpose of Library Visit

The purpose of the library visit of the respondents is shown in Table 6.45 and Figure 6.56. Twelve library purposes are identified and listed and the respondents were asked to rate those factors on a five-point Likert scale of 1 to 5 (Once in a while to Daily). Thus, for each challenge, the scores were obtained, and Mean, SD, and importance level are computed. The scores are presented in Table 6.45 and Figure 6.56 in which 'To read subject books' has the highest mean value of 3.25 and the Standard Deviation belongs to 1.627 comprising Rank 1 followed by 'To improve subject knowledge' with the mean value of 3.20 and SD is 1.608 belong to rank 2 and 'To read general books' placed jointly the 3rd position.

Table 6.45: Ranking order of purpose of library visit by the respondents

Purpose	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
To read subject books	412	1	5	1350	3.28	1.627	2.648
To improve subject knowledge	412	1	5	1319	3.20	1.608	2.585
To read general books	412	1	5	1254	3.04	1.647	2.713
To consult reference books	412	1	5	1192	2.89	1.338	1.789
To read journals/periodicals	412	1	5	1169	2.84	1.457	2.122
To consult research materials	412	1	5	1109	2.69	1.642	2.696
To write a research paper for publication	410	1	5	1092	2.66	1.703	2.899
To keep abreast with latest developments	412	1	5	1065	2.58	1.632	2.662
To browse Internet/search web resources	412	1	5	999	2.42	1.560	2.435
To access online resources	412	1	5	997	2.42	1.394	1.942
To borrow/return library materials	412	1	5	990	2.40	1.408	1.983
To complete assignments	412	1	5	942	2.29	1.315	1.728
Valid N (listwise)	410						

[Scale: 5= Daily; 4 = Weekly; 3 = Fortnightly; 2=Monthly; 1=Once in a while]

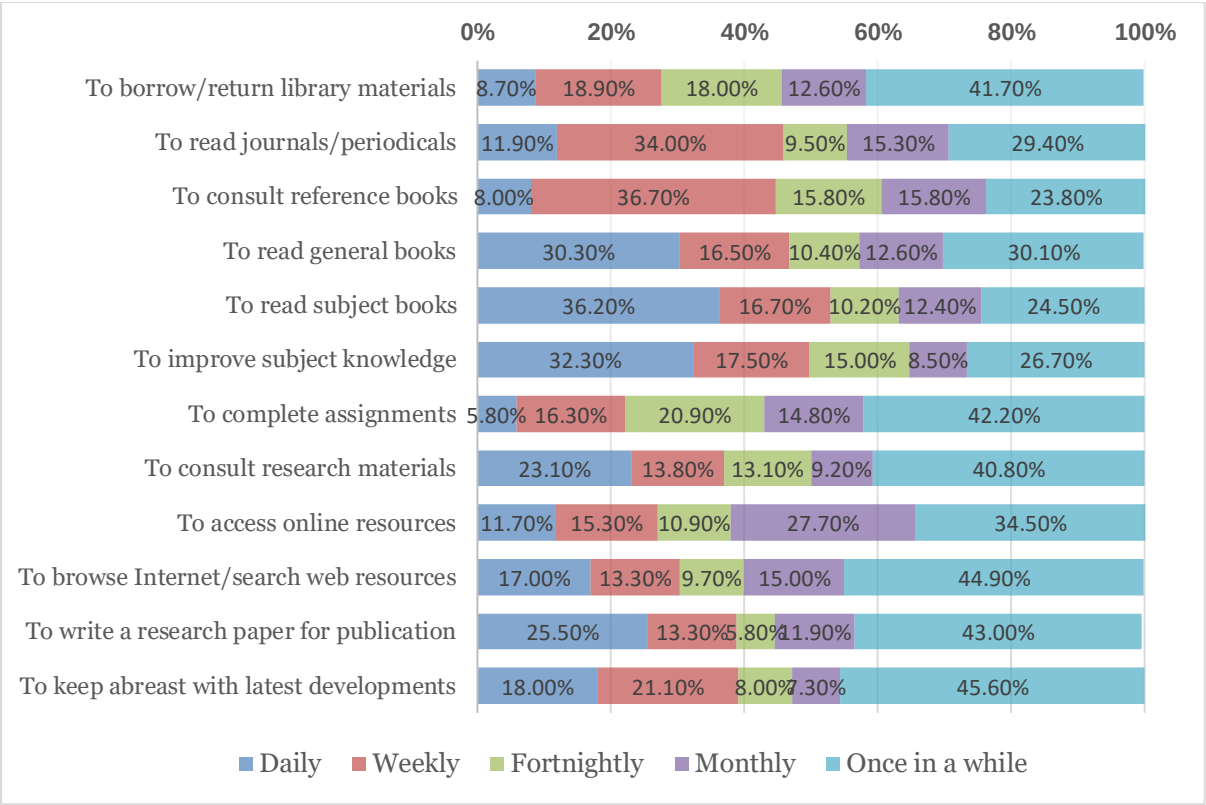


Figure 6.56: Percentage of respondents for purpose of library visit

Frequency of Library Visit

The frequency of visits by the users in their parent (institutional) library and other than the parent library was collected. Figure 6.57 indicates that 90 (21.8%) of respondents visited the library "Everyday", "Once in a fortnight" for 86 (20.9%), and "More than once in a week" for 77 (18.7%), whereas only 5.1% of respondents are visiting the library "Once in a month".

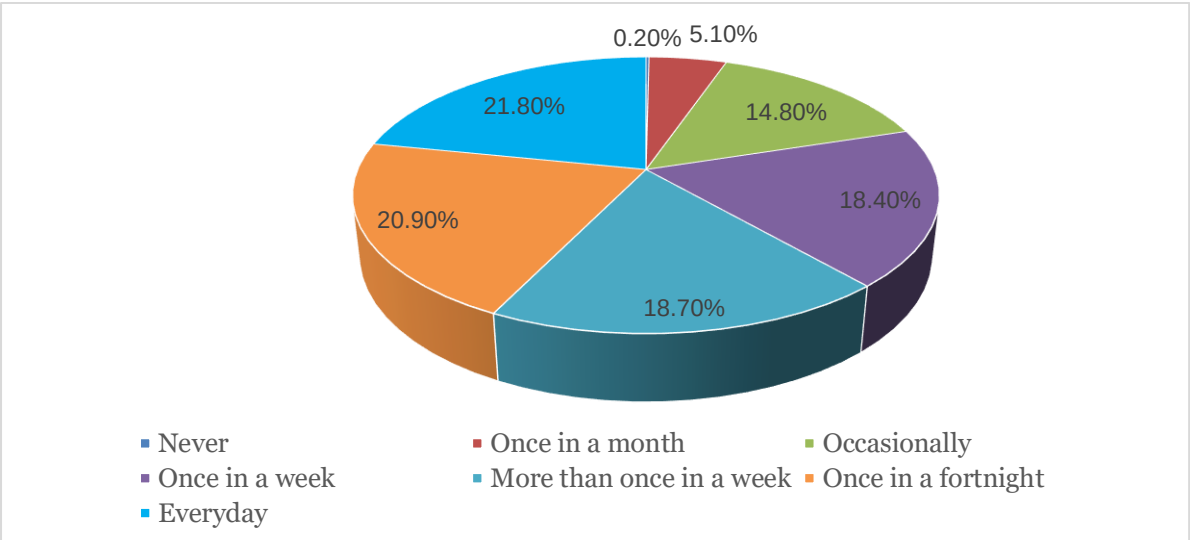


Figure 6.57: Visitation matrix of the users between parent and other libraries

Frequency of Average Time Spent in Library Per Week

Respondents were asked this question to know about their frequency of average time spent in the library per week. The data collected and presented in Figure 6.58 demonstrates that a majority of the respondents 32.80% spent time in the library for less than one hour followed by 27.20%% for more than three hours.

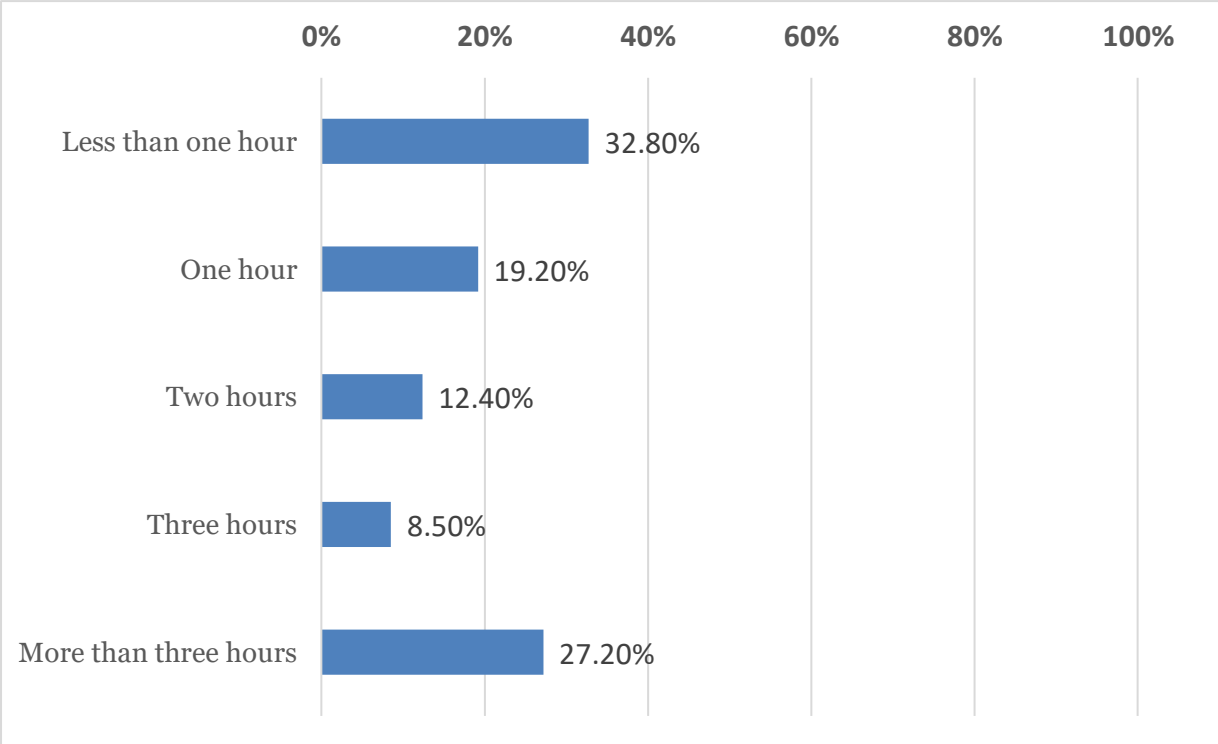


Figure 6.58: Frequency of average time spent in the library

Library Building/Space

Library building planning, architectural modeling, and infrastructural facilities are very important for efficient library services. A total of 12 indicators have been evaluated so that accurate evaluation can be made regarding these facilities for finding out the existing scenario of the medical libraries of Bangladesh. To achieve the objectives, a five-point Likert Scale was applied to assess the response made by the users. Table 6.46 and Figure 6.59 illustrate that the mean scores of all indicators are below 4.00 and positive satisfaction level on an average below 30% which represents that the respondents are not 'Strongly Agree' with the basic and infrastructural facilities in the libraries. At the same time, respondents 'Fairly Agree' in most of the cases that indicates the various facilities related to the library building fairly meet the demands of library users. So, the higher authorities should emphasize the infrastructural facilities of their libraries.

Table 6.46: Evaluation of users of library building/space

Indicators	N	Sum	Mean	Std. Deviation	Variance
Location of the library is very convenient for the students and faculties	412	1570	3.81	1.341	1.799
Building exterior view is excellent	412	1503	3.65	1.336	1.786
Library provides washroom and water supply properly	412	1493	3.62	1.306	1.705
Group study facilities are available	412	1474	3.58	1.164	1.354
Silent reading facilities with individual reading booth/cabinet	412	1453	3.53	1.398	1.953
Library internal environment is pleasant	412	1449	3.52	1.005	1.009
Other facilities are available [i.e., sufficient ventilation, humidity, dust controlling system, the entrance of daylight, sound control, etc.]	412	1439	3.49	1.162	1.350
Closed Circuit Cameras are installed to protect library materials	412	1410	3.42	1.068	1.140
Library furniture like chairs, tables, and bookshelves are standard	412	1356	3.29	1.139	1.297
Sufficient space for reading	412	1246	3.02	1.318	1.737
Sufficient space for safekeeping area	412	1229	2.98	1.262	1.593
Library provides pure drinking water for users	412	703	1.71	.940	.884
Valid N (listwise)	412				

[Scale: 5=Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree,1=Strongly Disagree]

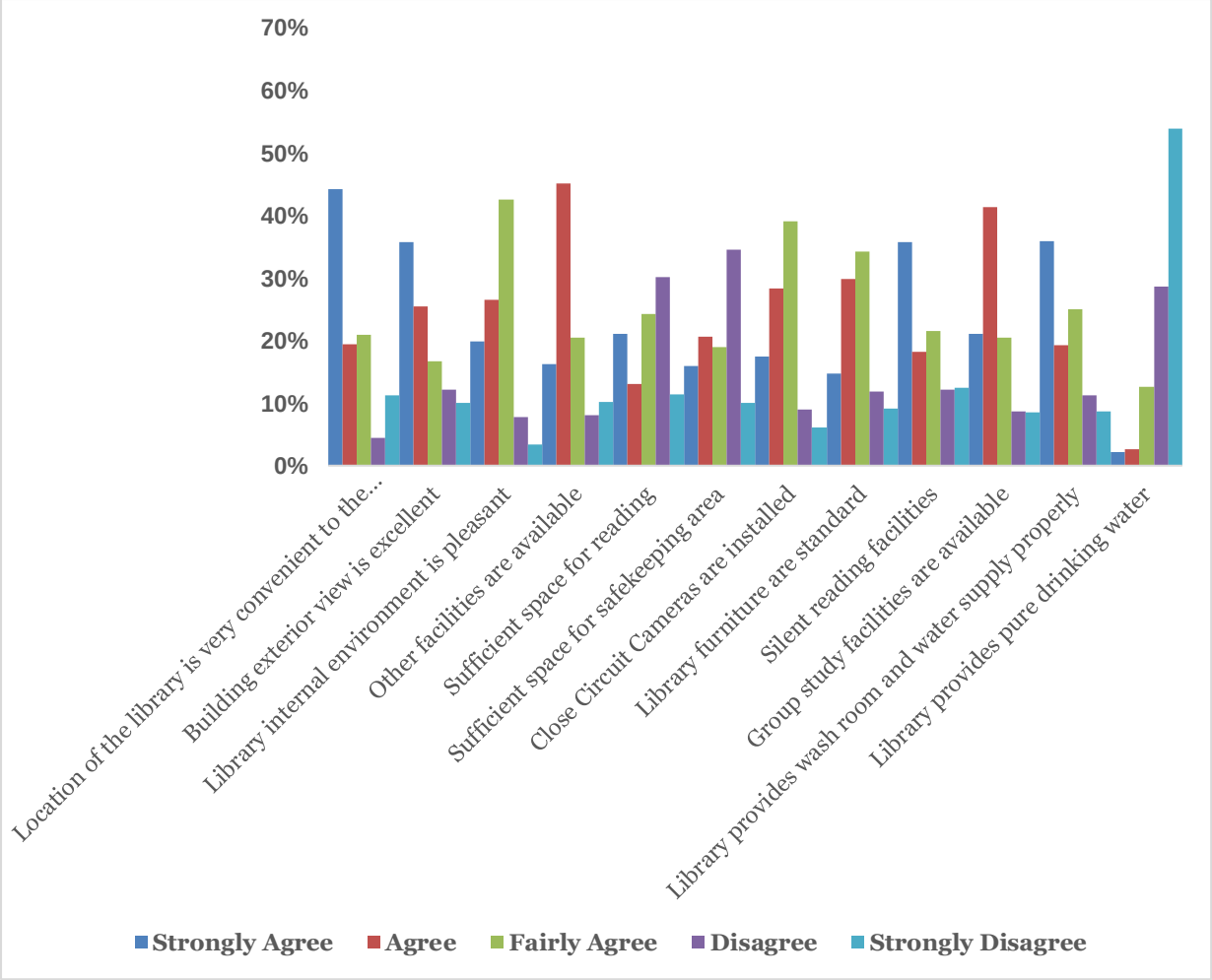


Figure 6.59: Library users' opinions on library space and other facilities

Preferred Information Source

The users of the libraries were asked to measure the status of preferred information sources for accessing information and rank them in the order of preference (1,2,3,4 and 5). Eight information products are identified, and a five-point Likert Scale was used to rank the preferred information sources. Table 6.47 And Table 6.48 reveal that E-books / E-journals/E-Theses as 'Extremely Important' source that satisfies the users largely and Medical Library Websites ranked 1st and 2nd with a mean score of 4.24 and 4.05, and a standard deviation of 1.144 and .926 respectively. Printed journals stand in the third position with a mean score of 4.04 and a standard deviation of .982. The researcher also found from Figure 5.59 that 60% of users are ranked E-books / E-journals/E-Theses as 'Extremely Important" followed by Printed journals for 37.6%. So. we may decide that E-books / E-journals/E-Theses, printed journals, and Medical Library Websites are very much preferred sources for medical library users. Table 6.48 is graphically presented in Figure 6.60.

Table 6.47: Preferred information sources of library users

Information sources	N	Sum	Mean	Std. Deviation	Variance
E-books / E-journals/E-Theses	412	1748	4.24	1.144	1.308
Medical Library Websites	412	1667	4.05	.926	.857
Printed journals	412	1665	4.04	.982	.964
Printed text books	412	1596	3.87	1.100	1.210
Online Medical Databases	412	1592	3.86	1.030	1.062
Theses / Research reports	412	1556	3.78	1.116	1.244
Seminar / Workshop / Conference proceedings	412	1529	3.71	1.072	1.150
Discussion with faculty / other experts	412	1494	3.63	1.047	1.096
Valid N (listwise)	412				

[Importance Level: 5 = Extremely important; 4 = Very important; 3 = Important; 2 = Somewhat important; 1 = Not important)]

Table 6.48: Percentage of preferred information sources

Information sources	Extremely important	Very important	Important	Somewhat important	Not important
	Row N %	Total %	Row N %	Total %	Row N %	Total %	Row N %	Total %
Printed journals	37.6%	40.0%	12.6%	8.3%	1.5%
Printed text books	34.7%	36.2%	12.9%	14.3%	1.9%
Discussion with faculty / other experts	24.5%	31.8%	25.7%	17.7%	0.2%
Theses / Research reports	31.6%	31.8%	24.0%	8.0%	4.6%
Online Medical Databases	31.3%	36.7%	22.1%	7.0%	2.9%
Seminar / Workshop / Conference proceedings	28.4%	30.3%	27.9%	10.7%	2.7%
Medical Library Websites	33.3%	47.1%	13.6%	3.2%	2.9%
E-books / E-journals/E-Theses	59.7%	20.1%	10.2%	4.6%	5.3%

[Importance Level: 5 = Extremely important; 4 = Very important; 3 = Important; 2 = Somewhat important; 1 = Not important)]

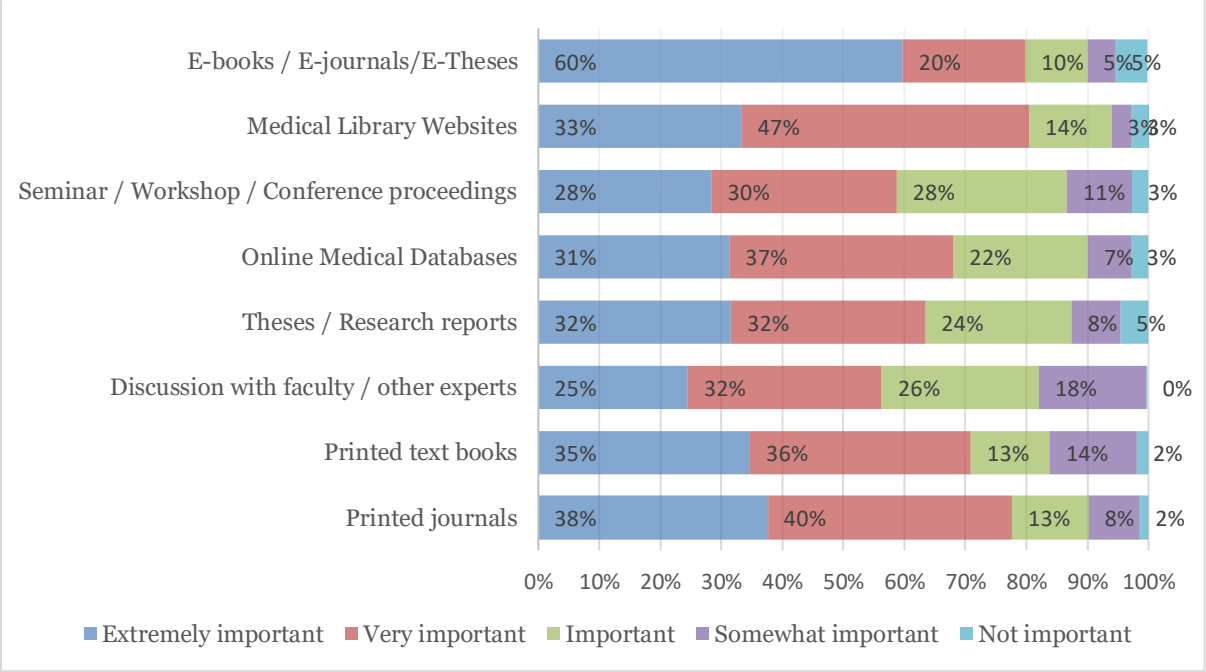


Figure 6.60: Percentage of preferred information sources

Extent of Satisfaction of Library Resources

The respondents were asked to evaluate the extent of satisfaction level regarding library resources as shown in Figure 6.61. They had been given five options, out of which the largest portion of respondents (111, 26.9%) evaluates the library resources as 'Fair' whereas only 27 respondents (6.6%) expressed as 'Excellent'.

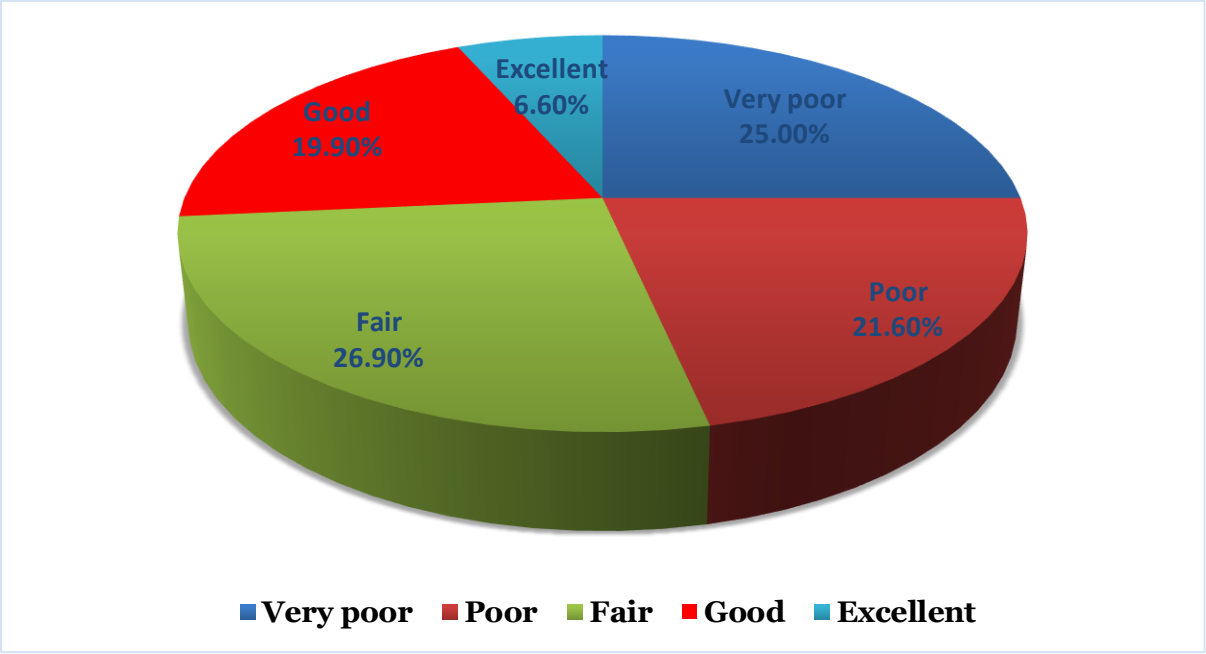


Figure 6.61: Extent of user satisfaction with library resources

Extent of Library Services

There is a general observation that libraries provide some basic services for users. In identifying the major information services, users were asked about the kind of services they get in the library. The respondents were asked to indicate their satisfaction with the Library services on a 5-point ranking scale from 'Excellent' to 'Very Poor'. Table 6.49 and Table 6.50 shows the descriptive statistics of library services ranking order based on Mean score and percentage level of importance of information services accordingly. It has been observed from Table 6.49 that 'Book Circulation Service' with the highest mean value (2.74) is ranked as the first which is followed by 'Reading Room Service" with a mean value of 2.73 ranked second. We also found from Figure 6.62 that 14% of users are ranked Photocopying services as 'Excellent" followed by Current Awareness for 12%. So, we may decide that the overall standard for library services in the surveyed libraries is not much appreciable since the mean scores are below 3. Table 6.50 is graphically presented in Figure 6.62.

Table 6.49: Descriptive statistics for the evaluation of library services

Library Services	N	Sum	Mean	Std. Deviation	Variance
Book Circulation Service	412	1128	2.74	1.232	1.517
Reading Room Service	412	1123	2.73	1.378	1.898
Audio-Visual Service	412	1101	2.67	1.143	1.306
Subject Bibliographic	412	1100	2.67	1.393	1.939
Internet Access	412	1092	2.65	1.342	1.800
Photocopying Service	412	1072	2.60	1.449	2.099
Reference Service	410	1064	2.60	1.173	1.376
Online Public Access Catalogue/ Web OPAC	412	1066	2.59	1.407	1.980
Abstracting/ Indexing	412	1065	2.58	1.286	1.655
Current Awareness	412	1046	2.54	1.326	1.758
E-Resources Access	412	991	2.41	1.310	1.716
Electronic document delivery service	412	980	2.38	1.324	1.754
Newspaper Clippings	412	953	2.31	1.442	2.079
Institutional Repository (IR)/Digital Repository (DR) service	412	909	2.21	1.290	1.663
Inter-Library Loan	412	831	2.02	1.297	1.681
Valid N (listwise)	412				

[Scale: 5 = Excellent; 4 = Good; 3 = Fair; 2 = Poor; 1= Very Poor]

Table 6.50: Percentage of importance level of information services

Library Services	Excellent	Good	Fair	Poor	Very poor
	Row Total N %	Row Total N %	Row Total N %	Row Total N %	Row Total N %
Reading Room Service	11.9%	21.4%	21.8%	17.2%	27.7%
Book Circulation Service	5.8%	24.8%	30.6%	15.0%	23.8%
Online Public Access Catalogue/ Web OPAC	11.2%	19.4%	20.1%	15.5%	33.7%
Internet Access	9.0%	20.9%	26.9%	12.6%	30.6%
E-Resources Access	6.6%	18.2%	20.1%	19.4%	35.7%
Audio-Visual Service	8.0%	11.9%	37.6%	24.3%	18.2%
Reference Service	9.2%	11.9%	24.5%	37.1%	16.7%
Current Awareness	12.1%	9.2%	28.6%	20.4%	29.6%
Photocopying Service	14.3%	13.3%	26.9%	9.0%	36.4%
Subject Bibliographic	11.7%	18.9%	26.0%	11.7%	31.8%
Abstracting/ Indexing	9.5%	19.9%	12.4%	36.2%	22.1%
Newspaper Clippings	11.4%	13.8%	14.3%	15.5%	44.9%
Inter-Library Loan	6.8%	9.0%	17.0%	13.6%	53.6%
Institutional Repository (IR)/Digital Repository (DR) service	7.0%	10.4%	21.8%	17.5%	43.2%
Electronic document delivery service	9.7%	9.5%	26.9%	16.7%	37.1%

[Scale: 5 = Excellent; 4 = Good; 3 = Fair; 2 = Poor; 1= Very Poor]

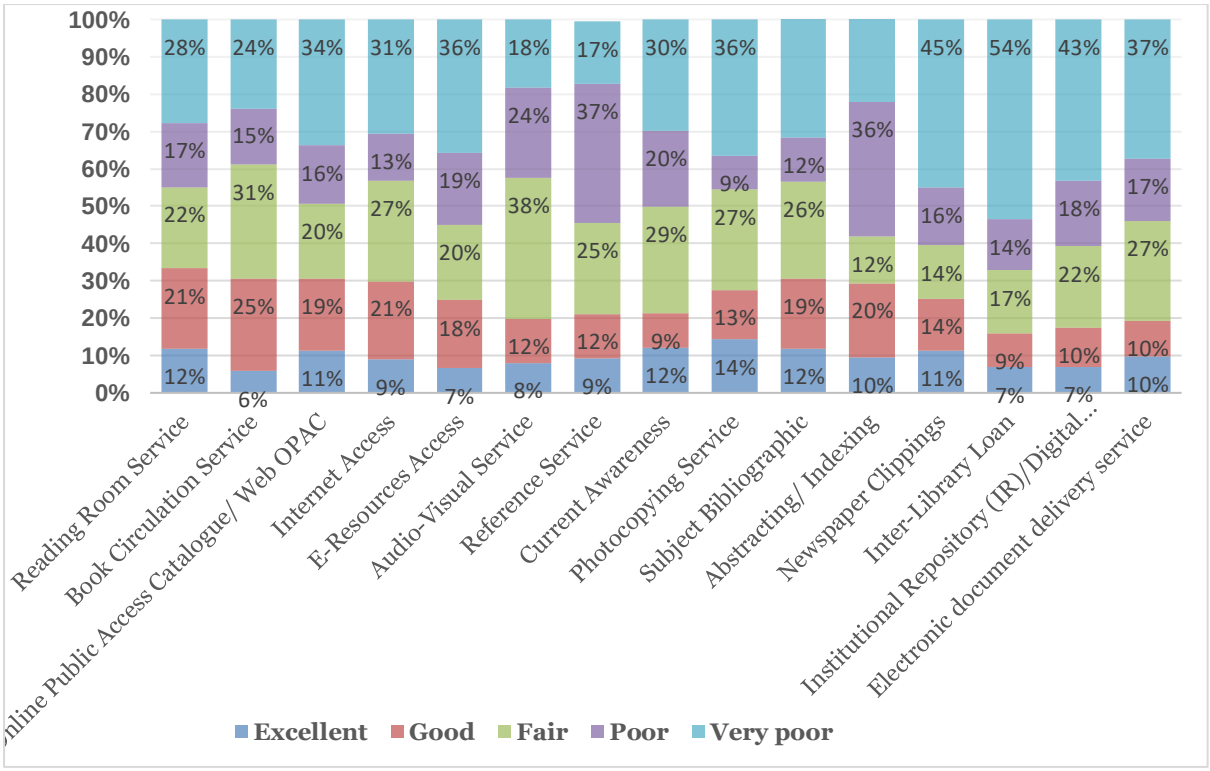


Figure 6.62: Satisfaction level of library services

Extent of Satisfaction of Library Services

The respondents were asked to evaluate the extent of satisfaction level of overall library services as shown in Figure 6.63. They had been given five options, out of which the largest portion of respondents (164, 40%) evaluates the library services as 'Fair' whereas only 37 respondents (9%) expressed as 'Excellent'.

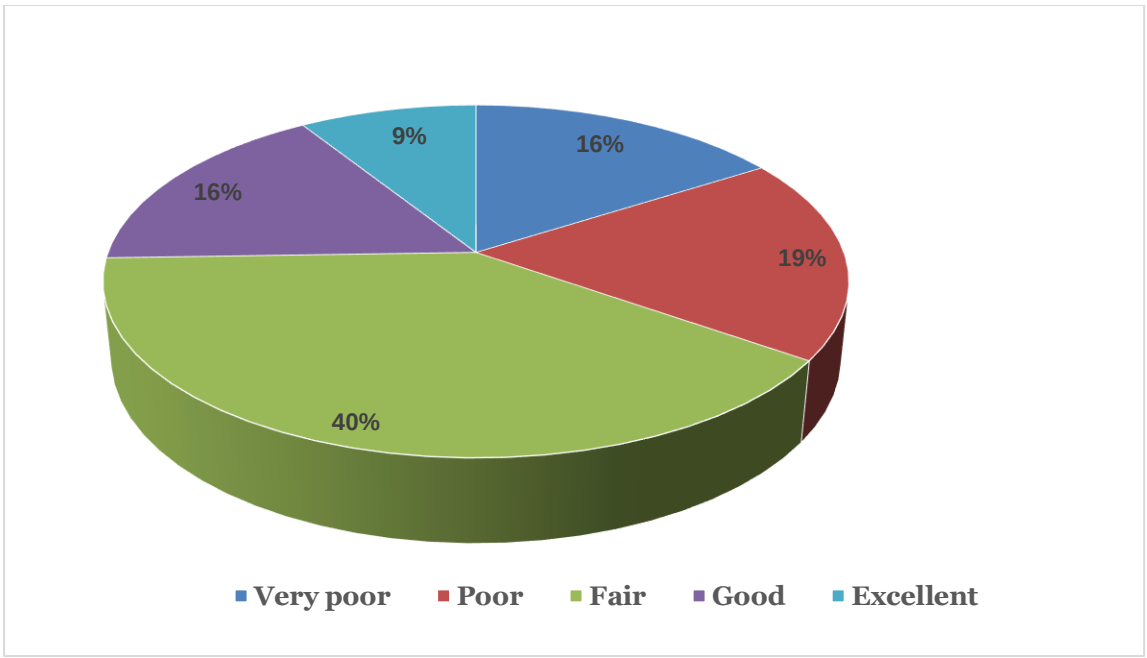


Figure 6.63: Percentage status of satisfaction with library services

ICT Enabled Library Facilities

Users were asked what their opinions were about ICT-enabled library facilities for medical professionals. Table 6.51 depicts that most of the respondents, 354 (85.9%) rated it "Strongly Agree" followed by 9% opined that "Agree". So, we may decide that medical professionals need ICT-enabled library facilities and services.

Table 6.51: Opinion on ICT-enabled library facilities for medical professionals

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Midly Disagree	11	2.7	2.7	2.7
	Neutral	10	2.4	2.4	5.1
	Agree	37	9.0	9.0	14.1
	Strongly Agree	354	85.9	85.9	100.0
	Total	412	100.0	100.0	

Table 6.52 explores that 33.5% of users are not aware of ICT-enabled library services of their respective libraries whereas 27% said that ICT-based library services are available on a partial basis.

Table 6.52: Awareness on ICT enabled library services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Don't know	138	33.5	33.5	33.5
	Not yet started	56	13.6	13.6	47.1
	In progress	81	19.7	19.7	66.7
	Partially	112	27.2	27.2	93.9
	Fully	25	6.1	6.1	100.0
	Total	412	100.0	100.0	

Figure 6.64 shows that the majority of the users 60% are not aware of the availability of their libraries' websites followed by 31% said that they are aware of the library website in their organization.

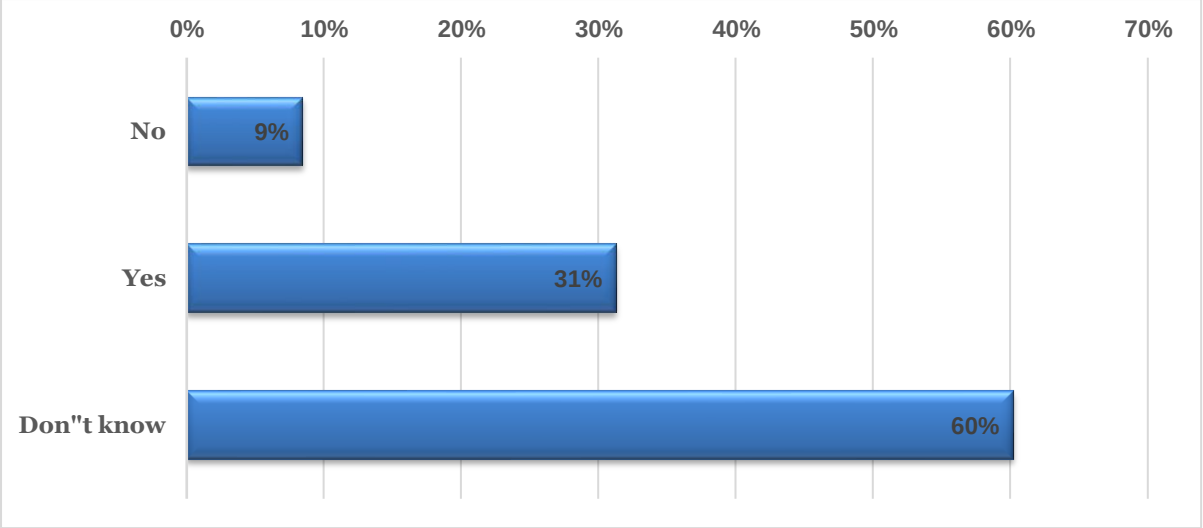


Figure 6.64: Awareness status of library web portal/website

It is explored from Figure 6.65 that, 367(89%) users out of 412 library users use the web-based/e-resources.

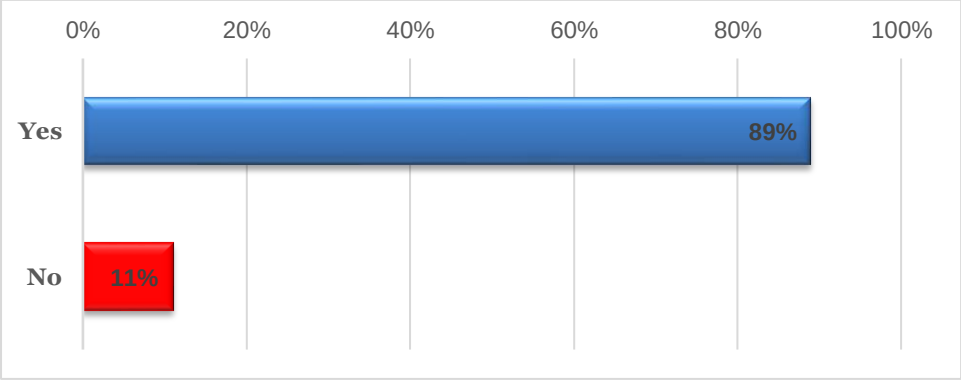


Figure 6.65: Status of usage of web-based resources

Extent of E-resources Usage

It was found that respondents use various types of e-resources. A question was asked to know the types of e-resources and their frequency of usage as shown in Table 6.53 and Figure 6.66. It has been observed that the majority of the respondents use e-journals (82.3%), web resources (73.3%%), E-books (72.8%), Institutional Repository (39.5%), and E-thesis (58.3%) where Multiple Responses allowed (n=367).

Table 6.53: Preference for e-resources by the respondents (n=367)

Usage of e-resources[a]	Responses		Percent of Cases
	N	Percent	
E-books	267	10.6%	72.8%
E-journals	302	12.0%	82.3%
E-newspapers	264	10.5%	71.9%
E-maps	66	2.6%	18.0%
E-thesis	214	8.5%	58.3%
E-research reports	165	6.5%	45.0%
CD- ROM bibliographic databases	29	1.2%	7.9%
Internet/web resources	269	10.7%	73.3%
Online Public Access Catalogue (OPAC)	213	8.5%	58.0%
Institutional Repository (IR)	145	5.8%	39.5%
Online databases	264	10.5%	71.9%
Professional Association Websites	167	6.6%	45.5%
International / Regional Institution Websites	155	6.2%	42.2%
Total	2520	100.0%	686.6%

a. Dichotomy group tabulated at value 1 in which Yes=1 [Multiple Responses Allowed]

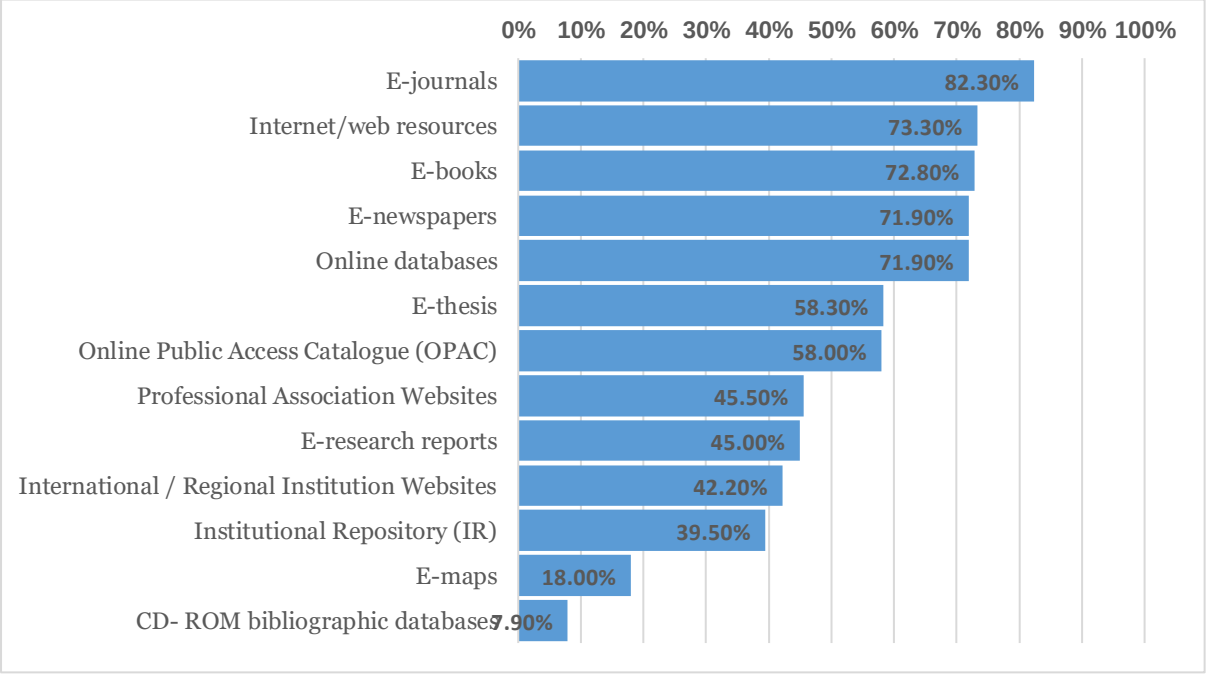


Figure 6.66: Percentage level of e-resources usage

Evaluation of Library Activities

In this ICT-based world, ICTs have been used in various areas of library facilities and services like web-based library services, library e-resources, library collections, library reading environments, and WiFi services. So, the users were asked to evaluate the existing library resources and services. The respondents were asked to indicate their satisfaction on a 5-point ranking scale from 'Excellent' to 'Very Poor'. Table 6.54 and Table 6.55 show the descriptive statistics of ranking order of library services/resources based on Mean score and percentage level accordingly. It has been observed from Table 5.54 that 'Library Collections' with the highest mean value (3.12) was ranked as the first which is followed by 'Traditional library services" with a mean value of 3.05 ranked second. We also found from Figure 5.66 that only 10% of users are ranked Traditional library services and 'Library reading environment' as 'Excellent". So. we may decide that the overall standard for library activities in the surveyed libraries is in a poor state since the mean scores are below 3 in major cases. Table 6.55 is graphically presented in Figure 6.67.

Table 6.54: Descriptive statistics for the evaluation of library activities

Library Areas	N	Sum	Mean	Std. Deviation	Variance
Library collections	412	1285	3.12	1.093	1.195
Traditional library services	412	1257	3.05	1.067	1.139
Internet/WiFi services	412	1138	2.76	1.104	1.218
Library reading environment	412	1119	2.72	1.265	1.600
Library timing	412	1059	2.57	1.268	1.608
ICT facilities	412	1000	2.43	1.251	1.564
Web-based library services	412	969	2.35	1.210	1.465
Online library resources	412	949	2.30	1.199	1.438
Valid N (listwise)	412				

[Scale: 5 = Excellent; 4 = Good; 3 = Fair; 2 = Poor; 1= Very Poor]

Table 6.55: Percentage of importance level of library activities

Library Areas	Excellent		Good		Moderate		Poor		Very poor	
	Row %	Total N	Row %	Total N	Row %	Total N	Row %	Total N	Row %	Total N
ICT facilities	4.1%		19.7%		24.8%		17.7%		33.7%	
Traditional library services	10.2%		22.6%		35.7%		25.2%		6.3%	
Web-based library services	3.4%		18.2%		21.8%		23.3%		33.3%	
Library collections	9.2%		28.4%		37.6%		14.6%		10.2%	
Online library resources	3.2%		16.0%		24.5%		20.6%		35.7%	
Library timing	7.0%		18.2%		28.2%		18.0%		28.6%	
Library reading environment	10.2%		16.3%		31.3%		19.4%		22.8%	
Internet/WiFi services	3.9%		23.1%		35.4%		20.6%		17.0%	

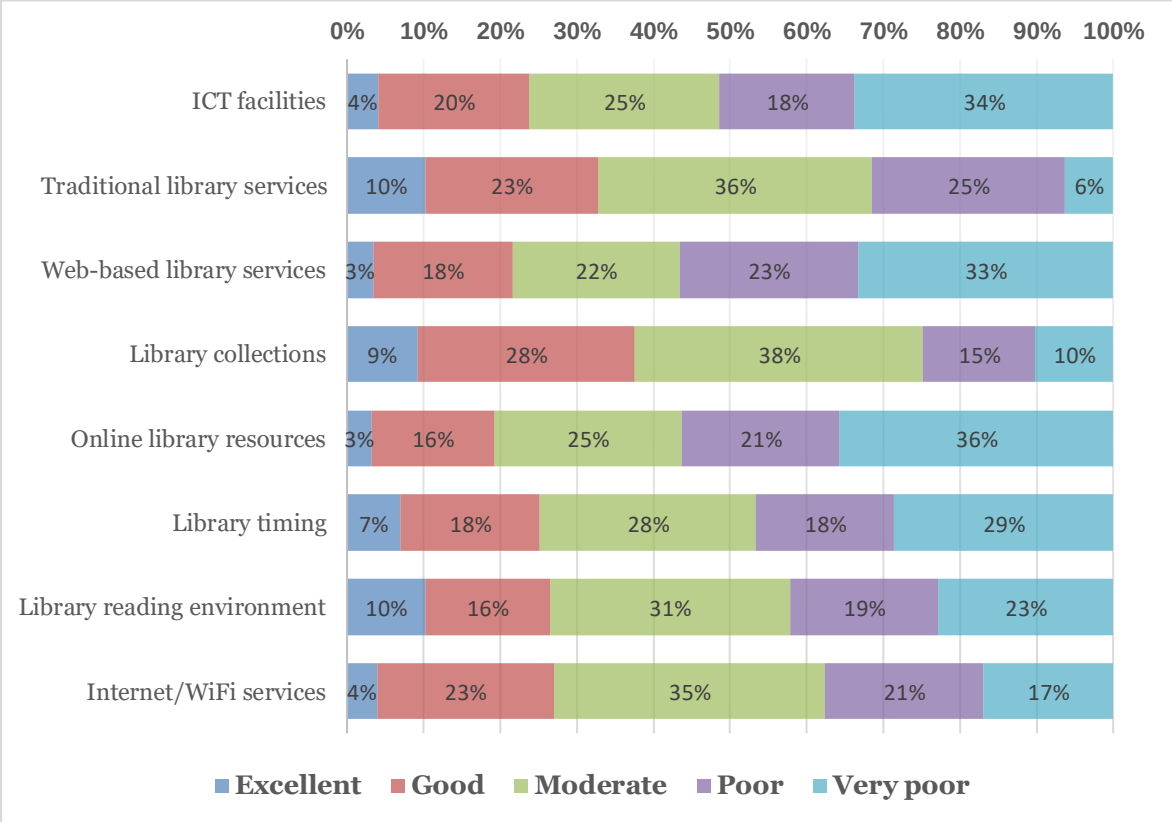


Figure 6.67: Satisfaction level of library activities

Extent of ICT- based Library Services

The emergence of Information and communication technologies (ICTs) has created an excellent opportunity for medical libraries to offer modern library services in this present 21st-century online library environment. ICT-based library services ensure the satisfaction of the users with diversified information needs, reduce the digital divide and offer library services in a 24/7 manner and provide the right information to the right reader at the right time. In this present technology-based information society, the vision of medical libraries should be to develop a 21st-century world-class knowledge resource centre and provide innovative and ICT-based library services and collections to their clients. The respondents were asked to indicate their awareness of the ICT-based library services. Table 6.56 and Figure 6.68 depict the descriptive statistics and percentage status of awareness level of various ICT-based library services offering the surveyed libraries. It has been observed from Table 6.56 that, the sample libraries are offering ICT-based services on a very limited scale. Modern library services are not available in the majority of the surveyed libraries apart from some basic services like Internet and WiFi services. It has been documented from Table 6.56 that 98.3% of users are aware of Internet service and 95.9% are for WiFi service where multiple responses were permitted. So, the medical libraries should give more emphasis on ICT – enabled library services to the users.

Table 6.56: Descriptive statistics for awareness of ICT-based services

ICT-based services[a]	Responses		Percent of Cases
	N	Percent	
OPAC	13	1.0%	3.2%
Web OPAC	22	1.7%	5.3%
Online renewal service	14	1.1%	3.4%
Institutional Repository (IR)/Digital Repository (DR) service	27	2.1%	6.6%
Online SDI service	5	0.4%	1.2%
Online reservation	25	1.9%	6.1%
Library Services through Social Networking Sites	16	1.2%	3.9%
Library 2.0 (RSS Feeds, Blogs and Wikis etc.)	8	0.6%	1.9%
Electronic document delivery service	12	0.9%	2.9%
Mobile based services	20	1.6%	4.9%
Remote access service	25	1.9%	6.1%
RFID based services	13	1.0%	3.2%
Wifi service	395	30.6%	95.9%
Virtual reference service	22	1.7%	5.3%
Internet service	405	31.4%	98.3%
Intranet service	51	4.0%	12.4%
Electronic Thesis and Dissertations (ETD)	13	1.0%	3.2%
E-CAS (Current Awareness Service)	13	1.0%	3.2%
Electronic Conferencing Services	22	1.7%	5.3%
Research Data Services	19	1.5%	4.6%
Systematic Reviews	13	1.0%	3.2%
Webometric Analysis Service	17	1.3%	4.1%
Online Literature Searching Service	35	2.7%	8.5%
Evidence-Based Practice (EBP) Service	10	0.8%	2.4%
Plagiarism Detection Service	35	2.7%	8.5%
Predatory Journal Selection Service	39	3.0%	9.5%
Total	1289	100.0%	312.9%

a. Dichotomy group tabulated at value 1 in which Yes=1 [Multiple Responses Allowed]

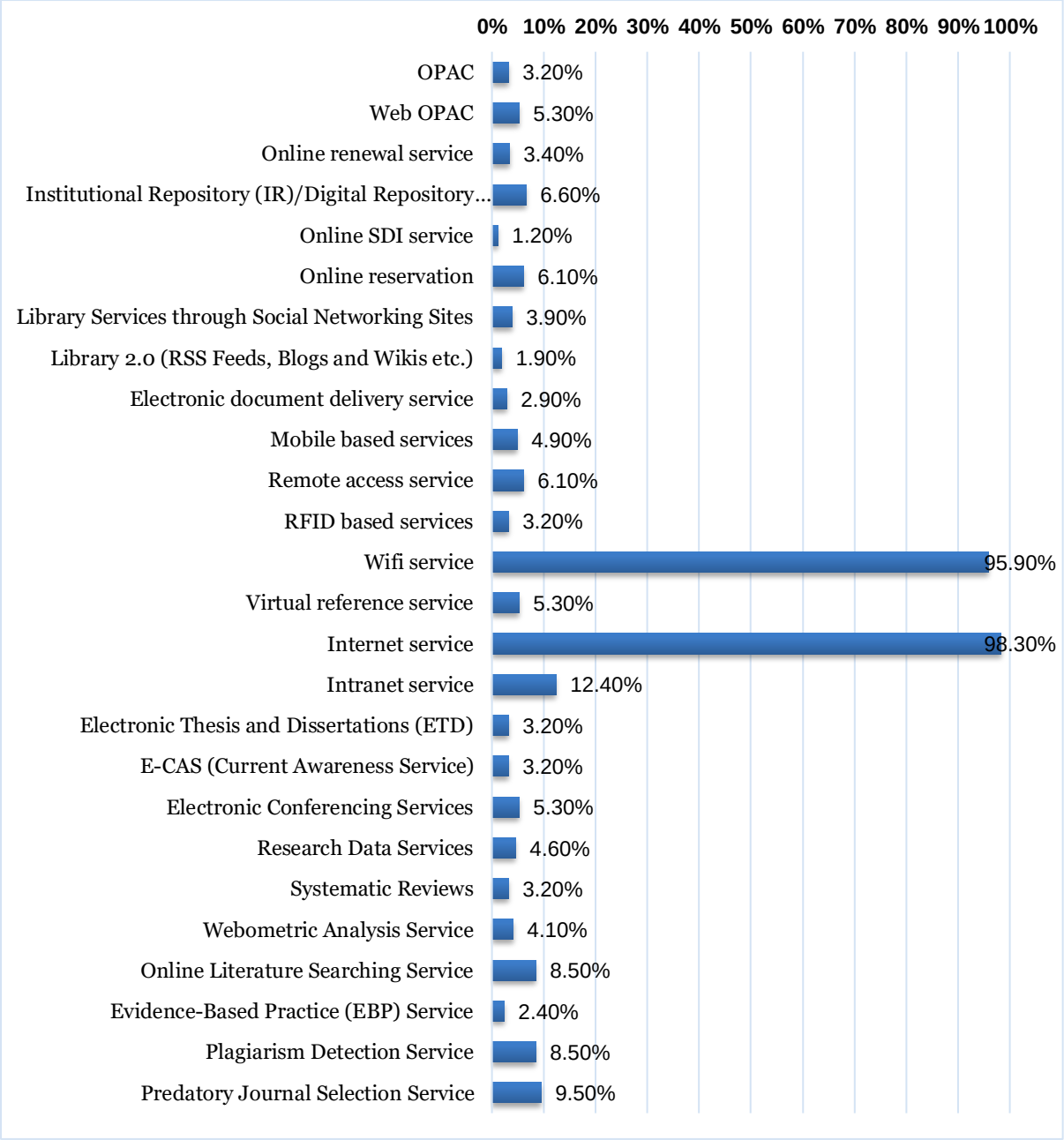


Figure 6.68: Percentage status of ICT-based services of sample libraries

Usage Status of Medical Online Databases

The respondents were asked to indicate their satisfaction with the most comprehensive medical online databases. Table 6.57 and Figure 6.69 depict the descriptive statistics and percentage level (Percent of cases) of using the status of various online databases. It has been observed from the Table that Google Scholar is the most dominating database that is used by 81.4% of users followed by PubMed by 78.8% and Hinari e-journals by 64.2% where multiple responses were permitted.

Table 6.57: Descriptive statistics for using online databases

Online health databases[a]	Responses		Percent of Cases
	N	Percent	
PubMed	313	8.7%	78.8%
Hinari E-journals	255	7.1%	64.2%
ScienceDirect	158	4.4%	39.8%
ISI Web of Science	137	3.8%	34.5%
EBSCOHOST	56	1.6%	14.1%
ProQuest	34	0.9%	8.6%
SpringerLink	110	3.1%	27.7%
Oxford e-journals	113	3.1%	28.5%
JSTOR	99	2.8%	24.9%
ResearchGate	177	4.9%	44.6%
BanglaJOL	98	2.7%	24.7%
DOAJ	124	3.4%	31.2%
Cochrane Library	65	1.8%	16.4%
Scopus	29	0.8%	7.3%
ARDI	65	1.8%	16.4%
UpToDate	63	1.8%	15.9%
DOAB	23	0.6%	5.8%
Wiley Online Books	115	3.2%	29.0%
PLoS Journals	128	3.6%	32.2%
Hinari e-books	96	2.7%	24.2%
BioMed Central (BMC)	68	1.9%	17.1%
PubMed e-journals	99	2.8%	24.9%
PubMed e-books	59	1.6%	14.9%
Indian Journals	114	3.2%	28.7%
Wilely Online Journals	151	4.2%	38.0%
Medical Subject Headings (MeSH)	80	2.2%	20.2%
Cambridge e-journals	72	2.0%	18.1%
POPLINE	14	0.4%	3.5%
Google scholar	323	9.0%	81.4%
ClinicalKey	6	0.2%	1.5%
Embase	6	0.2%	1.5%
CINAHL	15	0.4%	3.8%
Free Medical Journals	40	1.1%	10.1%
J-Stage	7	0.2%	1.8%
WHO Medicines Bookshelf	37	1.0%	9.3%
FreeBooks4Doctors	246	6.8%	62.0%
Total	3595	100.0%	905.5%

a. Dichotomy group tabulated at value 1 in which Yes=1 [Multiple Responses Allowed]

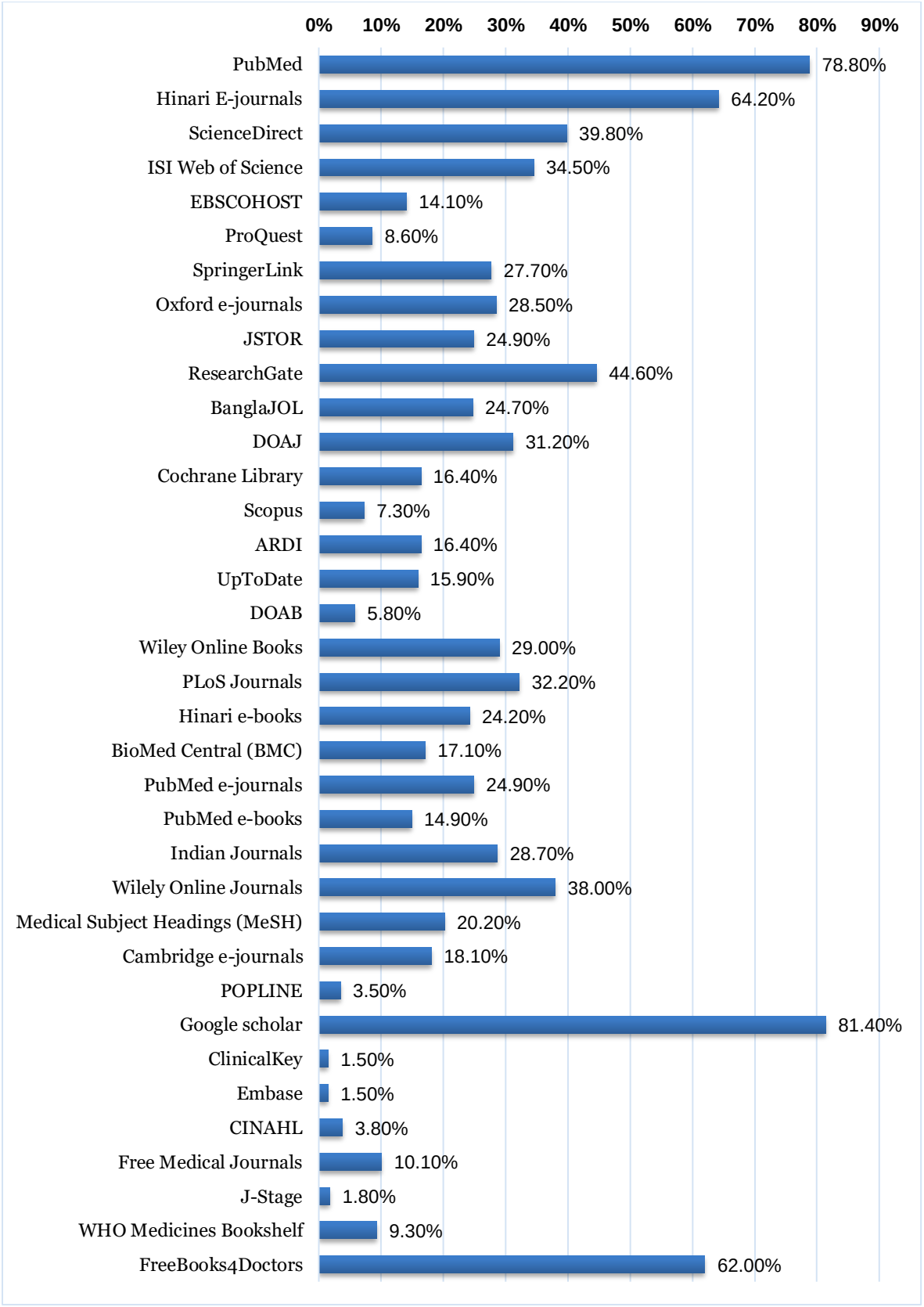


Figure 6.69: Percentage status of usage of online databases

Preference for Search Engine

Table 6.58 and Figure 6.70 show that out of a total of 412 responses, almost all counting 99.8% prefer Google to a great extent. 57% and 20% of respondents use 'Yahoo' and 'AOL' respectively where multiple responses allowed in which the researcher counts "Percent of cases" as the base value.

Table 6.58: Preferred search engine for searching the Internet (Multiple responses)

Search Engine[a]	Responses		Percent of Cases
	N	Percent	
Google	411	43.4%	99.8%
Yahoo	235	24.8%	57.0%
Bing	45	4.8%	10.9%
Baidu	2	0.2%	0.5%
AOL	84	8.9%	20.4%
Ask.com	68	7.2%	16.5%
Excite	77	8.1%	18.7%
Lycos	2	0.2%	0.5%
Others	23	2.4%	5.6%
Total	947	100.0%	229.9%

a. Dichotomy group tabulated at value 1 in which Yes=1 *[Multiple Responses Allowed]*

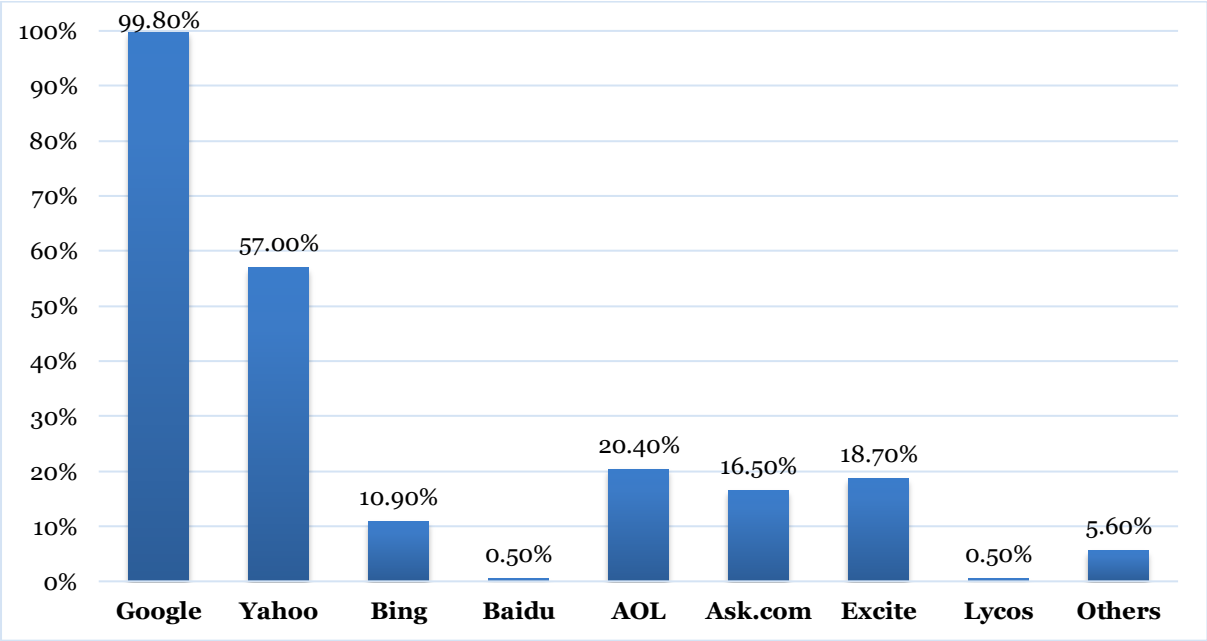


Figure 6.70: Percentage status of search engine usage

Constraints for Accessing Web Resources

Table 6.59 and Table 6.60 show the descriptive statistics of ranking order of constraints encountered while accessing online resources based on Mean score and percentage level accordingly. It has been observed from Table 5.59 that 'Inconvenient working hours of library' with the highest mean value (3.64) was ranked as the1st which is followed by 'Lack of adequate learning resources" with a mean value of 3.57 ranked second. We also found from Figure 5.70 that 41% of users identified the problems like inconvenient working hours and 38% for lack of knowledge of online resources as "Extremely Important". So. we may decide that there are a lot of barriers involved in accessing online resources from the users' end. Table 6.60 is graphically presented in Figure 6.71.

Table 6.59: Descriptive statistics of problems while accessing web resources

Barriers	N	Sum	Mean	Std. Deviation	Variance
Inconvenient working hours of library	412	1498	3.64	1.382	1.911
Lack of adequate learning resources	412	1469	3.57	1.365	1.862
Retrieval of irrelevant information	412	1456	3.53	1.241	1.539
Poor database searching skills	412	1435	3.48	1.449	2.099
No training of use of library resources	412	1434	3.48	1.359	1.846
Absence of modern technologies in the library	412	1430	3.47	1.369	1.875
Lack of Knowledge of online information sources	412	1414	3.43	1.486	2.207
Low bandwidth	412	1409	3.42	1.406	1.977
High cost of access	412	1325	3.22	1.267	1.605
Information overload	412	1264	3.07	1.294	1.674
No Internet access	412	1210	2.94	1.355	1.835
Valid N (listwise)	412				

Scale: 5 = Extremely important; 4 = Very important; 3 = Important; 2 = Somewhat important; 1 = Not important]

Table 6.60: Percentage of importance level of problems for web resources

Barriers	Extremely important	Very important	Important	Somewhat important	Not important
	Row Total N %	Row Total N %	Row Total N %	Row Total N %	Row Total N %
Lack of adequate learning resources	36.4%	15.3%	29.4%	6.3%	12.6%
Absence of modern technologies in the library	31.8%	20.9%	21.8%	13.6%	11.9%
Low bandwidth	30.1%	20.6%	27.9%	3.9%	17.5%
Information overload	15.3%	22.6%	34.5%	9.0%	18.7%
High cost of access	20.4%	18.2%	37.9%	9.7%	13.8%
Lack of Knowledge of online information sources	37.6%	11.9%	22.8%	11.4%	16.3%
No Internet access	16.5%	17.0%	32.3%	12.1%	22.1%
Poor database searching skills	36.9%	15.5%	20.9%	12.4%	14.3%
No training of use of library resources	26.2%	32.8%	20.1%	4.6%	16.3%
Retrieval of irrelevant information	23.5%	35.4%	23.5%	5.8%	11.7%
Inconvenient working hours of library	41.0%	10.9%	32.0%	2.7%	13.3%

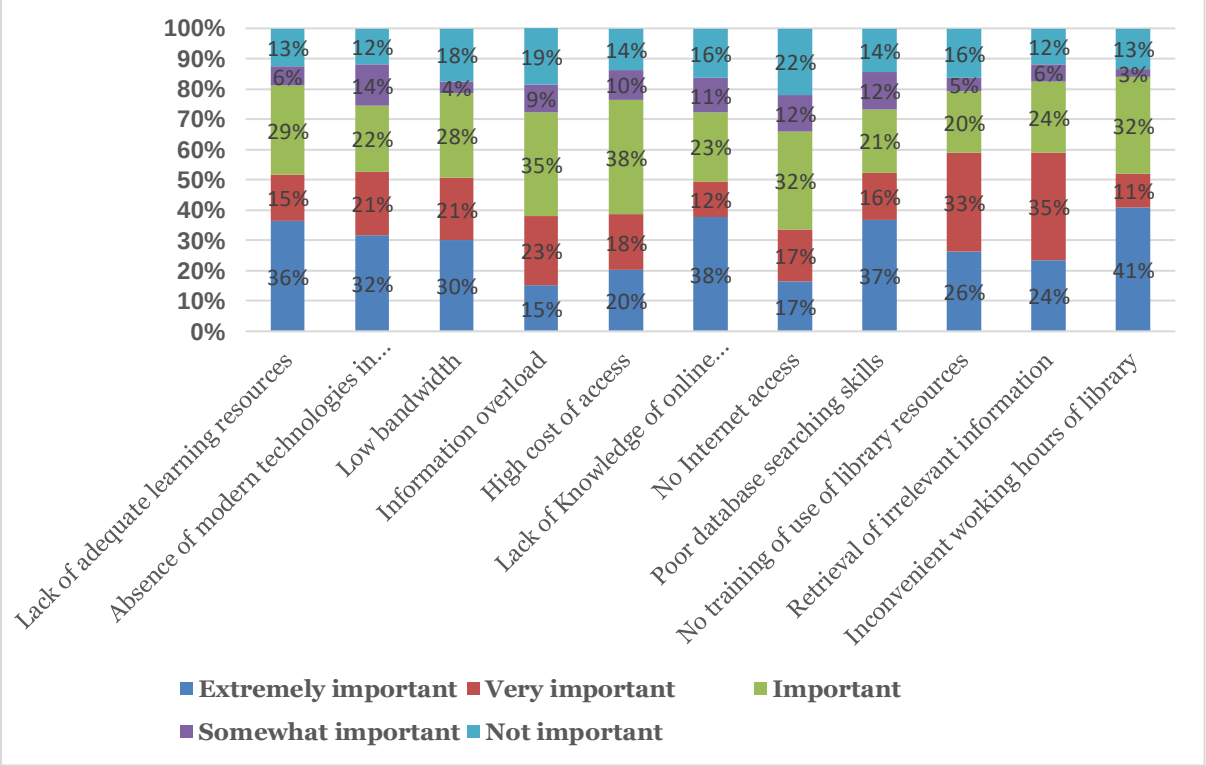


Figure 6.71: Importance level of problems while accessing web resources

Suggestions for Library Development

Table 6.61 and Table 6.62 explore the descriptive statistics of ranking order of suggestions received from the respondents based on Mean score and percentage level accordingly. It has been observed from Table 5.61 that 'Online access to more e-resources for library users with the highest mean value (4.62) was ranked as the1st which is followed by 'Library networking and resource sharing system should be established" with a mean value of 4.56 ranked second. We also found from Figure 5.71 that 73% of users identified suggestions like the rich collection of e-resources and 68% for developing networking and resource sharing as "Strongly Agree". So, we may decide that all the suggestions are extremely important for the development of medical libraries from the users' point of view since the mean value is above 4. Table 6.62 is graphically presented in Figure 6.72.

Table 6.61: Descriptive statistics of suggestions for library development

Suggestions	N	Sum	Mean	Std. Deviation	Variance
Online access to more e-resources for library users	412	1902	4.62	.690	.475
Library networking and resource sharing system should be established	412	1878	4.56	.697	.486
Library should develop Institutional Repository (IR)	412	1874	4.55	.698	.487
All modern technological facilities should be installed in the library	412	1868	4.53	.719	.517
ICT Skills and competencies of library personnel need improvement	412	1845	4.48	.743	.552
Library must be automated immediately	412	1840	4.47	.814	.663
Library should have own website	412	1832	4.45	.795	.632
Professional and qualified library staff should be appointed	411	1826	4.44	.771	.594
Library budget needs to be increased to improve library facilities	412	1828	4.44	.750	.563

[Scale: 5=Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree,1=Strongly Disagree]

Table 6.62: Importance level of suggestions received from users

Suggestions	Strongly Agree	Agree	Fairly Agree	Disagree	Strongly Disagree
	Row Total N %	Row Total %	Row NTotal %	Row TotalNN %	Row TotalN %
Library networking and resource sharing system should be established	67.5%	21.1%	11.2%	0.2%	0.0%
Online access to more e-resources for library users	73.3%	15.3%	11.2%	0.2%	0.0%
ICT Skills and competencies of library personnel need improvement	61.4%	26.2%	11.4%	0.7%	0.2%
Library must be automated immediately	65.5%	16.7%	17.0%	0.2%	0.5%
Library budget need to be increased to improve library facilities	58.3%	28.4%	12.1%	1.2%	0.0%
All modern technological facilities should be installed in the library	65.5%	23.5%	9.7%	1.2%	0.0%
Library should have own website	62.1%	21.8%	14.8%	1.0%	0.2%
Professional and qualified library staff should be appointed	60.7%	23.1%	15.8%	0.0%	0.2%
Library should develop Institutional Repository (IR)	66.0%	23.3%	10.4%	0.0%	0.2%

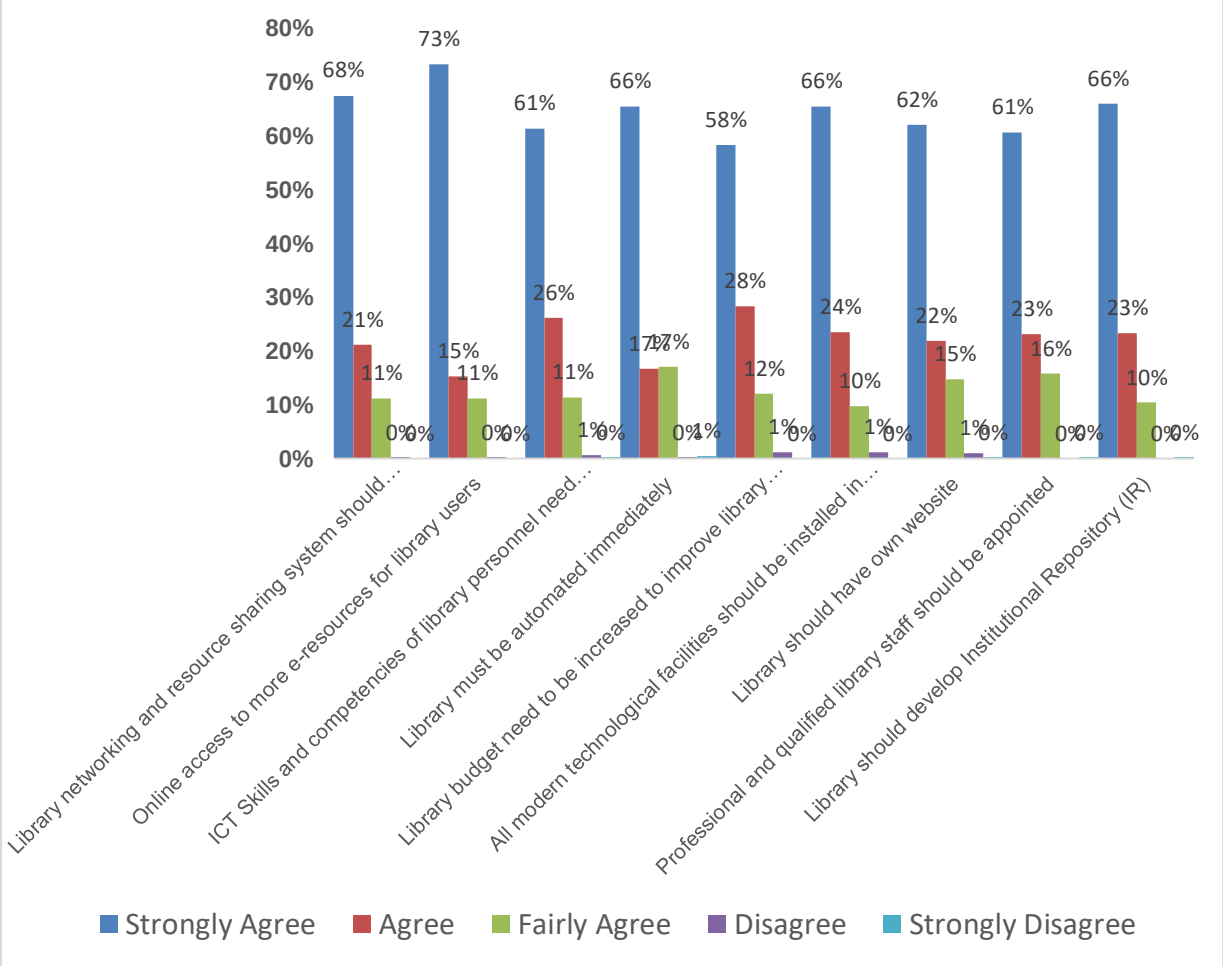


Figure 6.72: Importance level of suggestions for library development

CHAPTER 7

MODEL PLAN

Chapter 7

Model Plan

The steady growth of ICT in health science education for providing high-quality information services has significant implications for medical libraries. The collection of online and Internet-based health information resources as well as access through the network by medical libraries are increasing day by day. Developing an effective ICT-based information system is broadly recognized as a key component for medical libraries - a means of providing advanced health information and services to doctors, researchers, and other health information professionals. But how far have the medical libraries in Bangladesh are adopting this new technology to realize efficient access to various web-based health information resources? The medical libraries in Bangladesh are yet to exploit the full potential of an ICT integrated Health Information System and are lagging behind in maximum utilization of modern technologies as the libraries are encountering various problems like poor ICT infrastructure and the adequate budget for smooth library functioning. There are also limited bandwidth and a lack of skilled professional manpower. The libraries are providing huge support to the academic and research activities of particular organizations. In the current scenario, it is an urgent need to develop full-fledged ICT-based medical library systems and services in Bangladesh. It has been observed that the information services and library facilities of the medical libraries in Bangladesh are not in line with the standard library facilities and services. In respect of that, an attempt has been made to propose an effective model plan for establishing modern medical libraries in Bangladesh in terms of modern ICT tools and technologies.

The use of ICT in medical libraries is yet to spread in all the library areas and they have to go a long way to adopt ICT to perform their activities. It can be said that a great portion of the medical libraries of Bangladesh is not able to act as medical libraries in the truest sense of the term. Most of the medical libraries in Bangladesh are not in a standard position required to support medical education, academic, and research activities effectively and efficiently. The medical libraries of Bangladesh need to apply ICT tools and technologies in all library operations and services in order to reach a standard level. Besides, the process of automation, networking, and digitization/ Institutional Repository must also be started. The proposed model plan covers 10 core components/areas that are being emphasized by the library heads in the previous chapter for the medical libraries in Bangladesh at this moment. The plan may include

the components as shown in Figure 7.1 for making a modern medical library system in Bangladesh. The main motto of this model plan is to develop modern library systems and services aiming to provide user-centered services for physicians, medical students, and researchers in medical libraries.

Figure 7.1: Different components of the proposed model library

Library Facilities

The medical libraries in Bangladesh should envisage various types of facilities and services for their users. The following facilities could be considered in this perspective:

- Infrastructural facilities
- Information and Communication Technologies (ICT) facilities
- Environmental facilities

Infrastructural Facilities: First of all, the medical libraries should ensure good infrastructural facilities for running the library activities smoothly. The infrastructural facilities for the medical libraries are described below:

• Modern own library building, circulation area, storage area for books, journals, and back issues, general reading room, general study room, silent reading area, meeting room, space for staff, training room, new arrival display area, news clipping sections, reference area, newspaper corner, cyber corner area, separate washroom for male and female, provision of AC and proper ventilation system.

• All kinds of furniture such as book shelves, chart, magazine and literature racks, soft seating chairs, bulletin boards, multimedia tables, library book trucks and library book caddies, file cabinet, new arrival display board, mobile shelving system, search stations, learning center chairs and tables, study carrels, book trolleys and returns, journals-shelves, study carrels, study tables, chairs and tables for users, etc.

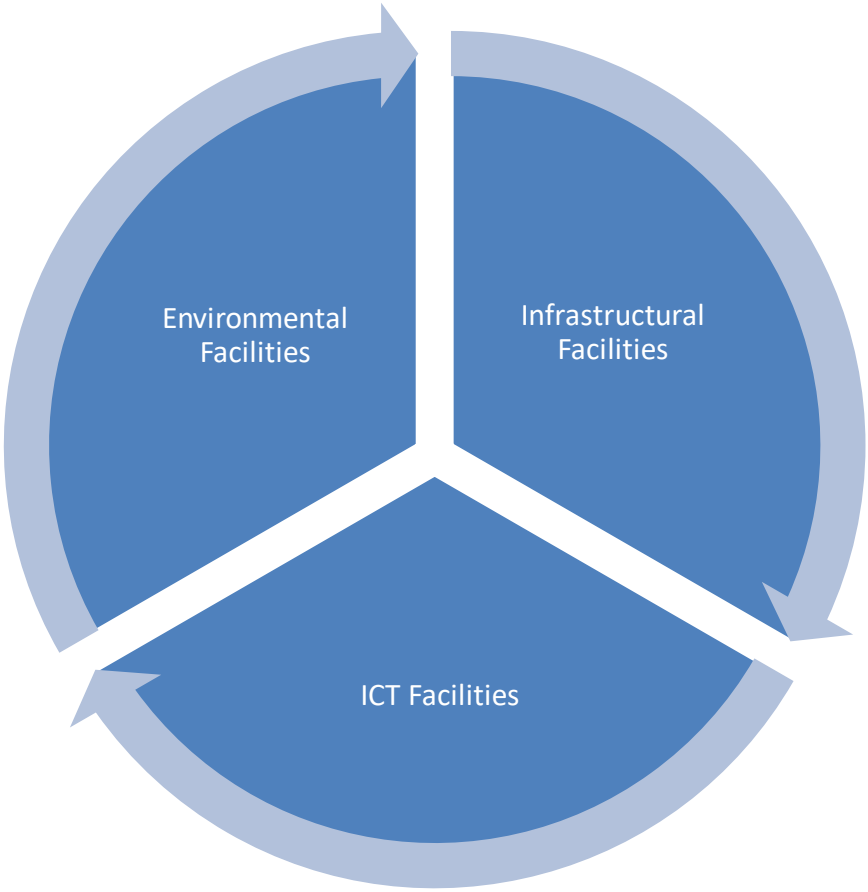


Figure 7.2: Facilities of the proposed model library

ICT Facilities: Medical libraries should ensure proper ICT facilities for delivering high-quality information services and the facilities are categorized into four types as presented in Table 7.1 and Figure 7.3.

Table 7.1: ICT infrastructure of the proposed model library

Hardware Infrastructure	Software Infrastructure	Communication Infrastructure	Storage and e-resources Infrastructure
• Server • High configured PCs • Laptop • Printer • Photocopier • Scanner • WiFi Router • Terminals for OPAC search • LED monitor • Speakers • CC camera • RFID Gate • UPS • Smoke detector • Book tracking device • Modem • Projector • High configured video conferencing devices	• System Software (Linux, Windows) • Application Software • Library Management Software (Koha, SLiMs) • Digital Library Software (DSpace, GreenStone) • Digitizing Software (Adobe Reader, Writer, Photoshop) • e-learning Software • Artificial Intelligence • Cloud Computing • Communication Software (Zoom, Skype) • Web Server Software (Apache HTTP Server, Apache Tomcat, Lighttpd) • Database systems (MySQL, MariaDB, SQLite) • Content management Software (WordPress, Joomla) • Browser Software (Firefox, Edge)	• Phone • Communication switches • Hub • Repeater • Smart Phones • Fax • Tele-conferencing • Networking (LAN, WAN, MAN) • Satellite • Barcode • Smartcard • RFID • Wireless • Internet • Intranet • Email, Voice mail • Instant Messaging • Web 2.0/ Social Media • Social Networking • Blogging • Voice Over Internet Protocol (VOIP) • Library Website	• Hard Drives • Solid State Drives • E-Resources • E-Books • E-Journals • Online Databases (Bibliographic, Full text, and multimedia) • E-Theses/ Dissertations • Electronic Thesis and Dissertations (ETD) • Library e-Consortia • E-Maps • E-Dictionaries • E-Newspapers • E-Encyclopedias • Institutional Repository

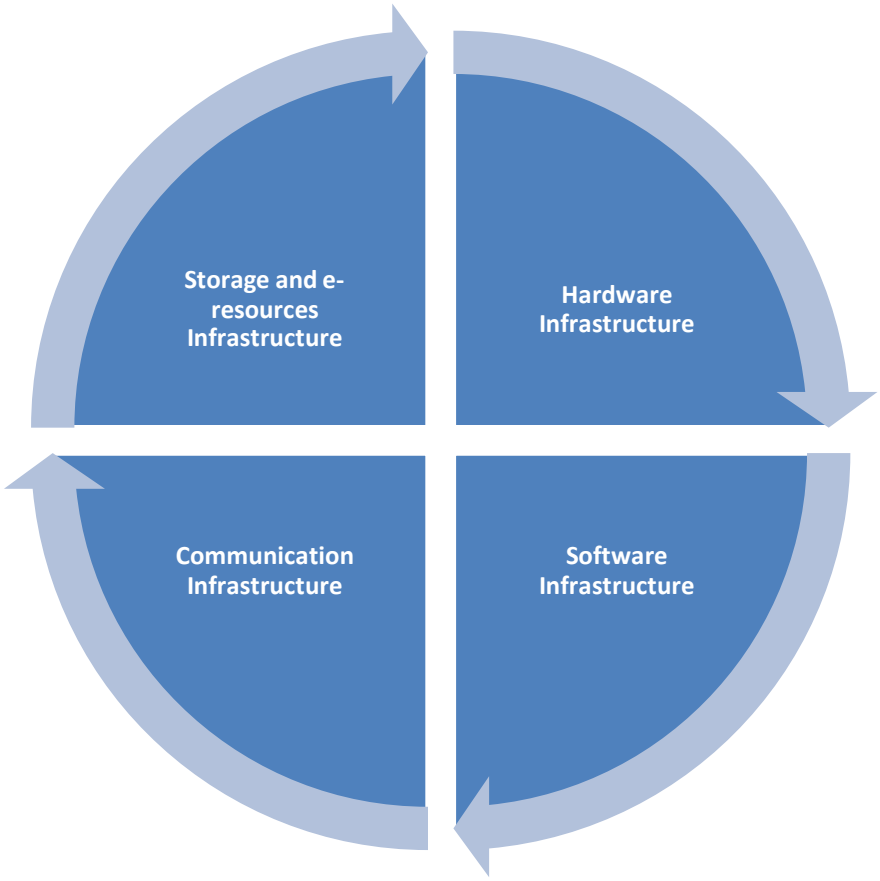


Figure 7.3: ICT infrastructure of the proposed model library

Environmental Facilities: Medical library environment can be grouped into two areas i.e working environment and the reading environment.

Working environment

A good working environment covers duties and responsibilities of staff members, interpersonal relationships and communications skills, understanding among all staff members, job satisfaction, and teamwork are treated as a good working environment.

Reading environment

A good reading environment largely depends on sufficient reading materials (both print-e-resources) and standard library services. It comprises a lucrative circulation desk for check-in and checks out, medical books, medical journals, reading space for users of the library, magazines, maps and newspapers, audio-visual resources, ICT resources for online meetings, medical databases, study table, modern PCs with Internet connection for accessing e-resources, laptops for using statistical reference management software, study chairs, open access bookshelves and silent zone inside the library.

Library Divisions

For functional convenience, the 5 core divisions have been proposed in the model plan for modern ICT-based medical libraries of the country, viz.: Acquisition, Technical, Readers' Services, System Administration and Special Services. The core functions of the Acquisition section cover subscription of library print and e-resources, contact to faculties for new resources collection, duplicate checking, price check, ordering, accessioning of library print and e-resources, selection of right vendor, negotiation with the vendor, final price and resource selection, confirmation of the order, receiving and checking the subscribed resources, online checking for e-resources and so on. Recommendations and any necessary feedback for the purchase of new books, periodicals, and e-resources can also be addressed in this section. The circulation system should be fully automated. Circulation activities cover the tasks like lending library resources; checking out library materials; receiving payment of fines for damaged and overdue materials; report generation for library users and issued items; reservation of particular resources, e-mail notification for overdue loans; renewal of loans; Notification to the library staff or problem borrowers, shelving and reshelving of library materials and so on. The medical library should maintain a reference section that is treated as one of the important and critical sections of a library. The main functions are providing information for a specific query, instructions for using library materials, and guidance for assisting users in choosing appropriate library materials. General reference books and subject reference books are also preserved in the reference section. The reference librarian also prepares a comprehensive list of bibliographic tools and other information resources and ensures access to library resources not available in the library and other reference book reservations and photocopying activities.

In the present technology-based era, all the proposed library divisions should be connected through LAN and Intranet. Library automation activities must be developed using the Standard Open-Source Library Management Software like Koha. The IT/System Administration Section is mainly responsible for developing an Integrated Library Management system, selecting proper library software, developing and maintaining the library website, maintaining library networking activities, providing Internet Service, maintaining Hardware and Software, maintaining library consortia activities, E-resources access services, off-campus e-resources access services, Web OPAC service, document delivery service, subscribing library databases, maintenance of IR activities, generating bar-coded identity cards, maintaining cyber corner activities, etc. are some of the core activities of. The IT section is also responsible for library management server, web portal, e-resources Server, EZ proxy server, Institutional

Repository server, and so on. Figure 7.4 explores a snapshot of the proposed library divisions and the core activities.

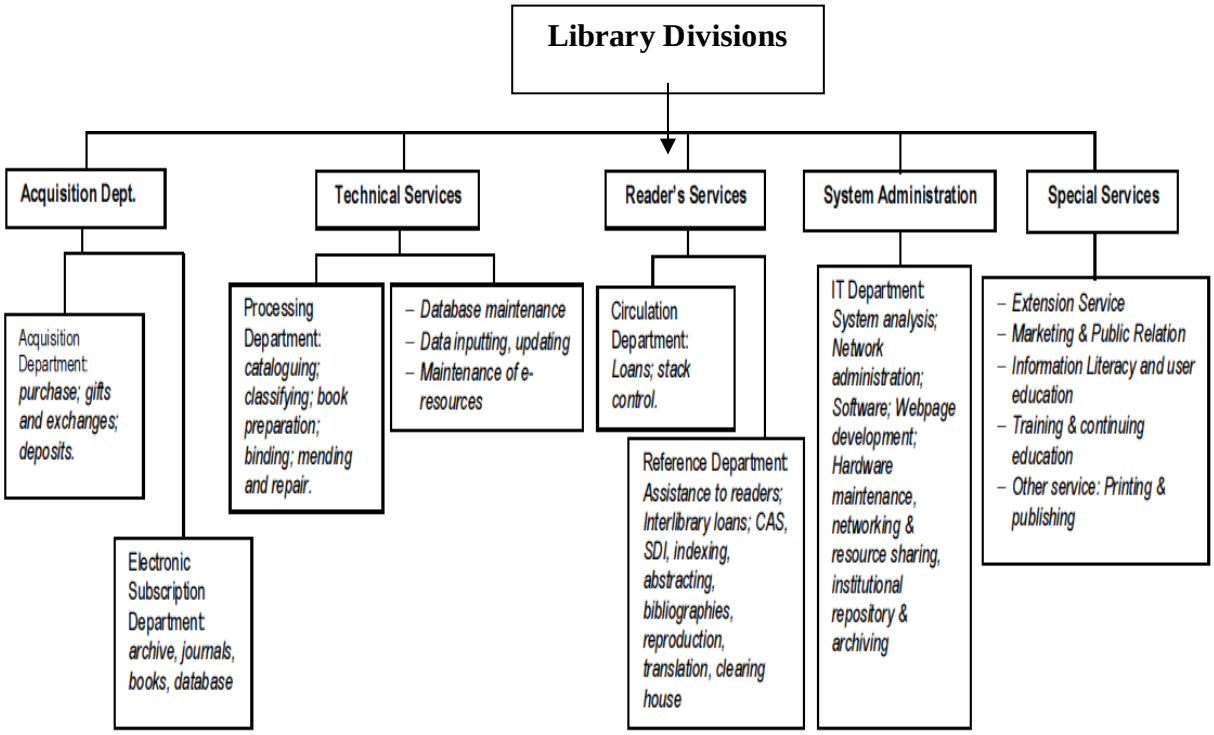


Figure 7.4: Proposed library divisions and brief activities

Library Services

Health professionals need updated information for delivering the right treatment to patients. In this digital age, medical libraries should offer innovative library services. The modern forms or notions of library services like library 3.0, Artificial Intelligence, the Internet of Things, the rising cost of e-resources and online databases, Cloud Computing, online access to a wide range of medical databases, guidance to research data management, systematic review, evidence-based information, developing digital library and legal issues are the major challenges for health libraries. Medical libraries should design the library services addressed in the institution's plan and objectives. The following services are important to success in implementing this strategy.

The study recommends the following modern and traditional library services that should be available in the medical libraries:

Table 7.2: Proposed library services of the model library

ICT based library services	Traditional Services
OPAC	Reading Room Service
Web OPAC	Circulation service
Online renewal service	Current Awareness Service
Institutional Repository (IR)/Digital Repository (DR) service	Referral service
Online SDI service	Indexing and Abstracting Services
Online reservation	Bibliographical service
Library Services through Social Networking Sites	On-line database searching
Library 2.0 (RSS Feeds, Blogs and Wikis etc.)	Reference service
Electronic Document Delivery service	E-alert services
Mobile-based services	Online literature searching
Remote access service	Translation service
RFID-based services	CD-ROM Searching
Wifi service	SDI Service
Virtual reference service	Photocopying and printing services
Internet service	Internet browsing
Intranet service	Article Indexing
Electronic Thesis and Dissertations (ETD) service	News-clipping service
CD-ROM/DVD read/search service	Inter-library loan service
E-CAS (Current Awareness Service)	Citation analysis service
Electronic Conferencing Services	Information literacy service
Research Data Services	E-mail service
Systematic Review service	
Webometric Analysis service	
Online Literature Searching service	
Evidence-Based Practice (EBP) service	
Plagiarism detection service	
E-indexing and abstracting service	
Online e-Journal Service	
Online e-Book Service	
Online Database Service	

Library Automation

Library Automation System must be introduced in the survey libraries in Bangladesh in order to provide speedy, accurate and qualitative services; avoid duplication of any work; increase technical processing efficiency over a manual system; save the time, effort and resources involved in the manual operation of libraries; and establish cooperation and coordination among the libraries in a simplified manner. The model plan for library automation is presented in Figure 7.5.

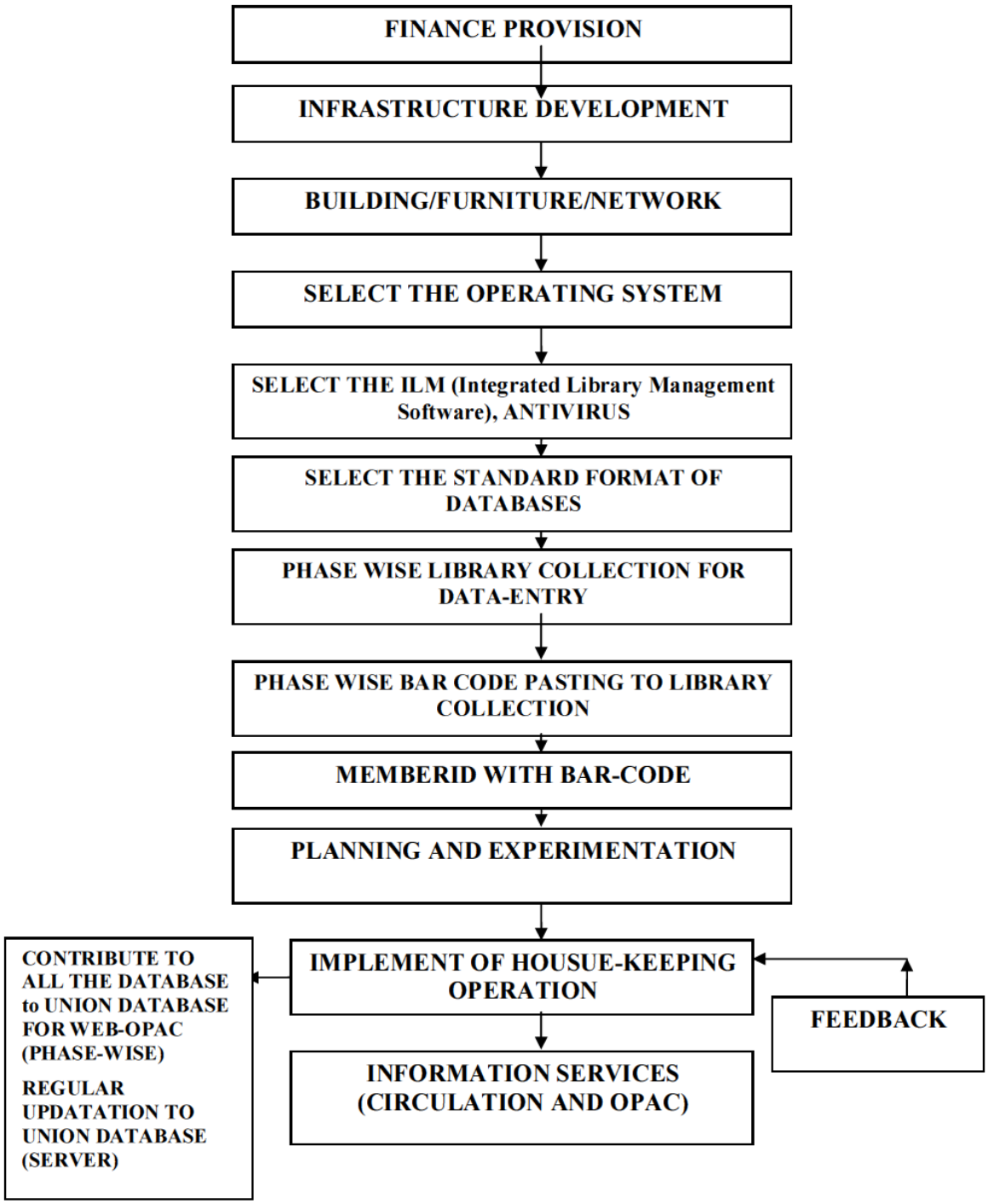


Figure 7.5: Proposed model plan for library automation

Brief Description of the Proposed Model

01. FINANCE PROVISION

Sufficient funds should be ensured for developing library automation and networking and purchasing and maintaining online database and software

02. INFRASTRUCTURE DEVELOPMENT

Infrastructure facility is also important for the development of library automation. Electronic equipment comprised digital scanners, PCs, servers, networking tools, barcode scanners, UPS, and printers. All the libraries have the facilities of accessing communication network services such as telephone, LAN, internet, e-mail, etc.

03. BUILDING/FURNITURE/NETWORK

All libraries should provide separate centralized computer sections for library automation and networking. It also provides the facilities for adequate furniture and set up the LAN campus as well as in the libraries.

04. SELECT THE OPERATING SYSTEM

Linux is the best operating system for the installation of the library automation system of the medical libraries of Bangladesh since it is available free of cost.

05. SELECT THE ILM (Integrated Library Management Software), ANTIVIRUS

Selecting integrated library management software and antivirus software are more functional in several practical aspects. As the study has availed the opportunity to survey the existing medical libraries in Bangladesh, based on the various major issues like collection, capacity, user satisfaction, manpower, the current infrastructure, country context, financial capability, etc., the study would like to suggest for installing Koha software which is the leading and free and open-source software that is widely used in all over the world. Koha is a web-based ILS, with a SQL database (MariaDB or MySQL preferred) back end with cataloging data stored in MARC and accessible via Z39.50 or SRU (Search/Retrieve via URL). Koha is functional with Linux Operating System.

Figure 7.6: Main modules of Koha

REASONS FOR SELECTING KOHA: Koha is one of the most popular and advanced open-source Integrated library management software (ILMS) in the world. Introduced in 1999, the leading medical libraries around the world are using Koha for library automation software. The software is suitable for all kinds of libraries, especially for medical libraries. The core modules of Koha cover acquisition, cataloging, circulation, serials control, patron management, reporting, OPAC, branch relationships, and much more. The key features are necessary modules for library activities, automated email notification, report generation, integration with other online library catalogs, import metadata, user management, library resource management, ease of customization, advanced search facility, provision of RFID, and Web OPAC.

06. SELECT THE STANDARD FORMAT OF DATABASES

For networking, cataloging library resources, and retrieving protocol standards, the selection of MARC (Machine Readable Cataloguing) standards and Z39.50 are recommended in the study. For networking, Public IP, Multiple LAN Cards, Firewall ports, and Internal and External DNS servers are required.

07. PHASE WISE LIBRARY COLLECTION FOR DATA-ENTRY

Library should take the data entry work in Phase wise like in First Phase: books can be entered, Second Phase: Journals, back volumes, In the Third Phase: Dissertations, CD's, and other reading materials of the libraries.

08 PHASE-WISE BARCODE PASTING TO THE COLLECTION

This Form is used to generate the Bar Code Labels and to print the same either on Bar Code / Thermal Printer or on Laser Printer.

09. MEMBER ID WITH BAR-CODE

Library membership ID card with bar code needs to be printed and delivered to users.

10. PLANNING AND EXPERIMENTATION

Software testing is an important factor in the planning of library automation system.

11. IMPLEMENT OF HOUSE-KEEPING OPERATION

This is the most vital step in which the total system is functional. The implementation of housekeeping operations of Koha can be visualized in Figure 7.7

12. INFORMATION SERVICES (CIRCULATION AND OPAC)

Circulation services are developed in this stage as well as other library modules like acquisition, serial control, and other administrative works. The library catalog of books and other reading material can be accessed through the web OPAC.

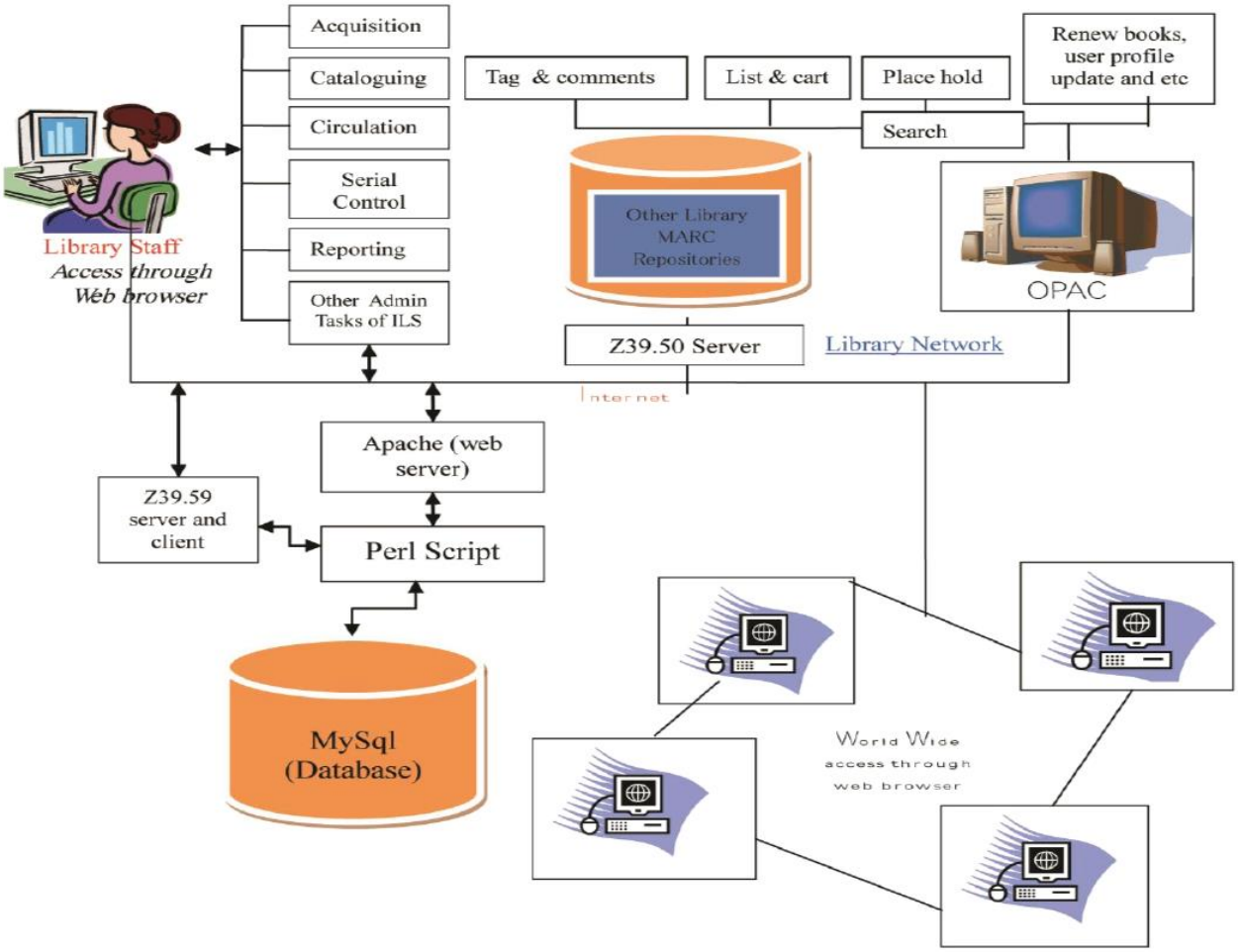


Figure 7.7: Proposed Koha Integrated Library System (Source: Ahmed,2014)

13. FEEDBACK

Receiving feedback from library staff and users are also necessary for the smooth functioning and tracing of the system problems of Koha.

14. CONTRIBUTE TO ALL THE DATABASE

A web-based interface is designed to provide easy access to the merged catalogs. The library catalog is a major source of bibliographic information that can be used for interlibrary loan, collection development as well as for copy cataloging, and retro conversion of bibliographic records.

15. REGULAR UPDATE TO UNION DATABASE (SERVER)

Back up of MY SQL database of the library is essential so that it can be restored later at any time. The System Administrator should perform this job regularly on the Server PC where the database system is installed. The installation of the latest version of Koha 22.05, a Linux Server (Debian), MariaDB or MySQL, Apache, Root access to the server, and Perl are highly recommended.

Library Networking

Library networking means a group of libraries are interconnected for information sharing and building up a rich collection through combined efforts and subscriptions. The rising costs for books and journals could be shared by the same type of libraries by library networking. A Library network is usually formed through a formal agreement whereby centralized development of cooperative programs and services are available to all the network member libraries. Computers and telecommunication technologies are needed to set up a strong library network.

BMLNET: a Proposed Schema

BMLNET stands for Bangladesh Medical Libraries Network. The network would be set up for traditional resource sharing, e-resource sharing, and procurement among the interested medical libraries. Though the knowledge production rate of our country is low, worldwide knowledge is producing in invigorate growth. Owing to the paucity of the budget of medical libraries, the rapid growth of knowledge, information, and publication, and also the immense demand of the users, the library network or library consortium is now a demand. It is high time for the medical libraries in Bangladesh to develop a strong library network for the collective subscription of resources and wider access to all types of medical resources.

Objectives of BMLNET:

The primary objective of the library network should be to provide access to the maximum number of resources for all members at a minimum cost. Because of the lack of any standard public library network, the information services in Bangladesh are highly suffered. For this reason, the establishment and implementation of a medical library networking system in Bangladesh is an urgent need, and spreading such a networking system is the prime objective of BMLNET.

The core objectives of the proposed BMLNET are as follows (Mannan, 2000):

- *"To build a maximum collection and to increase resources of the network members;*
- *To achieve effective bibliographic control of library materials for promotion of the flow, exchange, and use of relevant information;*
- *To ensure better and rapid access to information resources and to ensure maximization of their use by network members;*
- *To avoid unnecessary duplication both in the acquisition and processing of library materials;*

- *To provide and avail technological facilities for all housekeeping functions and user services;*
- *To provide access to composite databases;*
- *To provide efficient means of inter-library services, document reproduction and transfer facilities;*
- *To also provide access to national and international databases; and*
- *To stimulate, promote and upgrade the skills and competence of library staff and network members in information handling by arranging research and training programs."*

Benefits of BMLNET:

The expected benefits of the proposed network will be as follows:

- Library subscription costs of network members will be reduced;
- Duplication of information materials and efforts will be avoided;
- Maximum collection of library resources;
- Build up specialized collections of resources;
- Comprehensive coverage of e-resources;
- More library services.

Proposed Configuration:

The Star configuration for this network should be chosen for BMLNET since the Star network will ensure the maximum benefits for the participating libraries. WAN (Wide Area Network) should be formed based on the physical location of the medical libraries in the country and data flow requirements. Considering the existing availability of hardware and other facilities in the libraries of the proposed system, the ONOS (Open Network Operating System) project, an open-source community hosted by the Linux Foundation, may be used.

Choice of Focal Point:

The following factors have been considered in determining the Focal Points (FP) for BMLNET:

- Richness of library resources;
- Strong infrastructural facility and manpower;
- Research activities of the organization;
- Number of users within an organization and neighborhood;
- Financial position;
- Technological application;

— Location, etc.

If we consider the above factors, Bangabandhu Sheikh Mujib Medical University Library (BSMMUL) may act as the focal point of the proposed network.

Functions of Central Focal Point:

The main function of the Central Focal Point (CFP) will be to act as the coordinating center of the proposed network. Other functions will include:

— Management and administration of all the activities of BMLNET;

— Providing policy, guidelines, and planning to the Government along with the member libraries;

— Monitoring and coordinating the proposed network;

— Managing financial activities of the BMLNET;

— Promotion of communications of the BMLNET.

Functions of the Member Libraries:

The main functions of the Nodes/Members of this proposed network are as follows:

— To coordinate and communicate with the focal point and other nodes throughout the focal point;

— To coordinate efforts for suitable collection development and reduce unnecessary duplications;

— To help the users in acquiring the right materials at the right time;

— To provide library services to users easily and quickly;

— To take initiatives for the promotion, development, and innovation of BMLNET.

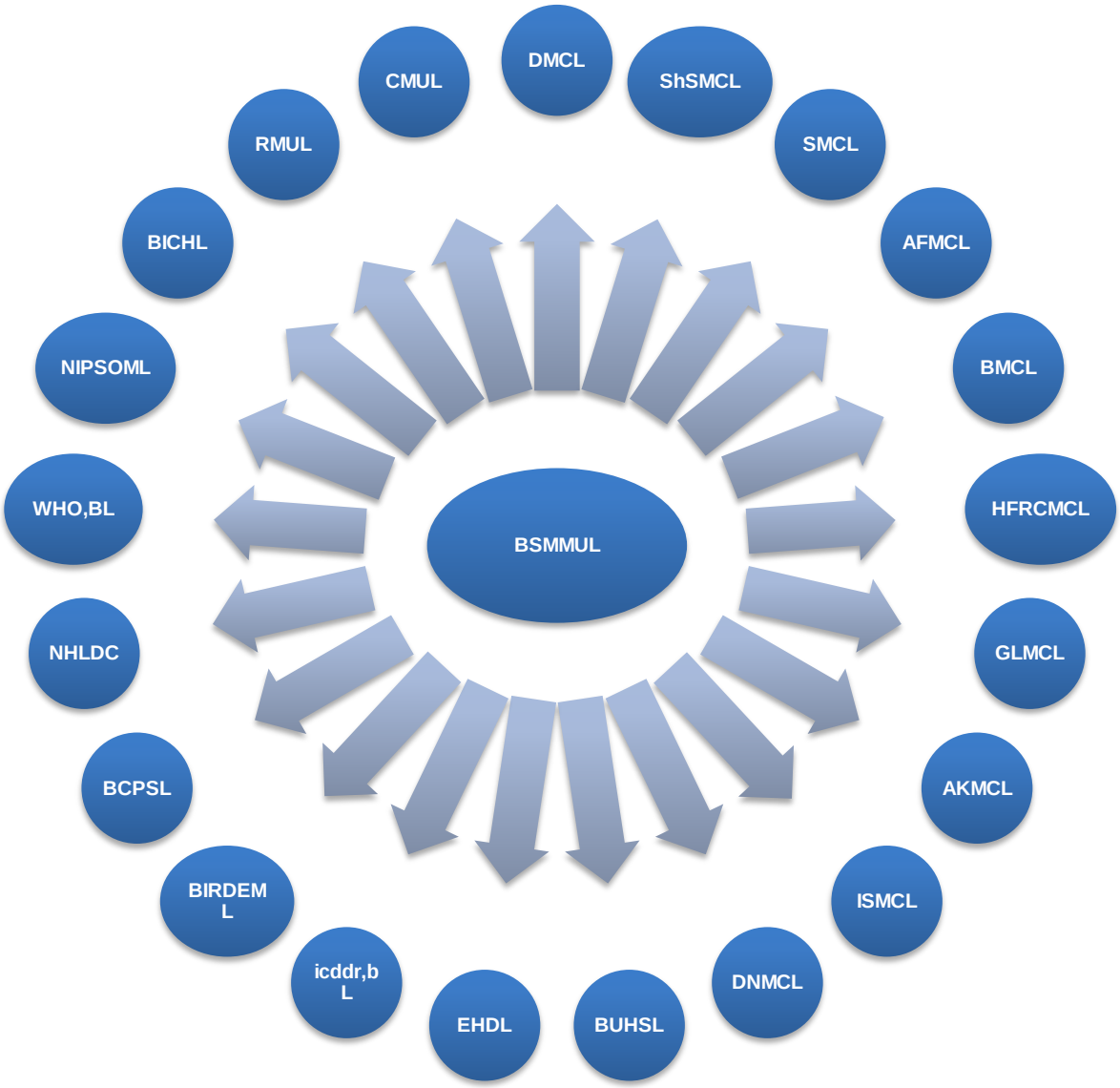


Figure 7.8: Proposed model plan for BMLNET

[Bangabandhu Sheikh Mujib Medical University Library = BSMMUL, Dhaka Medical College Library = DMCL, Shaheed Suhrawardy Medical College Library = ShSMCL, Sir Salimullah Medical College Library = SMCL, Armed Forces Medical College Library = AFMCL, Bangladesh Medical College Library = BMCL, Holy Family Red Crescent Medical College Library = HFRCMCL, Green Life Medical College Library = GLMCL, Anwar Khan Medical College Library = AKMCL, Ibn Sina Medical College Library = ISMCL, Dhaka National Medical College Library = DNMCL, Bangladesh University of Health Sciences Library = BUHSL, Evercare Hospital Dhaka's Library EHDL, International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) Library = icddr,bL, Bangladesh Institute of Research and

Rehabilitation for Diabetes, Endocrine and Metabolic Disorders Library = BIRDEML, Bangladesh College of Physicians and Surgeons Library = BCPSL, National Health Library and Documentation Centre = NHLDC, WHO Bangladesh Library = WHO,BL, National Institute of Preventive & Social Medicine Library = NIPSOML, Bangladesh Institute of Child Health Library = BICHL, Chittagong Medical University Library =CMUL, Rajshahi Medical University Library = RMUL]

Figure-7.8 shows a proposed network limited to the investigated medical libraries only. But at the last stage, the proposed network among the medical libraries may be expanded throughout the whole country irrespective of types and sizes as shown in Figure-7.9.

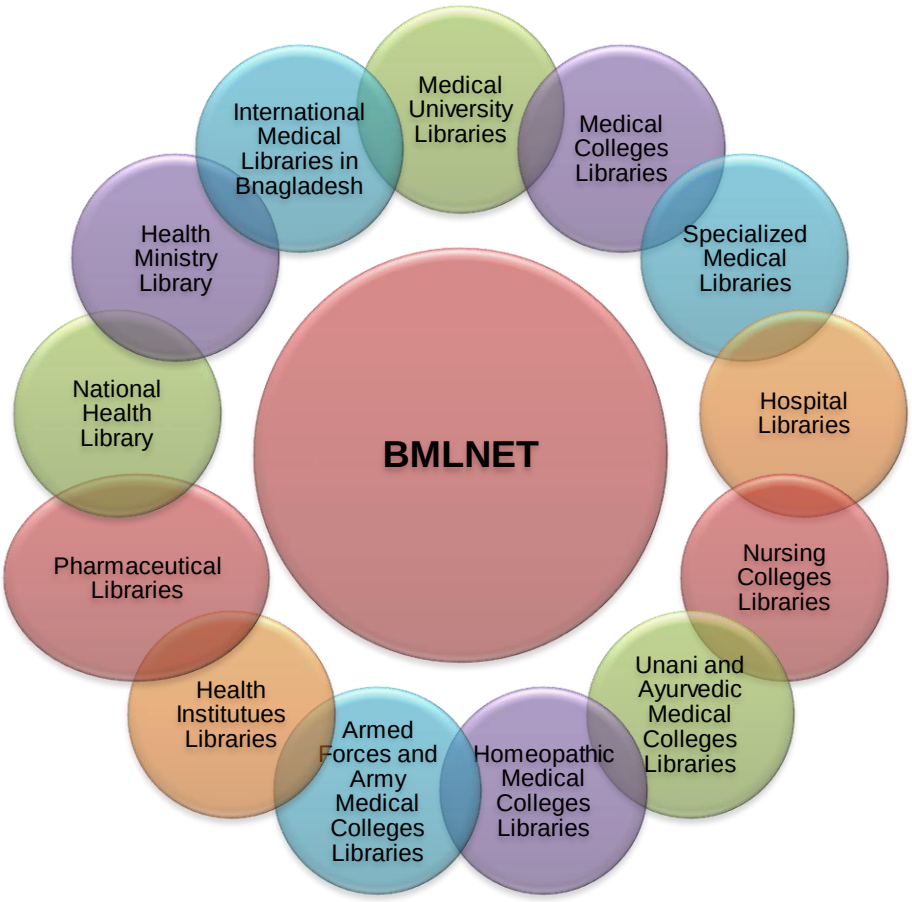


Figure 7.9: Configuration for the medical library network in Bangladesh (if extended in the future)

Hardware and Software Requirements

Hardware:

— One modern CPU for Focal Point.

— One network server for Focal Point and each node.

— Network card, Gateway, Router, Bridge

— Wireless Access Point

— High Configured PCs for all nodes and focal point

— Modem and modem-rack that support Transmission Control Protocol / Internet Protocol (TCP/IP)

— T switching Hub

— Photocopying machines

— Printers

— Storage devices for data preservation

Software:

Each of the participating libraries must have the following:

- Adobe Reader, Writer, and Photoshop
- Windows 11 (latest version)
- Linux (latest version)
- LAN (Novel/Ethernet, to begin with, it may be optional)
- Software for E-mail (MS Outlook)
- Word processors
- DBMS packages (MYSQL)
- Repository packages (DSpace)
- Library automation Software: Koha
- Programming languages: C/C++, Java
- Optical Character Recognition (OCR) software
- Library Website for all members

There must have a coordinating body for the overall management and administration of BMLNET. The coordinating body should be composed of library heads of the member libraries and will have full legal power for policy-making and development of the network. The development of BMLNET could ensure the maximum usage of information resources and save a huge amount of money for all the member libraries. Library networking is an important area of modern library services. Medical libraries in Bangladesh can reach the highest position in library services by sharing of resources. Thus, the successful implementation of BMLNET may ensure faster access to both online and print resources, shared library activities, provide user-centered services, and develop good communication among the member libraries.

Library Consortium

Library consortium aims to access more online resources at a reduced cost. Cooperative subscriptions of electronic information resources can result in lower prices for each of the member libraries of the consortium and saving in terms of the actual cost, time and staff. At present, there are three library consortia namely LiCOB (Library Consortium of Bangladesh), UDL (UGC Digital Library), and BdREN (Bangladesh Research and Education Network) available in Bangladesh.

Subscription of electronic information resources by the medical libraries in Bangladesh is not much appreciable due to the massive cost of medical online databases and e-resources. The formation of the consortium i.e. UDL and LiCOB has considerably improved the library consortium scenario of Bangladesh. The mission of the said consortia is to boost academic and research activities through collaborative subscriptions to electronic resources (e-books and e-journals). So the study would like to suggest that, all the surveyed libraries should join to LiCOB and UDL consortium for the below-stated benefits (University Grants Commission of Bangladesh, 2014):

1. Provide access to a large volume of e-resources at lower rates of subscription;
2. Promote efficient on-campus and off-campus access to e-resources;
3. Promote library cooperation;
4. Generate usage statistics of e-resources;
5. Accelerate academic and research activities;
6. Increase the research productivity ;
7. Popularize to optimum usage of e-resources.

Library Digitization

The medical libraries in Bangladesh should take proper initiatives to digitize library materials, through digitization of library resources. Library digitization endeavors are linked with three purposes like preservation of valuable library resources, smart information searching facilities, and online access to library resources. Old manuscripts, research protocols, Govt. important documents and policies, journals, official gazettes, images, maps, historical recordings, and other historical documents are converted into digital form. Library digitization is very much required for preserving historical, valuable, and precious materials. The model plan for digitization is explored in Figure 7.10 (Fabunmi et al., 2006).

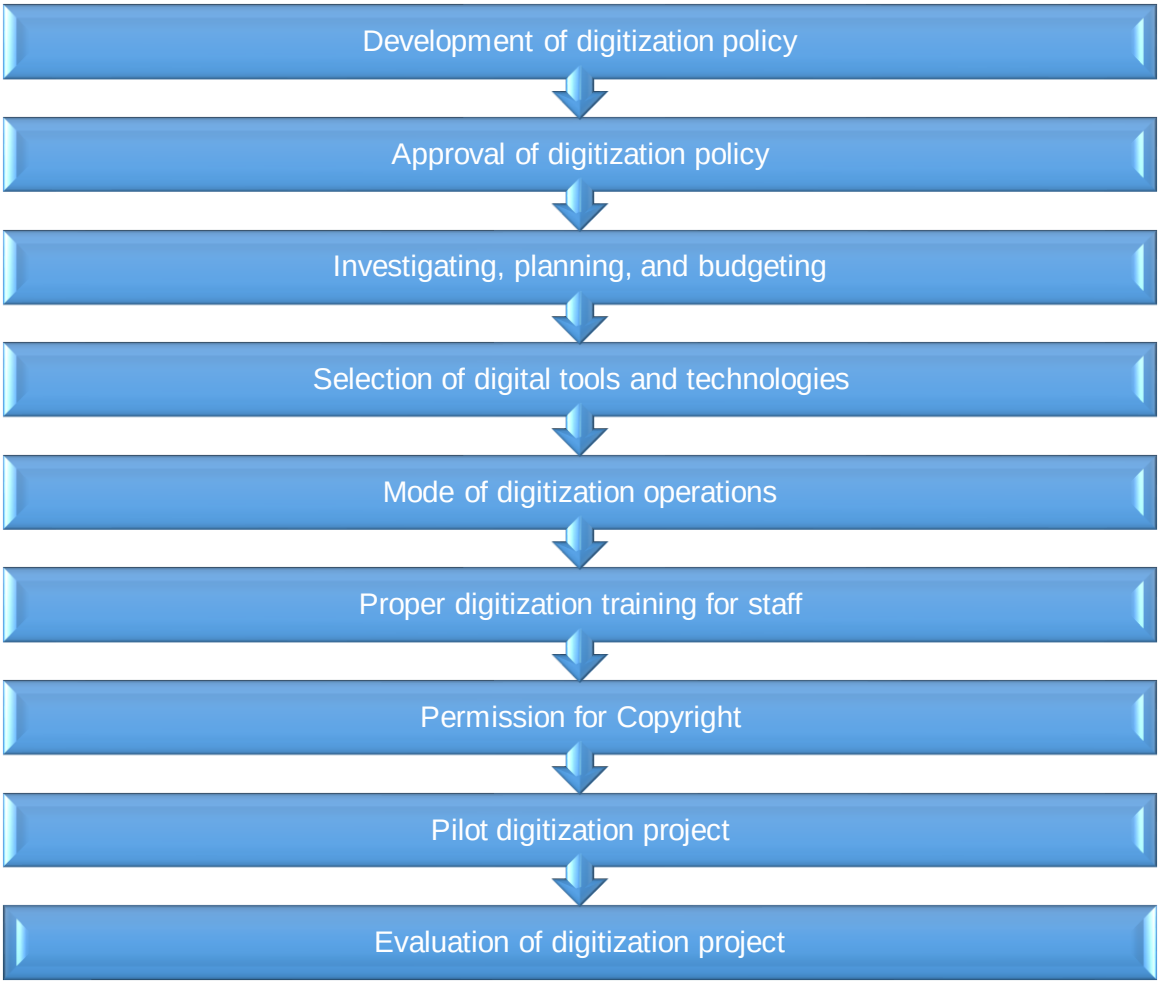


Figure 7.10: Model plan for the library digitization process

Institutional Repository (IR)

The development of Institutional Repository (IR) at medical libraries worldwide has greatly increased with the growth of the Open-Acess movement for the access of scientific journals and open-source software development. IR has been emerged as a mechanism for storing digital contents created by research organizations, universities, etc., aiming to the long-term preservation of research activities, and also becoming a key component within the library and open access communities. Institutional repository is an online database with a set of services where intellectual works, book chapters, articles, technical papers, reports, audio, video, image including published and unpublished materials are stored in digital format for a long time with facilities of self-archiving and open access to institutional scholars and research organizations. IR serves as an online digital repository for the dissemination of digital documents produced by the scientists, doctors, researchers, fellows and staff members within the context of their research, training, and management work to make them more visible in the national and international level. Therefore, it is an urgent need for medical libraries in Bangladesh to

develop IR for preserving and showcasing their scientific outputs for global visibility. DSpace is the most user-friendly and open-source IR software in terms of feature, usability, community involved, and software architecture. The study would like to recommend "DSpace" for the development of IR in the medical libraries of Bangladesh. The core system requirements for installation of the latest version 79 of DSpace are listed below (dSPACE, 2022)

Hardware Requirements:

- Any modern processor / CPU
- 32 GB of Random-Access Memory (RAM)
- ~ 30- 40 GB for Tomcat
- ~10-20 GB for Database (PostgreSQL or Oracle)
- 4 TB of Storage (or roughly enough storage for all the files to store in DSpace)
- 30 GB for dSPACE software products
- 1 GB for SYNECT server
- 20 GB of free disk space on the system partition, for example, for run-time software like the Microsoft .NET Framework
- Full HD graphics adapter with a resolution of 1920 x 1080 pixels
- 3.3 V / 5 V Universal PCI slot (DS817-04 and later)
- ExpressCard/54 slot

Software Requirements:

- UNIX-like OS (Linux, HP/UX, Mac OSX, etc.) or Microsoft Windows
- Windows Server 2019
- Java JDK 7 or 8 (OpenJDK or Oracle JDK)
- Relational Database: (PostgreSQL or Oracle)
- Apache Maven 3.0.5 or above (3.3.9+)* (Java build tool)
- Apache Ant 1.8 or later (Java build tool)
- PostgreSQL 9.4 or later
- Servlet Engine (Apache Tomcat 7 or later, Jetty, Caucho Resin, or equivalent)
- Browser Software: Google Chrome/Mozilla Firefox/Microsoft Edge
- Graphics Card: NVIDIA® graphics accelerator (OpenGL-compliant)
- DS814 Link Board
- Microsoft Visual Studio C/C++ Professional/Enterprise
- C/C++ Compiler of the GNU Compiler Collection (GCC)
- CodeMeter Runtime Version 7.40
- Standard TCP/UDP protocol

RFID-based Library System

Medical libraries in developed countries have shifted gears towards dynamically evolving RFID technologies to modernize and automate library functions to the extent possible. Modern libraries are using different types of advanced technologies to modernize library activities. Radio Frequency Identification (RFID) is one of the more advanced technologies for upgrading library systems. There are three types of RFID systems viz. Low Frequency (30 kHz to 500 kHz), High Frequency (3 MHz to 30 MHz), and Ultra-high Frequency (300 MHz to 960 MHz). RFID is much required in the library to keep track of library resources and easy circulation process.

Components of RFID System

The RFID system has core five components: RFID Tag, RFID Reader, Antenna Communication infrastructure, and Application software.

Advantages of RFID System

The medical libraries in Bangladesh should introduce the RFID system in order to get the following advantages and the possible RFID usage areas are shown in Figure 7.11.

- Fast charging/discharging
- Self check-in/out by library users.
- More data can be kept in RFID
- Ease inventory management
- Easy installation of RFID tags
- Low possibility of missing library resources

Figure 7.11: Model plan for RFID-based library management system

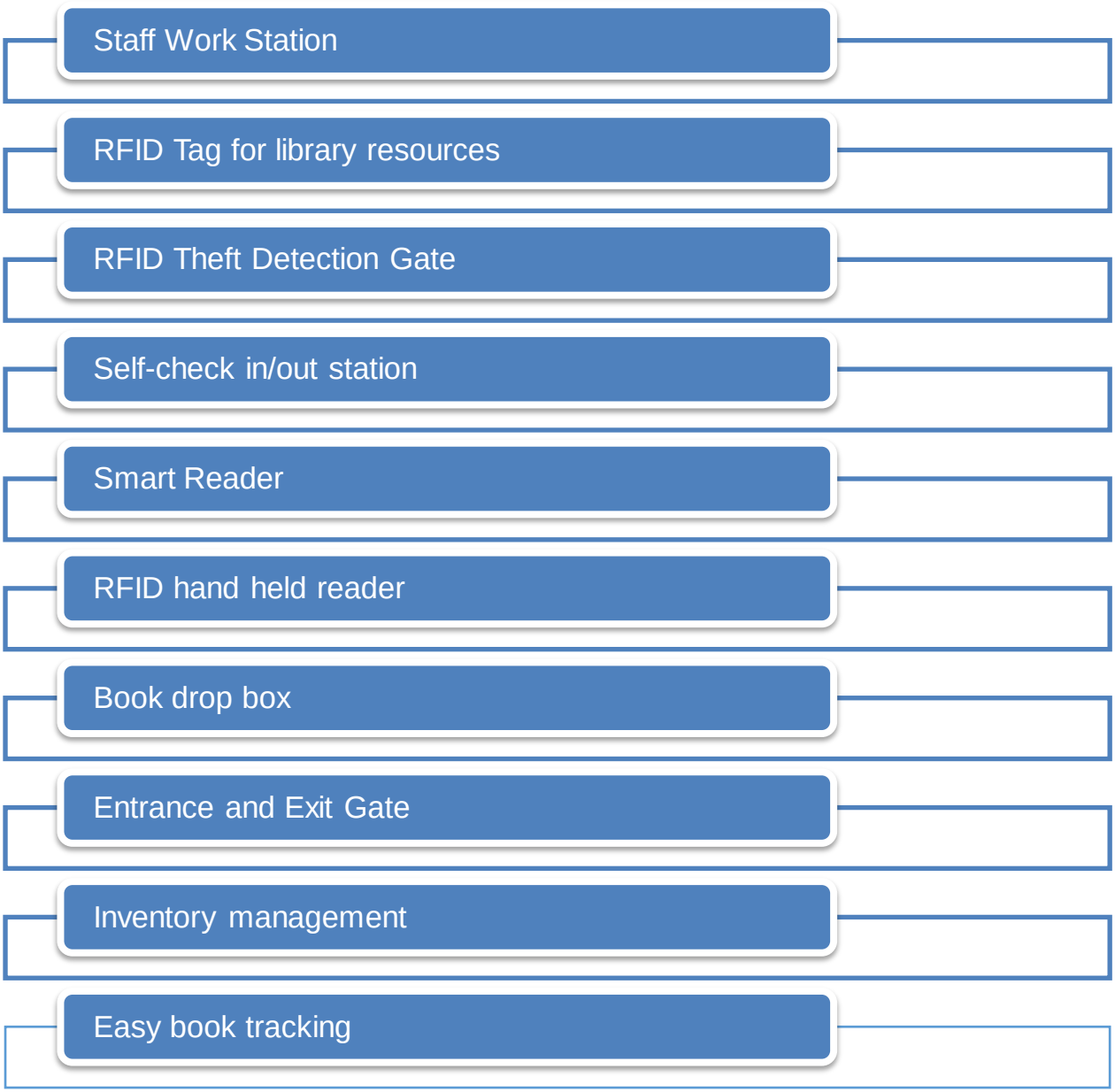


Figure 7.12: RFID usage areas in library operations

Library Website

Website is nothing but a collection of web pages, typically common to a particular domain name or subdomain on the World Wide Web on the Internet. A library website is defined as *"a dynamic 'environment' or a 'virtual workspace' providing access to vast and disparate sources of library content and services at a point in time that makes sense in the complex learning and research process. Doing so reduces the cognitive load on users when acquiring and processing digital resources and facilitate a truly user friendly experience"* (Detlor & Lewis, 2006).

The library website has had a profound impact on libraries. The website has not only changed the way users seek and use information but also the way libraries store, organize and disseminate information. It has opened many opportunities for the libraries to extend the services and the modes of delivering the information to the intended users beyond the four walls and delivering library services 24 hours and 365 days and allow users to access information from anywhere. A comprehensive resourceful library website to provide access to the following:

(i) General information of library resources, services and facilities;
(ii) Access to subscribed online databases;
(iii) Link to other open-source databases and institutional repositories;
(iv) Access to subscribed e-books and e-journals;
(v) Library services and facilities;
(vi) Online messaging service;
(vii) OPAC/ Web OPAC;
(viii) Remote access of web resources;
(ix) Provide general information about the library;
(x) New arrival of books and library timings;
(xi) Link to Open-access resources;
(xii) Search box;
(xii) Library 2.0 resources;
(xiii) Social networking site link;
(xiv) Contact information.

Library websites have brought revolutionary changes for developing modern library and information systems throughout the world (Houghton, 2000). So the medical libraries in Bangladesh should have developed a library website that is an integral part of the library infrastructure considering the factors like publisher's online platform, consortia-based subscription models, access to online resources, web-based library services, ever-decreasing cost of technologies, and the dwindling budgets of libraries. The core information of the medical library website are listed in Table 7.3. A proposed model plan for designing a medical library is also explored in Figure 7.13.

Table 7.3: Proposed library website contents of medical libraries

General Information	Library Resources	Library Services	Library 2.0 Features	Other Content Related Features
About library	Search for articles, books, journals, databases and more	Commons Computer Lab	RSS news feeds	Book recommendations
Contact Us		Study & Meeting Spaces	Blogs	My Library
Opening hours		Writing Assistance	Social networking sites (Facebook, MySpace, Orkut, Twitter, Flickr, etc.)	Log in to view My Library profile
Staff directory	Exam papers	Research Data Services		Privacy statement
News & events	Digitized collections	Ordering Articles/ILL		Library promotional materials
Policies and procedure	Link to e-journals	Online instructional tutorials	Podcasts /vodcasts	Information services for faculty and students
Mission statement	Link to online databases	· Citation style guides and tools	Social book marking and tagging	
FAQs	Online subject guides	· Evaluating web resources and websites	Library wiki	Book reviews and other web resources
Comment & feedback	Online Catalog (OPACs)	· Information literacy	Tools for Researchers	Subject specialists
Annual reports	Web OPAC	· Plagiarism information	DOI Registry	Remote access information
Floor map	OPACs (Intranet)	· Web search guides/tips	Data Management	Information for disabled users
Newsletter	Link to other library OPACs	· Reference Management Software	ORCID ID	Job opportunities
Visitor information	Special collections/Unique information	New arrivals list	Research Metrics	Contact
Others (history, library committee, photo gallery, etc.)	Link to e-books	Ask a librarian	Alerting Services	
	Link to local information	Photocopy Request	Bibliographic Software	
	Link to Institutional Repository	Laptop Request	Research Data Management	
		My account	Research Sprints	
		Journal Search		
		Borrow Materials		
		Borrow Materials		
		Textbooks on Reserve		
		Interlibrary Loan		
		Sooner Xpress		
		Reserves		
		Purchase Request Form		
		Technology Lending		

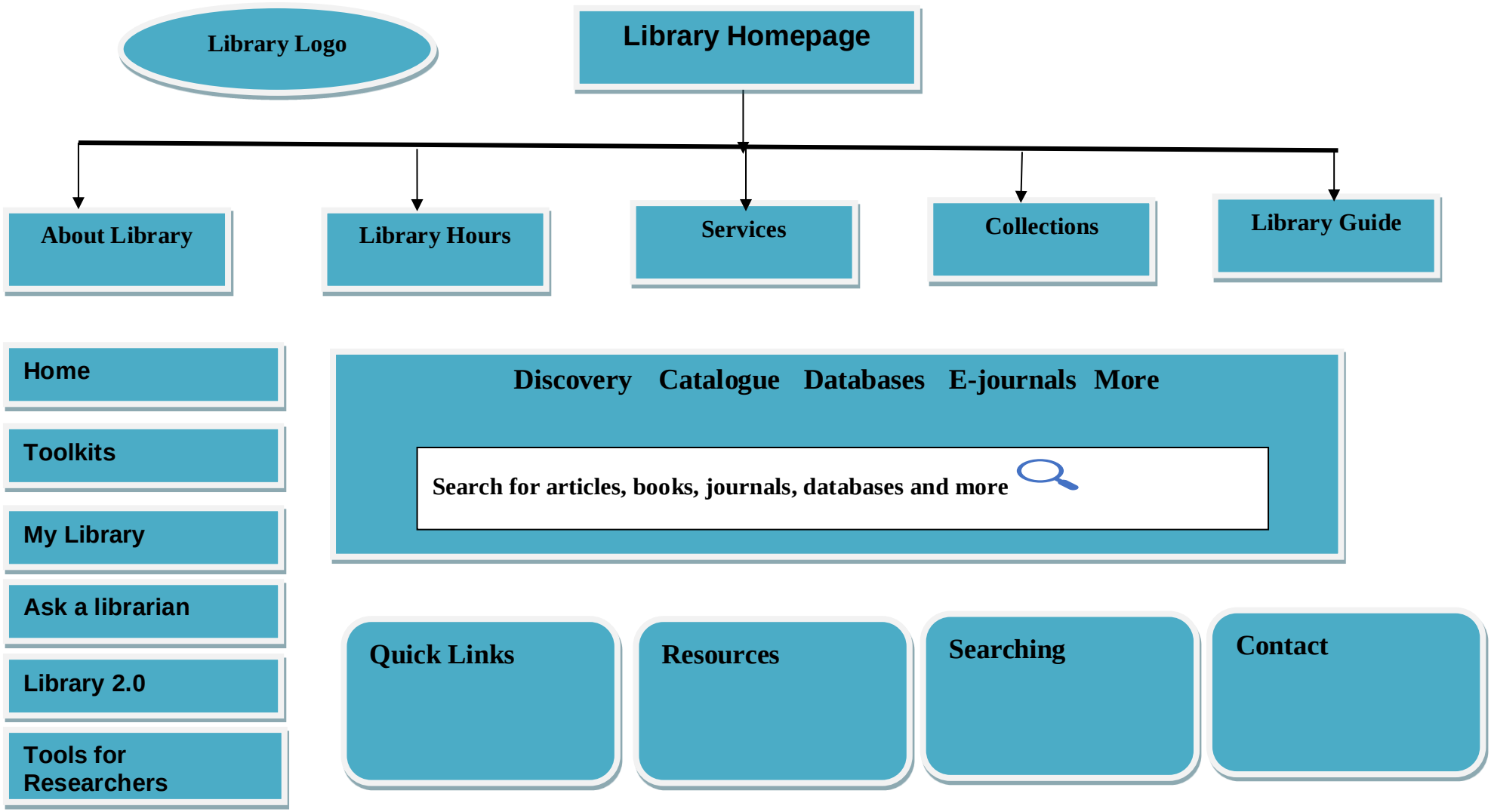


Figure 7.13: Proposed library website of medical library

CHAPTER 8

FINDINGS, RECOMMENDATIONS, AND CONCLUSION

Chapter 8

Findings, Recommendations and Conclusion

The proliferation of modern ICT tools and technologies (such as Internet, WWW, Digital Library System, Library 2.0, Library Networking, Knowledge Management System, Big Data, Institutional Repository, Web-Based Library Services, E-resources, Integrated Library System, e-Consortium, Digitization, RFID System, Smart Library, Cloud Computing, and Artificial Intelligence) are playing a significant role for medical libraries to explore ways of enhancing advanced library activities and services. Over time, the role of medical librarians has been changed considerably from traditional librarians to serving as medical informationists, expert searchers, bibliometric analysts, research analysts, collaborators in the research process, liaisons, and embedded librarians working on clinical care and health research. It is a recognized fact that current medical information is very much required for clinicians and medical students. The medical libraries of Bangladesh will, therefore have to play an increasingly important role in order to meet the diversified information needs of healthcare specialists. Modem information technologies like Integrated Library Systems, Knowledge Management Systems, and Digital Library Systems must be introduced in their operations without any delay for speedy and better services to the users.

The majority of the investigated medical libraries have already perceived themselves to be hybrid in nature, which actually is a good indicator of standard health information systems and services. At present, the medical libraries doing small-scale modern library systems mainly subscribing/registering to Research4Life particularly for free access to e-journals and e-books, developing an Integrated Library System with free and open-source software, and becoming a member of library consortium. It will take more time for planning sound health information systems and services, as it involves a huge budget, skilled professional staff, and many technical and non-technical aspects such as the acquisition of modern ICT tools, and software, the setting up of a proper library networking system, and finally the creation of strong ICT infrastructure. Medical libraries in the country should establish a sustainable information communication infrastructure for keeping in touch with global information flow and to enhance their library systems in line with the developed countries' medical library systems though it requires a sufficient library budget and strong ICT infrastructure.

The core objective of the study is to identify the existing status of health information systems and services in the selected medical libraries of Bangladesh including infrastructural facilities, ICT facilities, and services, and to make a model plan which will be compatible with the need of the users of the medical libraries of Bangladesh. As it is evident from the foregoing chapters, medical libraries of Bangladesh have been suffering from adequate budget and limited administrative support from the supreme management of the respective organization. Major findings from the heads of surveyed libraries and library users have done under this study have been furnished in Chapter 6. This chapter (Chapter 8) aims to furnish the important findings of the questionnaire survey. The key challenges and recommendations for the medical libraries of Bangladesh have also been explored based on the data analysis and findings; also, a model plan for a medical library has been schemed out for the future action plan of the medical libraries in Chapter 7 in which 10 core improvement areas have been outlined in details, in addition, limitations of the study and a guideline for further study to the future researchers are also discussed.

In this chapter the summary of the findings is being presented in the following styles:

(A) Summary of the Findings (Library Heads)

(B) Summary of the Findings (Library Users)

(A) Summary of the Findings (Library Heads)

This study is an empirical study entitled, " Health Information Systems and Services in the Medical Libraries of Bangladesh: Problems and Prospects" which was conducted based on the questionnaire responses from 20 library heads and 412 library users. It is worth mentioning that, 22 medical libraries were included in the preliminary survey on scrutinizing relevant data, and keeping the ability of the library to contribute information substantially to meet the survey objectives, finally, 20 medical libraries are selected for inclusion in the data analysis since 2 medical libraries namely Rajshahi Medical University Library and Chittagong Medical University Library have recently been established and library activities have not started yet. To fulfill the objectives of the study, it was important to unmask the present status of medical libraries of Bangladesh with special emphasis given to the status of the library system in their library operations along with their growth, collection, workforce, budget, ICT status, Library resources, Library problems, etc.

The key findings of the study are furnished below based on librarians' perspectives:

1. In regard to the nature of organization/institution, the study unfolds that, a majority of 9 (45%) organizations, out of 20 medical organizations fall under the 'Private' type and 20% (4) organizations are exclusive Autonomous organizations followed by 25% (5) are under "Public" and only 2(10%) are treated as International organizations i.e. icddr,b and WHO, Bangladesh.
2. It is observed that DMC is the oldest public medical college in the country established in 1946 and Anwar Khan and Green Life are the newest private medical colleges that are established 11-12 years back. icddr,b and BCPS have also been established many years back i.e. 1962 and 1972 accordingly. In relation to website availability, 95% of surveyed medical organizations have their own institutional websites apart from NHLDC.
3. In relation to library space and seating capacity, the study reveals that BSMMUL has the largest space i.e., 228,00 square feet for 750 users, and WHO Bangladesh Library has the smallest space i.e., 1200 square feet. Bangladesh University of Health Sciences Library and Evercare Hospital Dhaka's Library each have a total of 50 seats for users and only 20 seats are available in WHO Bangladesh Library.
4. In regard to the existence of their own library buildings, it is found that 80% of libraries covered in the study have their own library buildings that reflect a good infrastructure sign for developing modern library systems and services.
5. In relation to library user types, "Doctor' is the most common category of users found in 95% of surveyed libraries.
6. The study reveals that BSMMU library has the highest number of users belonging to 1000 per day whereas EHDL has the lowest number of users i.e., 10 per day.
7. The very existence of the service of a library depends upon users who are one of the key components of a library. The strength of the users is a good indicator for medical libraries as the users accelerate the usage of library resources and ultimately the whole organization is being benefitted. The survey shows that almost 95% of libraries out of 20 medical libraries mention the strength of their registered user population. With respect to library membership status, the study explores that BCPS Library has the highest number of library members i.e., 3400.
8. Regarding staff strength, the study unfolds that, the total library manpower of 20 medical libraries is 126 (an average of 6). It is found that the position "Librarian" is available in the major 45% of libraries, but 4 libraries (20%) namely BSMMU, NIPSOM, WHO,B and ShSMC have no professional full-time librarians. BSMMU library has the biggest number of personnel i.e. 29 persons with 4 IT experience

whereas EHDL and WHO,BL each has the lowest number of personnel i.e. 1 person in the library, which is not a good sign for library development. All the surveyed libraries have more or less a number of professional staff apart from ShSMCL, WHO,BL and NIPSOML; and the BSMMU Library has the highest number i.e. 11 of professional staff.

9. With respect to the availability of the Library Advisory Committee, it is observed that 75% of libraries have a "Library Advisory Committee".
10. In relation to sufficient space availability, the overall adequacy of library space is appreciable, as reflected in Figure 5.10. it is found that 75% of libraries have adequate space for library operations and services. Moreover, 25 percent of the libraries have faced much inadequacy of space.
11. Regarding the status of library divisions and sections, it is found that, SMCL, BMCL, AFMCL, GLMCL, ISMCL, EHDL, WHO,BL, NIPSOML and BICHL have no acquisition division; SMCL, EHDL, WHO,BL and NIPSOM have no separate circulation unit. At present, IT departments with a server room are mandatory for those who are intended to modernize their libraries. It is also observed that none of the surveyed libraries have a separate IT division in the library and 95% of libraries have a 'Textbook Section' and 85% have a 'Circulation Section'.
12. In relation to sources of library acquisition, "Purchase" source is followed in all of the surveyed libraries followed by "Donation" and 'Internal Publication" accounts for 80% and 85% of libraries accordingly.
13. In regard to the maintenance of the Accession Register, 95% of sample libraries maintain the Accession Register apart from WHO, B Library. It is also documented that, most of the libraries i.e., 65% have a manual register and 30% of libraries have both manual and computerized accessioning systems. So, the data indicates that medical libraries have been shifting their activities from traditional to the computerized system.
14. In regard to the processing of library materials, four libraries (20%) namely DMCL, ShSMCL, GLMCL and WHO,BL are not following any classification scheme and the National Library of Medicine (NLM) scheme is widely used in the major 50% investigated libraries. icddr,b Library and BUHS Library are using both LC (Library of Congress) and NLM schemes for processing library materials. AACR-2 (Anglo-American Cataloguing Rules-2) code is dominating in the 40% of surveyed libraries for cataloging library materials. icddr,b Library, and BUHS Library are using both AACR-2 and MARC 21 for processing library materials, and the 9 libraries (45%) namely DMCL, ShSMCL, AFMCL, BMCL, ISMCL, EHDL, GLMCL, NIPSOML and WHO,BL are not following any classification schemes that reflected a very poor

performance in respect to cataloging Codes. But not a single library follows the Resource Description and Access (RDA) for cataloging purposes though it is the most popular code in the health libraries of the developed world.

15. OPAC is an outreach bibliographic record service, where LAN (Local Area Network), MAN (Metropolitan Area Network), or WAN (Wide Area Network) are available. Only 2 (10%) out of 20 medical libraries have OPAC facilities, followed by 1 (5%) where the work is going on, 10 (50%) have a plan for OPAC, and 7 (35%) do not have a plan. Though it is a disappointing figure, but a large number of medical libraries have a plan for developing OPAC/Web OPAC in near future. It is worth mentioning here that only the icddr,b library credits for Web OPAC.
16. In relation to library access system, the study reveals that 55% of the libraries have an open access system, whereas 20% of libraries have a closed access system, and 25% of libraries have both systems.
17. Library marketing mechanisms like display boards, web portals, automatic e-mail alerts, telephone, social networking, library website, annual report, and mailing group are widely used for marketing library products. It is found that 58.3% of studied libraries have reached their information products to the users through display boards followed by 33.3% of libraries applying library website.
18. In regard to the collection (print resources) of the medical libraries, the study revealed that 11 (55%) out of 20 major medical libraries, possess a collection between 1-10000 volumes and ranked highest; followed by 4 (20%) are having between 10001-20000 volumes; 1 (5%) medical library falls in the range of 20001-30000 volumes; 4 (20%) medical libraries are having 30001-40000 volumes. BSMMU library has the total largest print collection i.e. 39621 followed by icddrb,L and DMCL accounting for 38175 and 36750 respectively than other libraries. All the surveyed libraries have combinedly a total of 222016 books collection and then bound journals accounting for 46057.
19. In the present online arena, e-resources have become important sources of online information within the medical health domain. It is explored that, all the surveyed libraries apart from 3 libraries namely Shaheed Suhrawardy Medical College Library, Ibn Sina Medical College Library and Evercare Hospital Dhaka's Library are subscribing/registering to various e-resources and online databases and they are building up e-book/e-journal collections in their digital resource bases through Research4Life platform (Hinari, AGORA, OARE, ARDI, GOALI) as well as various open-access databases. The study also reveals that only icddr, b and BCPS libraries are subscribing to Wiley Online Books. The major subscribed e-books databases like Springer E-Books, EBSCO e-Books, SAGE e-Books, ProQuest Ebrary are not

subscribed by any of the studied libraries. So, we may conclude that the surveyed libraries are heavily dependent on the Research4Life portal for accessing online databases like Scopus, CINAHL, Embase, Dimensions, Clinical Key, Global Index Medicus, Cochrane Library, etc. and also for accessing with free or low-cost online access to up 132,000 leading e-journals and e-books in the fields of health, agriculture, environment, applied sciences and legal information since 2004. icddr,b library is in an advanced position in relation to the accessible online resources since various valuable online databases like Web of Science, Scopus, Dimensions, Lens, CINAHL, UlrichWeb, Cambridge, Oxford, JSTOR, ASM Journals, GIDEON, National Geographic Virtual Library, Indian Journals, EBSCO Discovery Library Search, Springer e-journals, Cochrane Library etc. icddr,b and BCPS libraries have access to the highest number of e-resources stands for 178631 and 177187 accordingly. The surveyed libraries have more access to e-books compared to e-journals through the Research4Life program and individual subscribed/registered sources.

20. As mentioned earlier, Hinari is the most vital, resourceful and valuable e-resources platform in health sciences for developing countries like Bangladesh with zero/no-cost access up to 21,000 e-journals, up to 69,000 e-books, up to 115 other information resources, So Hinari has a significant impact for popularizing the usage of medical e-resources in all the surveyed libraries and it is found that 85% investigated libraries are the registered members of Hinari.
21. Access to online databases and e-journals are extremely indispensable, both for the researchers and clinicians, as they not only save time but also remove geographical constraints in locating the learning resources, besides providing wider access to hyperlinked digital contents covered in a wide spectrum of subjects in varied forms. In this regard, an attempt has been made in this study to find out the availability of various e- resources. The present study, however, reveals that Hinari, AGORA, OARE, ARDI, and GOALI are dominating online databases in all surveyed libraries apart from Shaheed Suhrawardy Medical College Library, Ibn Sina Medical College Library, and Evercare Hospital Dhaka's Library. It is also observed that the studied libraries apart from icddr,b library are showing poor performance in respect to subscribing the databases like Emerald, Springer e-Books, JSTOR, SAGE e-journals, Wiley e-journals, EBSCO e-Books, SAGE e-Books, ProQuest ebrary, Scival, Web of Science, UpToDate, Cambridge, Oxford and so on. Library consortium is also vital for medical libraries in Bangladesh for accessing subscribed online databases but the majority i.e. 90% of libraries are not the members of two available consortia in Bangladesh namely UGC Digital Library and Library Consortium of Bangladesh.

22. Textbooks, reference books, local journals, foreign journals, theses, and online resources are the key information sources available in the medical libraries. It is explored that, 'Text books' has the highest mean value of 4.90 and the Standard Deviation belongs to .308 comprising rank 1 as the most preferred information source followed by 'Reference books' and 'General books' with a mean value of 4.10 and 3.65 and their SD is 1.021 and 1.226 belong to rank 2 and 3 accordingly and 90% users said that they use textbook almost always.
23. Regarding the provision of library services, the study reveals that Circulation Service, Current Awareness Service, Referral Service, Indexing and Abstracting Services, Bibliographical Service, Online database searching, Reference service, E-alert services, Online literature searching, Translation service, CD-ROM Searching, Selective Dissemination of Information (SDI), Photocopying and printing services, Internet browsing are the most common library services in the sample libraries. Reading room service and circulation services are available in 100% of libraries followed by 80% of libraries offering Internet services.
24. In regard to the provision of web-based library services, the study depicted that 100% of sample libraries have been able to provide WiFi and Internet Services in their libraries; others cover 15% each for Online e-Journal Service, Online Database Service, and Online E-Book Service. It is also found that other web-based library services like OPAC, Web OPAC, Online renewal service, Institutional Repository (IR)/Digital Repository (DR) service, Online SDI service, Online reservation, Library Services through Social Networking Sites, Electronic Document Delivery service, Mobile-based services, Remote access service, RFID-based services, etc. are not provided on a significant level since only 5-10% libraries are capable to do these. However, the medical libraries need to pay more attention to providing all the stated web-based services which are highly essential for clinicians and scientists.
25. Regarding the usage of reference management and plagiarism detection software, it is found that only 5% of the library is using EndNote software followed by 20% libraries for Zotero and the rest 80% of libraries are not aware of referencing software. Only one (5%) library is currently using iThenticate for detecting plagiarism and 95% of libraries do not use any sort of plagiarism software.
26. With respect to ICT and automation facilities, the study depicts that, 80% of surveyed libraries have some sort of ICT facilities. BSMMU Library, Anwar Khan Medical College Library and icddr,b Library have been found to be automated libraries, whereas BUHS, BCPS, BIRDEM, and NHLDC libraries are semi-automated. The rest 65% of libraries are manually operated. It indicates that automation of medical libraries has been started on a limited scale in Bangladesh recently. Koha and SLiMs

software are widely used in the medical libraries of Bangladesh. Among the sampled libraries that have automation facilities, 100% (n=7) libraries have been performing 'Circulation' functions with the automated system, 60% for Processing, 60% for 'Serial control' functions, and 40% for 'Acquisition' functions (Multiple Responses allowed).

27. The result comes from the data analysis, it is observed that networking and resource sharing activities are unavailable in the medical libraries at present. The result also shows that all the investigated medical libraries are agreed to organize a networking and resource sharing system.
28. The Internet has become an indispensable resource for university libraries worldwide to enhance collections and improve services and operations. Fortunately, the figure of Internet connectivity in the medical libraries in Bangladesh is quite satisfactory. found that BSMMU has the largest number of Internet-connected computers i.e., 80 but Holy Family Red Crescent Medical College Library has not had any net-connected PCs. 65% of surveyed libraries don't charge for using the Internet and almost 75% of studied libraries have both Broadband and WiFi types of Internet connections. 55% of surveyed libraries have library webpages linked to individual institutions' homepages and 5% of library's web pages are not functional while conducting the survey. In regard to Intranet, only 10% of libraries belong to this credit for accessing e-resources.
29. In regard to the provision of ICT equipment and modern technology, a total of 242 computers are available in surveyed libraries. Server counts of only 13, followed by Scanners, Photocopiers, and Routers belong to 21.20 and 23 accordingly. BSMMU, icddr,b, and NHLDC libraries are in an advanced position in terms of ICT equipment. A very poor trend has been observed in the availability of own digitally created resources (Books/book chapters, journal articles, Photographs, Maps, Thesis/ Dissertations, Audio-visual, Newspapers, Reports/Protocols, Government's publications in which the icddr, b library is in the top position for the creation of digitized collections i.e., 8741 followed by BCPS and NHLDC have digitized theses of 5000 and 200 respectively.
30. The study depicts that, DSpace is used as a digital library/IR software in almost 30% of libraries that are currently involved with some sort of digitized or Institutional Repository activities, and 20% of libraries have not decided yet about digital library software and no digital software is available in 50% libraries.
31. Institutional Repository (IR) plays a crucial role not only in information preservation and retrieval of scholarly outputs of an organization but also provides online global access to the researchers to a great deal. Even though the utility of IR is considered

more exigent, surprisingly the study revealed that the present scenario of developing IR in surveyed libraries is quite disappointing. Out of 20 respondents, only the icddr, b library is in a well-advanced position for developing IR. icddr,b library has its own Institutional Knowledge Repository (IKR) using DSpace open-source software. Since 2005, icddr,b maintains this Institutional Knowledge Repository (IKR) and so far a total 10098 documents have been uploaded.

32. An exclusive and rich budget is not only crucial but highly essential, particularly for the successful application of modern ICT-based library activities and services. The study revealed that, due to unavailability of information, in place of the actual monetary allocation details, this study has only covered the total amount of budget for purchasing books, periodicals, and e-resources for the financial year 2019-2020. It is found that Shaheed Suhrawardy Medical College Library is allocated the highest budget among all libraries for purchasing books, periodicals and e-resources for the financial year 2019-2020 i.e. 80 lac taka followed by BSMMU and icddr,b Library that stands for 75 lac and 68 lac respectively.
33. Another important objective of this investigation is to unfold the impact of ICT in medical libraries of Bangladesh. A total of 18 ICT impacts have been marked and traced that the impact i.e.'Creates the awareness about library' has the highest mean value of 4.90 and the Standard Deviation belongs to .308 comprising Rank 1. The impacts titled 'Increases job satisfaction of Library staff' and 'ICT improves easy access to online library resources' with the equal mean value of 4.75 and their SD is .444 belong to rank 2 jointly and 'Improves the quality of library services' placed the 3rd position.
34. Training and education in Information Communication Technology (ICT) is fundamental in helping the library staff to become knowledgeable about the modern health library systems and services. Hence the staff should get proper training in ICT. This study reveals that the majority of the staff members don't have expertise in modern library systems like Online medical databases, Licensing, Electronic Resource Management (ERM), Web page design, ILS management, Communication with Vendors/publishers/aggregators, Installation and customization of software, System Administration & Maintenance, Maintenance of Library Website and Development of Institutional Repository (IR).
35. The study depicts that, 85% of surveyed libraries have a plan for overall modernization of library services in the future. The study reveals that the indicators i.e. "Educate the users on online information literacy", "Developing Institutional Repository", and "Digitization of unique materials in the library" combinedly ranked 1st with a mean score of 5.00 and Sum 100. 'Library plans to automate all its

functions' ranked as 2nd with (mean score=4.90) and (standard deviation=.308). Other issues concerning the library plans for better services with a Mean score=>3.00 include: Providing access to Electronic Journals, Provide Electronic Document Delivery / Full-text services, Plan to have Campus-wide Local Area Network, Create & provide access to the library web page.

36. The majority of the library heads expressed a very positive evaluation for the development of the modern health library system. The core recommendations cover Library should follow the standard for its various functions, Use standard software for its automated functions, Develop and implement an integrated library information system, Implement of RFID system, Create a rich learning environment for library users, Provide online OPAC access to library users, Develop Institutional Repository for global access, Develop Digital Library System, Library should have trained manpower for all ICT applications, Enhance the staff skills in modern library tools and technologies, Provide web-based library services, Formation of library networking and resource sharing and Create demand for online access to other databases.
37. With the core challenges that hinder the application of ICT in medical library activities and services, the study shows that Lack of modern library software, Lack of ICT resources to modernize library services, Inadequacy of ICT facilities, Lack of IT staff, Lack of professional staff, Lack of sufficient budget, Lack of ICT infrastructural facilities, Ignorance of the authorities about the library and its services, Lack of government concentration and Lack of training to make staff efficient are the top ten challenges for medical libraries which have a mean value above 4 out of 5.

(B) Summary of the Findings (Users)

The key findings of the study are furnished below based on users' perspectives:

1. A total of 500 questionnaires were distributed amongst the scientists, doctors, students, researchers, and staff members of twenty medical libraries selected for the study. Out of 500 questionnaires distributed, a total of 412 filled questionnaires were received with a response rate of 82.4%.
2. In relation to the sex of the respondents, the study unfolds that 209 (50.7.4%) of the respondents are male and 203 (49.3%) are female.
3. Regarding the age of the respondents, it is found that the majority of the respondents numbering 202 (49%) are in the age group of 26 – 35 years followed by 26.7% in the group of 21-25. A few respondents accounting for 3 (.7%) are in the age group of 56-65 years. The table clearly shows that users in the age group between 26-35 are the highest.

4. It is observed from the study that the majority of the respondents numbering 185 (44.9%) are Doctors, whereas 125 respondents representing 30.3 percent are Students and the Researcher represents 40 (9.7%).
5. With the academic qualification of the respondents, it is found that the maximum number of respondents are from the 'MBBS' group i.e., 224 (54.40%) followed by the group 'Others' numbering 37 (9%).
6. It is found that the majority of the users visit the library daily for the reasons like Reading subject books (36%), Improving subject knowledge (32%), Reading general books (30%), Consult reference books (8%), Reading journals/periodicals (12%), Consult research materials (8%), Write a research paper for publication (25%), and Keep abreast with latest developments (18%).
7. The study demonstrates that a majority of the respondents 32.80% spent time in the library for less than one hour followed by 27.20%% for more than three hours.
8. The study reveals that E-books / E-journals/E-Theses as 'Extremely Important' preferred information source that satisfies the users largely and Medical Library Websites ranked 1st and 2nd with a mean score of 4.24 and 4.05 and standard deviation of 1.144 and .926 respectively. Printed journals stand in the third position with a mean score of 4.04 and a standard deviation of .982. We also found from Figure 5.59 that 60% of users ranked E-books / E-journals/E-Theses as 'Extremely Important" followed by Printed journals for 37.6%.
9. In relation to extent of satisfaction with library resources, it is noted that only 27 respondents (6.6%) expressed an 'Excellent' ranking.
10. In regard to extent of library services, it is marked that 'Book Circulation Service' with the highest mean value (2.74) was ranked the first which is followed by 'Reading Room Service" with a mean value of 2.73 ranked second.
11. The largest portion of respondents (164, 40%) evaluates the library services as 'Fair' whereas only 37 respondents (9%) expressed as 'Excellent'.
12. It is observed that 85.9% of users strongly agree with the statement ICT enabled library facilities are essential for medical libraries.
13. It is explored that, 367(89%) users out of 412 library users use the web-based/e-resources.
14. It has been observed that the majority of respondents use e-journals (82.3%), web resources (73.3%%), E-books (72.8%), Institutional Repository (39.5%), and E-thesis (58.3%) where Multiple Responses allowed (n=367).
15. It has been observed from the study that, the sample libraries are offering ICT-based services on a very limited scale. Modern library services are not available in the majority of the surveyed libraries apart from some basic services like Internet and

WiFi services. It has been documented from Table 5.56 that 98.3% of users are aware of Internet service and 95.9% are for WiFi service where multiple responses were permitted. So, the medical libraries should give more emphasis on ICT – enabled library services to the users.

16. Google Scholar is the most dominating database that is used by 81.4% of users followed by PubMed by 78.8% and Hinari e-journals by 64.2% where multiple responses were permitted.
17. It is explored that out of a total of 412 responses, almost all counting 99.8% prefer Google as the preferred search engine to a great extent. 57% and 20% of respondents state as 'Yahoo' and 'AOL' respectively where multiple responses are allowed in which the researcher counts "Percent of cases" as the base value.
18. It has been observed from the study with respect to constraints for accessing web resources, the problem 'Inconvenient working hours of library' with the highest mean value (3.64) was ranked as the 1st which is followed by 'Lack of knowledge of online sources" with a mean value of 3.57 ranked second. There are also other problems like Retrieval of irrelevant information, Poor database searching skills, No training on the use of library resources, Absence of modern technologies in the library, Lack of Knowledge of online information sources, Low bandwidth, High cost of access, Information overload and No Internet access.
19. Finally, the study unfolds some of the key suggestions that are extremely important for the development of medical libraries in Bangladesh from users' point of view where all the major respondents strongly agree like Online access to more e-resources for library users, Library networking, and resource sharing system should be established, Library should develop Institutional Repository (IR), All modern technological facilities should be installed in the library, ICT Skills and competencies of library personnel need improvement, Library must be automated immediately, Library should have own library website, Professional and qualified library staff should be appointed and Library budget needs to be increased to improve library facilities.

Challenges Facing the Medical Libraries: Bangladesh Scenario

For socio-economic development, and to uphold the country's dignity in world society it is essential to develop reliable and up-to-date information systems for the medical libraries of Bangladesh. Considering the socio-economic conditions of Bangladesh, it is not easy to build up simultaneous information systems because, like many developing countries, medical libraries have fewer ICT resources, little telecommunication facilities, limited budget, poor logistic support, and unavailability

of trained personnel for technology-based information systems. Some of the major constraints hindering modern health library development efforts in medical libraries of Bangladesh are outlined below:

1. **Budget constraints:** Modern library system requires a sufficient budget for procuring physical infrastructure, subscribing e-resources, implementation, licensing, training, costs for the integrated library system, and support for the technical infrastructure. The sustainability of the medical library is difficult unless organizations have good budgetary support. Most of the investigated libraries are facing the problem of the shrinking library budget. Due to a lack of sufficient funds, notable ICT-based development projects are absent in sampled libraries where the source of funding comes from the government and concerned organization authorities. Due to this shortage of sufficient funds, libraries are still unable to take necessary initiatives for modern library systems and services. Libraries need to plan and pursue sufficient budget allocation from the parent organization. There is no easy solution to recover budget limitations. The libraries need to create awareness among the respective highest authorities and make them understand the intangible value of the library and recognize its contributions to value creation. Dynamic leadership is required to influence the top management to stop budget cuts.
2. **Poor ICT Infrastructure:** Modern library system demands strong ICT infrastructure such as:
    - Integrated Library System, Library RFID System, Knowledge Management Systems, and Digital Library System
    - Library Website, Servers, Structured LAN, Online Resources;
    - Modern library PCs both for library staff and users;
    - Internet connectivity with sufficient bandwidth;
    - Standard library software
    - Institutional Repository System

    A very poor trend with respect to ICT-related library systems and services has been observed in the studied medical libraries. It is observed that the ICT infrastructure in most of the medical libraries is not up to the desired level to run advanced ICT-based library services to a great extent. These barriers include the unavailability of the library website, the absence of an Integrated Library System, low bandwidth, low configured PCs, skilled IT knowledgeable staff, inadequate number of PCs, and limited online resources.
3. **Lack of Library Automation**: Full-fledged library automation facilities are not available in the major investigated libraries and most of the libraries are in the initial stages of the automation activities. Commercial software is not used for automation

purposes. Koha is the open sources software that is also not properly used in medical libraries to create automation. Dspace and Green Stone Digital library software are also not widely used to develop IR. Library activities like Acquisition, classification, cataloguing, circulation, serial control, access right to staff members, access right to library users, preparing library reports, information retrieval, online public access catalogue, and searching library database are also not successfully implemented with the automation in the major medical libraries.

4. **Skilled Manpower:** Skilled manpower is one of the prerequisites for the successful implementation of an ICT-based health information system. Modern library systems and services require advanced competencies and skills such as Library automation, development of IR, Online procurement and use of e-books and e-journals, maintaining bibliographical and full-text databases, searching and retrieval, web design, hosting, etc. The medical library professionals are also expected to be firmly grounded in ICT-related competencies such as core hardware and software skills, web design, online health databases skills, systematic review skills, e-resource management, metadata management, reference management, and so on. Unfortunately, good IT knowledge regarding modern library systems and services among the medical librarians is not at a standard level apart from some of the studied libraries in Bangladesh. So, enhancing the skills of medical librarians on the latest trends and developments in medical librarianship is one of the key challenges.
5. **Lack of Professional Librarian:** Absence of a skilled professional librarian, no library can run smoothly. In this regard, the chief librarian should be well qualified, professionally trained, experienced, and should be well skilled and professional. At present, three investigated medical libraries have professional librarians, the heads (In-charge) of these libraries come from different educational backgrounds. In the absence of a qualified chief librarian, the medical libraries cannot perform their daily duties efficiently and effectively.
6. **Lack of Sufficient Professional Library Personnel:** To introduce diversity and to provide better library services to the users, a medical library must need to have skilled and professional personnel. Basic functions and services of the investigated medical libraries are hindered because of the lack of sufficient trained manpower.
7. **Inadequate ICT Resources:** At present, a lot of online databases, e-resources, and ICT-based library resources are available due to the rapid and tremendous development of science and technology. But the major investigated medical libraries cannot able to collect these modern library materials due to the shortage of budget.
8. **Absence of Classification and Cataloguing Unit:** Classification and cataloguing are the most important processing units. But these units are not so developed and

even not available in some of the investigated medical libraries and they also are not following any standard classification scheme and cataloging code for processing library materials.

9. **Absence of Networking and Resource Sharing:** The absence of networking and resource sharing is the main reason for the poor status of the medical libraries in Bangladesh. It is a great regret that, no attempt has been made so far for adapting networking and resource systems among the medical libraries in Bangladesh.
10. **Standardization Problem**: All the investigated medical libraries do not follow any standard for library automation and IR development. Every library carries out its work in its way.
11. **Non-Professional Staff**: There are a large number of non-professional staff members in the surveyed libraries, who do not have any professional qualifications, experiences, and knowledge of IT. Non-professional staff is not able to perform library functions smoothly, which ultimately creates a problem for the overall development of medical libraries.
12. **Lack Of Online Resources:** It is found that the studied medical libraries can't afford to subscribe to online databases, e-books, and e-journals for wider coverage of online resources. Mainly they are dependent on free/registered sources for accessing online resources.

Recommendations

The study offers some suggestions to enhance the effectiveness of library resources and services and to promote the use of information resources of medical libraries to carry out library activities and services efficiently. The following constructive suggestions are submitted for the planners, administrators, library managers, and policymakers of Bangladesh to take necessary measures to bring necessary improvement to the existing library services. Based on the existing conditions of the medical libraries in Bangladesh, the following recommendations could be suggested for establishing dynamic and smooth medical library systems and services:

1. **Establishment of Model Plan:** The core improvement areas as proposed in the model plan should be established for enhancing library activities in the medical libraries of Bangladesh. ICT resources like software, hardware, effective professional development, networking facility, and financial support for the successful implementation of the proposed model plan should be taken into consideration. If it is not possible to develop the model plan at a time, then it should be implemented phase by phase depending on the demand of the respective library.

2. **Proper Funds Allocation:** The allocation of funds for the library should be increased. The Govt. of Bangladesh and higher authorities of the private/ specialized medical colleges/ institutions should provide the necessary financial support to organize, maintain and develop modern library systems and services. Library authority should allocate necessary funds to procure computers and other ICT-based equipment, online databases, Library website, IR development, Library Integrated System, online resources, print resources, and for taking membership of library consortium. There should also be sufficient budget provision for IT purchase, database creation and maintenance, training and development, recruitment of skilled manpower, and so on.

3. **Implementation of ILS:** The medical libraries should consider carrying out Integrated Library Systems (ILS) in automating library operations which are treated as the first step for introducing modern library systems and services. Most commercial library software packages could be quite expensive for an individual library to purchase. There are also several open-source software packages available for library automation and the development of IR. In this regard, Koha and DSpace might be the best option for the medical libraries of Bangladesh.

4. **Strong ICT Infrastructure:** Strong ICT infrastructure is the precondition for setting up a standard medical library system. Modern medical libraries are highly dependent on modern ICT tools and networking technologies. They demand cutting-edge IT and communication infrastructure such as powerful servers; high configured PCs, networking devices, scanners, printers, photocopiers, modern and latest library software like Koha, DSpace, and GreenStone; structured LAN with broadband Intranet facilities, RFID components, separate IT section; library website; required number of workstations capable of providing online information services, high configured audio-visual equipment and internet connectivity with sufficient bandwidth. So, adequate ICT infrastructure should be ensured in the medical libraries of Bangladesh.

5. **Member of Library Consortium:** Due to the financial crunch and the rising costs of journals, many academic/ research/scientific libraries cannot subscribe to all the required journals and databases. Libraries formed consortia to overcome the problem and share the resources. Sharing electronic resources have become the necessity of individual libraries due to their decreasing excellence, further, it is suggested to

establish and development of network and networking systems like BdREN, LiCOB, and University Digital Library (UDL) Consortium. Medical college Libraries have to join the said consortia for accessing more e-books and e-journals.

6. **Electronic Collection Development:** Most of the medical college libraries under study are very much poor in their subscribed collection of electronic information sources. The study recommends the development of a rich collection of online databases. In the collection, there should be bibliographic and full-text databases and e-journals/e-books as suggested by the medical community in these colleges. The core online health databases may be subscribed to by the libraries. The medical college librarians should find out the most suitable and qualitative online resources based on users' demands.

7. **Medical Online Databases:** Medical Online Databases play a very significant role for healthcare professionals to keep abreast with the latest development of modern health sciences areas. The core subscribed online medical databases like MEDLINE Complete, ClinicalKey, OVID Databases, Embase, Wiley Online Libray, Cochrane Library, CINAHL Complete, Web of Science, iThenticate, EndNote, SpringerNature, GIDEON, ScienceDirect, Scopus, UpToDate, etc. should be subscribed for accessing and management of health information.

8. **Medical e-journals and e-books platform:** Medical libraries should have also access to subscribed e-journals and e-books platforms like AccessAnesthesiology, AccessBiomedical Science, AccessCardiology, AccessEmergency Medicine, AccessMedicine, Books@Ovid, Ebscohost eBook Collection for Healthcare, Oxford Medicine Online, ProQuest's Health & Medicine Ebook, Elsevier e-books, Wiley Online Books, Springer e-books, SAGE medical journals, Taylor & Francis e-journals, Elsevier e-journals of health sciences, Wiley e-journals, BMJ journals, Springer e-journals, Oxford and Cambridge e-journals and so on.

9. **Building Institutional Repository (IR):** The libraries of Bangladesh may increase their digital collections/digital information resources through "Institutional Repository" and make it freely available worldwide. The libraries can store all their publications, like annual reports, journals, and other publications in digital form. Like developed countries, Bangladesh embraces the concept of establishing institutional repositories but the tendency for establishing IR is not satisfactory so far. So, it is an urgent need for developing medical libraries in Bangladesh to develop IR with DSpace since it is open-source software and free of cost.

10. **Digitizing Existing Materials:** Digitizing existing materials can be a good idea to build up digital collections /digital information resources/electronic resources among the medical libraries of Bangladesh. Digitization can help in the preservation of original manuscripts and rare resources as well as space problems for preserving resources can be minimized.

11. **Advanced Training Programmes:** The study recommends that the library professionals of medical libraries should undergo innovative training programs on various areas of modern librarianship like Integrated Library System (ILM), digitization, Library management software, E-resource management, Knowledge management, library website design, e-licensing, IR, negotiation with e-publishers, advanced searching of medical databases, citation analysis, reference management, research data analysis, systematic reviews, subscription of e-resources, e-resources usage statistics system such as Counting Online Usage of Networked Electronic Resources (COUNTER), clinical domain such as Electronic Medical Record (ERM) and so on. Professionally skilled human resources are very much required for the stated library training programs.

12. **Develop Hybrid Library:** Considering the financial condition of the medical libraries in Bangladesh, all the libraries covered in this study should develop a hybrid environment, where both print and electronic resources exist side by side. So, it is proposed that the libraries should maintain both e-resources and printed materials.

13. **Introducing Networking and Resource Sharing System:** Networking and resource sharing system is one of the most effective ways of serving the user's needs comprehensively. National and regional information networks should be established among the medical libraries in Bangladesh.

14. **ICT-based Services:** There is a need for the re-orientation of library services in developing countries, especially in Bangladesh. Libraries should become more proactive in the provision of ICT-based services. This can be achieved if adequate provision is made for the development of electronic information resources to guarantee effective globalization of library services through the utilization of Information and Communication Technologies.

15. **Construction of Library Website:** The website of a library is an important and effective library marketing and online resources accessing the tool. Though the major

sample libraries have their library websites, these contain only some basic information about the library. Thus, the study highly recommends that all the medical libraries of Bangladesh should launch their full-fledged library websites immediately as indicated in the model plan.

16. **Attitudes of Higher Authorities:** The higher authorities of the medical libraries in Bangladesh do not provide the full attention to the development of modern library systems and services in most cases. The libraries are also not getting full financial support from the top management. The higher authorities must come forward for providing full financial support and recruiting skilled professional staff in order to successfully run the medical library.

17. **Attitudes of Library Staff:** The attitudes of library staff should also be changed in respect of providing modern library services, upgrading library systems, handling ICT tools, and taking advanced library training on Knowledge Management Systems and Integrated Library Systems.

18. **Creation of Patients Database:** Medical libraries should develop the patients' database for managing Electronic Medical Record (ERM) for preserving a high volume of data based on patient's detailed information, treatment, examinations, laboratory results, and the name of concerned doctors. As a result, the creation of a patient database can provide huge support both for the patients and doctors for getting the patient's information quickly, and ultimately the patients can enjoy quality medical and nursing care. So the medical librarians should cultivate deeper connections with the physicians and hospital staff for managing the ERM of patients. The hospital of a particular organization may be benefitted from its concerned library in transitioning from paper-based systems to electronic ones through the creation of patient databases. For effective health records management practices in Bangladesh, the medical libraries should preserve and organize the patients database in an organized way for tracking a particular patient quickly.

19. **Hospital Library Services for Patients:** The medical libraries should provide a reliable and up-to-date collection of resources of healthcare and education information for patients. The patients should also have access to PCs for viewing movies, checking e-mail, and searching the news. Medical libraries should respond to the information needs of patients based on diseases and drugs. The libraries can organize book reading sessions for patients so that they can spend their leisure time

more effectively. Medical libraries can also provide health literacy services to patients for getting a solid foundation of their treatments and life after treatments.

20. **Library Policies and Strategic Plans:** Libraries should have clear policies and strategic plans for overall library development in different areas and services. Lack of library policy regularly affects library services and produces administrative dualism and conflict in some cases. The head of the library should write and review the library policies and strategic plans annually to identify core improvement areas.

Conclusions

This study emphasized the current state of library systems and services of twenty medical libraries in Bangladesh in terms of library automation, ICT infrastructure, Institutional Repository (IR), Library Website, staff strength, online databases, suggestions for developing a model medical library, and challenges for implementing an ICT based library system. The majority of the medical libraries in the country are lagging behind in adopting ICT in library systems and services due to the poor ICT infrastructure, shortage of professional and skilled library personnel, limited electronic resources, and inadequate budget. Medical library networking in Bangladesh is so much essential for ensuring better library services and free flow of information from one library to another. So, networking and resource sharing among medical libraries in Bangladesh is a must for the proper development of our country. To achieve this objective, the proper implementation of the Bangladesh Medical Library Network (BMLNET) is the prime need at the present time. After the implementation of the proposed network, it can be expected that the medical libraries in our country will enter into a new world in which health information systems and services will be ensured.

The rapid technological changes introduced in the libraries have put new challenges before library professionals and Libraries to keep pace with the technological innovations which require significant efforts and initiatives. Medical libraries must ensure high-quality information to clinicians for an effective decision-making process for better clinical care. Most medical libraries in the country are struggling to set up modern tools and technologies in their libraries. The medical libraries in the country are not capable to purchase foreign printed and online journals and books to the shrinking of the library budget and escalating cost of journals. There is an urgent need for the Govt. of Bangladesh to address the issues being faced by medical libraries and take necessary initiatives to overcome the barriers. It is expected that

the Govt. of Bangladesh with support from higher management of private organizations will pay attention to revitalizing medical libraries and set up a roadmap that will strengthen the medical libraries in Bangladesh for providing specialized information to doctors for improving the overall health education system in Bangladesh.

The study has found that the few medical libraries have sound ICT infrastructure but several medical libraries in the country are still lagging in advanced and sophisticated ICT infrastructure and electronic resources. The quality of medical education and research depends upon the quality of information sources and services provided by the medical libraries. Health is an important sector for the socio-economic development of Bangladesh. It is not possible to develop a standard medical education system in the country without adequate health information supply to clinicians, students, and researchers. It would be difficult for health professionals to have timely access to health information without developing modern health library systems and services. The health environment in Bangladesh in relation to the availability of health information sources is confined to medical libraries, research libraries, and National and International medical databases. So, planning of dependable and modern health library systems and services for Bangladesh is the utmost necessity. The study intends to show how the facilities available in medical college libraries of Bangladesh serve the needs of the medical faculty and students, and also how these libraries can be reorganized for the maximum utilization of information sources and services. Medical education is not imagined in any country of the world without modern health library systems and services. The medical college libraries provide the basic academic and research information needs of the medical users. Medical libraries in the country have a big duty and a significant role to play in shaping new generations while imparting learning and research activities or endeavors.

In a nutshell, the medical libraries in Bangladesh are moving forward toward some sort of modern library system, at different phases and levels. The provision of accessing e-books, e-journals, and e-theses are gaining momentum and the development of websites, Library Consortia, IR, RFID system, and library automation system have a tremendous impact on the medical libraries. A close look at the current status of surveyed libraries in Bangladesh shows several promising advancements as well as gaps. In the race of modern systems and services, icddr,b library is at the top position; others are BSMMU, BIRDEM, and BCPS libraries. The

rest of the surveyed libraries are in the most deplorable condition for managing standard library systems and services. Lack of sufficient funds, lack of infrastructural facilities, skilled LIS professionals, limited access to online databases, and lack of ICT tools and technologies are the major challenges for the medical libraries in Bangladesh. If the foregoing recommendations and the proposed model plan with providing sufficient budget are followed and implemented, the existing condition of medical libraries of Bangladesh will certainly improve and will reach a new height. But it will take more time for medical libraries in Bangladesh to set up full-fledged health information systems and services. The environment of the medical library has currently undergone a drastic change in terms of collections, services, and operations. Medical libraries are essential and useful for improving the quality of health care in Bangladesh. So, we hope that medical libraries in Bangladesh should proactively be engaged themselves in developing modern health information systems and services to meet up the information needs of clinicians, faculties, students, and scientists.

Limitations of the Study

The present study entitled "**Health Information Systems and Services in the Medical Libraries of Bangladesh: Problems and Prospects**" is an attempt to know the present scenario of medical libraries of Bangladesh. The limitations of the study are stated below:

1. It is confined to selected medical libraries in Bangladesh. Broader inclusion of medical libraries may provide more useful information.
2. There are a limited number of studies in terms of health information systems and services in the medical libraries of Bangladesh, and this has led the researcher to rely on literature based on developed countries' medical library systems to build up a background upon which the study has been undertaken.
3. The study is limited to 412 users and 20 libraries might have restricted the scope and coverage of the study.
4. The scarcity of literature based on the Bangladesh medical library health system is one serious limitation of this study.
5. Because of time limits, other types of medical college libraries (e.g. dental college, nursing training institutes, health ministry, health technology institute, Unani and homeopathic college, etc.) are not covered for the study.

6. The cost-benefit analysis and the details technological aspects of the proposed model have also not been taken into consideration due to resource and time constraints.
7. The convenience sampling method is being used in this study and the small size of the sample due to the Corona pandemic represents a limitation of this study.

Areas for Further Research

There is a scope for further research based on different aspects of medical libraries. Therefore, several numbers of research studies have been suggested for future study of medical libraries of Bangladesh are follows:

1. A study of information-seeking strategies and behavior of medical professionals in medical libraries in Bangladesh;
2. Explore the use of Information and Communication Technology (ICT) by medical college libraries;
3. Study on the electronic databases and their impact on the library users of medical college libraries in Bangladesh;
4. Study on the status of consortium and resources sharing activities in Medical College Libraries in Bangladesh;
5. Study on the impact of information communication technology (ICT) on information needs and information-seeking behavior of users of medical college libraries;
6. Knowledge Management Systems in medical libraries of Bangladesh: A study of some selected private and public medical libraries;
7. Professional competencies in Libraries: A study on Medical Libraries in Bangladesh.

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APPENDIX 1:

QUESTIONNAIRE - 1 (LIBRARIANS)

QUESTIONNAIRE ON "HEALTH INFORMATION SYSTEMS AND SERVICES IN THE MEDICAL LIBRARIES OF BANGLADESH: PROBLEMS AND PROSPECTS"

(For Librarians/Information Professionals)

[Please put tick (√) mark on the relevant ones.]

01. INSTITUTIONAL PROFILE

i. Name of the Library: _____

ii. Year of Establishment: _____

iii. Present Address:_____

Telephone no: _____

Email:_____

Fax:_____

Website:_____

iv. Parent organization: _____

v. Library Area : _____ [Square fit.]

vi. Library Working Hours:

a. Week days : _____ A.M. To _____ P.M.

b. Friday & Holidays : _____ A.M. To _____ P.M.

vii. Seating capacity: _____ [Numbers]

viii. Average number of users visiting the library per day: _____ [Numbers]

ix. Total number of library members: _____

x. Type of the organization:

International	Public	Private	Autonomous

xi. Name and Designation of the Head:

_____

02. LIBRARY USERS

Please mention about category of users (Multiple response)

☐ Teacher ☐ Student

☐ Doctor ☐ Scientist

☐ Researcher ☐ Staff

☐ Others; please specify: _____

03. STAFF STRENGTH

3.1 Please mention your total number of staff with their designation, status and qualification

Designation	Number	Educational qualification PhD/Master/Diploma/ Certificate in ISLM	IT education	
			Yes	No
Library Administrator/Chief Librarian/Principal Librarian				
Librarian/Head of Library/ Senior Manager				
Additional Librarian				
Deputy/Associate/Joint Librarian/ Library Manager				
Senior Assistant Librarian/ Sr. Information Officer				
Library Officer/Information Officer				
Junior Assistant librarian				
IT Specialist/System administrator				
Library Assistant				
Library Attendant				
Others (please specify):				

04. LIBRARY ADVISORY COMMITTEE

4.1Is there any Library Advisory Committee for your Library? Yes ☐ No ☐

If yes

4.2 Functions of the Library Advisory Committee

a. Formulating a development plan for library ☐

b. Framing rules and regulations for the use of library ☐

c. Examining proper implementation of library policy ☐

d. Allotment of funds and checking of library expenditure ☐

e. Any other (Please Specify)**:** _____

05. LIBRARY SPACE

5.1 Do you feel that Library has adequate space to provide the various types of services to the clienteles? Yes ☐ No ☐

5.2 Do you think that the number of seats provided in the library is adequate to meet the users and teachers? Yes ☐ No ☐

5.3 Do you provide Research Cubical/ Research Carrels? Yes ☐ No ☐

5.4 Does the Library have its own building? Yes ☐ No ☐

06. LIBRARY DIVISIONS

Please mention the various division/units of your library: (Please Tick V)

Acquisition	☐	Audio Visual	☐	Processing/Technical	☐
Periodical	☐	Circulation/Lending	☐	Administration section	☐
Reference	☐				
Textbook Section	☐	Reprographic	☐	E-resources Section	☐
IT Division	☐	Others (please specify):_____			

07. COLLECTION DEVELOPMENT

7.1 Do you have any written policy regarding collection development in your library?
Yes ☐ No ☐

If yes:

7.2 What policy do you adopt in selection of publication for acquisition? (Multiple choice)

a) User survey by the library/institution ☐

b) Users' request through e-mail/telephone ☐

c) Through meeting of the selection board/library committee ☐

d) By the librarian from the list supplied by the book vendors ☐

e) As per the request of the administration of the parent body/donor ☐

f) Any others (Please specify): _____

7.3 What are selection tools / sources used for the subscription of library resources? (Multiple choice)

a) Direct purchase from Publishers ☐

b) Vendors ☐

c) Direct purchase from market ☐

g) Online purchase of Publishers' Websites ☐

g) Consortium ☐

h) Any other (Please Specify): _____

7.4 What are the sources of acquisition in your library? (Multiple choice)

a) Purchase ☐

b) Donation ☐

c) Exchange ☐

d) By Gift / Donation ☐

e) Internal publication ☐

f) Any Other (Please Specify):_____

7.5 Do you maintain accession register?

Yes ☐ No ☐

7.6 If yes, what is the methodology for accessioning?

a) Manual Register ☐

b) Both manual and computerized accessioning ☐

c) Computerized accessioning ☐

08. TECHNICAL PROCESSING

8.1 State the scheme of library classification followed to classify the books:

a) Dewey Decimal Classification (DDC) ☐

b) Colon Classification (CC) ☐

c) Universal Decimal Classification (U D C) ☐

d) Library of Congress Classification (L C) ☐

e) National Library of Medicine (USA) Classification (N L M) ☐

f) Any other (Please specify): _____

8.2 Library cataloguing code/standard followed:

a) AACR-1 (Anglo-American Cataloguing Rules-1) ☐

b) AACR-2 (Anglo-American Cataloguing Rules-2) ☐

c) RDA (Resource Description and Access) ☐

d) ALA (American Library Association) Code ☐

e) CCC (Classified Catalogue Code) ☐

f) MARC-21 (MAchine-Readable Cataloging) ☐

g) Any other (please specify): _____

8.3 Mention the Standard Subject Headings List used for assigning Subject Headings:

a) Medical Subject Headings (MeSH) ☐

b) Sear's List of Subject Headings ☐

c) Library of Congress Subject Headings ☐

d) Not Available ☐

8.4 What form of catalogue do you use?

a) Card form ☐

b) Book form ☐

c) Computerized OPAC ☐

d) Not Available ☐

8.5 Access to your Library:

a) Open access ☐

b) Closed access ☐

c) Both System ☐

09. LIBRARY PUBLIC RELATION AND MARKETING

9.1 Do you have any Public Relation Policy for your library? Yes ☐ No ☐

If yes,

9.2 How do you inform your information product and services to the users?

Through display board	☐	E-mail	☐
Web Portal	☐	Library website	☐
Automatic E-mail Alert	☐	Mobile short message	☐
Using Telephone	☐	Printed Documents	☐
Using Social Networking*	☐	Mailing Group	☐

*(*Facebook, Library Blog, Twitter, MySapce, Google Buzz, Digg, Delicious, StumbleUpon, Reddit, Google Bookmarks)*

Others:_____

10. LIBRARY RESOURCES

10.1 Please tick the following items with the number (approximate):

Library Resources	Total Number
Books	
Theses/Dissertations	
Reports	
Loose Journals	
Magazines	
Bound Journals/ Magazines	
Audio-Visual materials	
Atlases	
Maps	
Microfilms	
News Clippings	
Others	

10.2 Please mention the total number of accessible online resources in the appropriate box:

Item No.	Total Number
E-Journals (titles)	
E-books	
Online Databases (Subscribed and registered)	
E-Reports	
E-Theses/E-dissertations	
E-Encyclopedias	
E-Dictionaries	
E-Newspapers	

10.3 Please select the following information resources according to extent of use by library users

(Importance level: 5=almost always 4=usually 3=sometimes 2=rarely 1=never) Please Tick (√))

Sl. No	Information Sources	Scale				
		5	4	3	2	1
1	Text books					
2	Reference books					
3	General books					
4	Bangladeshi journals					
5	Foreign journals					
6	Theses/Dissertations					
7	e-journals					
8	e-books					
9	e-theses					
10	Online databases					
11	Library website					

12	Newspapers					
13	Research reports					
14	Indexing and abstracting sources					
15	Audio visual materials					
16	Bibliographic database on CD-ROM					
17	Popular magazines					
18	Web based resources					
19	Hand books					
20	Manuals					
21	Yearbooks					

Any other, please mention _____

10.4 Does the library have the following access/web tools for better library services?

SL#	Category/item	Yes	No
1	MyAthens [*Note :* **Athens** is an Remote Access Management] System]		
2	RemoteXs [Online access of library e-Resources from anywhere]		
3	EBSCO Discovery Library Search		
4	VuFind [*Note:* ***VuFind*** is a library resource portal]		
5	Joomla [***Joomla*** the dynamic portal engine and content management system]		
6	Blogging (e.g., Twitter, Weblogs)		
7	Listservs (e.g., Lisforum, Lislinks)		
8	RSS Feeds		
9	Wikis (e.g., Wikipedia, LIS Wiki)		
10	Social Networking (e.g., LinkedIn, Facebook)		
11	Ulrichsweb: Global Serials Directory		

10.5 Are you producing following Information Products?

a) Library News Letters Yes☐ No☐
b) Library Catalogues Yes☐ No☐
c) Library Annual Report Yes☐ No☐
d) Library Manual Yes☐ No☐
e) List of Additions Yes☐ No☐
f) Indexing and Abstracting Journals Yes☐ No☐
g) Specialized Databases Yes☐ No☐

Any other: _____

10.6 Please mention which one of the E-journals, E-books and online database subscribed/registered by your library.

Electronic Information Sources	**Please tick √**
JSTOR	
Emerald	
Oxford University Press	
ASM Journals	
Springer e-journals	
Indian Journals	
Cochrane Library	
Hinari-Health	
AGORA-Agriculture	
OARE-Environment	
ScienceDirect e-journals	
ProQuest e-journals	
EBSCOhost	
Cambridge University Press	
Embase	
ARDI- Innovation & Technology	
GOALI-Law	
ISI Web of Science	
ClinalKey	
Scival	
Scopus	
Ulrichsweb	
UptoDate	
Wiley e-Books	
ScienceDirect e-Books	
Springer e-Books	
EBSCO e-Books	
SAGE e-Books	
ProQuest ebrary	
Others (Pls specify):	

11. LIBRARY SERVICES

11.1 What types of services are available in your library? (please put tick (√) which is only applicable)

i)	Reading Room Service	☐ Yes	☐ No
ii)	Circulation service	☐ Yes	☐ No
iii)	Current Awareness Service	☐ Yes	☐ No
iv)	Referral service	☐ Yes	☐ No
v)	Indexing and Abstracting Services	☐ Yes	☐ No
vi)	Bibliographical service	☐ Yes	☐ No

vii)	On-line database searching	☐ Yes	☐ No
viii)	Reference service	☐ Yes	☐ No
ix)	E-alert services	☐ Yes	☐ No
x)	Online literature searching	☐ Yes	☐ No
xi)	Translation service	☐ Yes	☐ No
xii)	CD-ROM Searching	☐ Yes	☐ No
xiii)	Selective Dissemination of Information (SDI)	☐ Yes	☐ No
xiv)	Photocopying and printing services	☐ Yes	☐ No
xv)	Internet browsing	☐ Yes	☐ No
xvi)	Article Indexing	☐ Yes	☐ No
xvii)	News-clipping service	☐ Yes	☐ No
xviii	Inter-library loan service	☐ Yes	☐ No
xix)	Citation analysis service	☐ Yes	☐ No
xx)	Information literacy service	☐ Yes	☐ No
xxi)	E-mail service	☐ Yes	☐ No
xxii)	Others (specify)		

11.2 Which software are you using for providing reference management services to users?

Software name	**(please tick)**
RefWork	
EndNote	
ProCite	
Reference Manager	
Papyrus	
Mendeley	
Zotero	
Not available	
Others (pls. specify)	

11.3 Which software are you using for detecting plagiarism?

Software name	**(please tick)**
iThenticate	
Turnitin	
Writecheck	
Anti-Plagiarism	
DupliChecker	
PlagTracker	
Copyscape	
Not available	
Others (pls. specify)	

12. ICT AND AUTOMATION FACILITIES

12.1 Does your library have ICT facilities? Yes ☐ No ☐

If yes, then answer the following questions:

12.2 Year of ICT inception: _____

12.3 Status of library automation:

Fully	
Partially	
Initiated	
Not automated	

12.4 If fully automated, please mention what functions are performed with the help of computer and related technologies in your library.

- Administrative functions ☐
- Acquisition functions ☐
- Processing ☐
- Circulation ☐
- Documentation functions ☐
- Serials control ☐
- Preparing in-house database ☐
- Others (please specify): ☐

_____

12.5 Type of automation software you are using: (please tick)

Type of Software	(please tick)
In house developed software	
Commercial software	
Open source software	

12.6 Which software are you using for Integrated Library System?

Software name	(please tick)
KOHA	
Liberty	
ABCD	
Evergreen	
SLiMs	
OpenBiblo	
Not available	
Others (please specify)	

13. INTERNET FACILITIES AND LIBRARY WEBSITE

13.1 How many computers with internet connection do you have in the library? _____

13.2 Do you charge users to browse Internet? Yes ☐ No ☐

13.3 On an average how many users browse Internet within as working day? _____

13.4 Status of your Internet connection:

Broadband ☐ Narrow band ☐ WiFi ☐
Others: _____

13.5 Please indicate browser software use:

MS Edge ☐
Opera ☐
Chrome ☐
Firefox ☐
Safari ☐

Others (Please specify): _____

13.6 Please indicate which search engine you use frequently:

Google ☐
Yahoo ☐
AltaVista ☐
Lycos ☐
MSN ☐

Others (please specify): _____

13.7 Does your library have a website? Yes ☐ No ☐

13.8 If yes, URL of the library website: _____

13.9 Contents of library website [You may tick more than one]

Contents	YES	NO
General information on the library, staff, contact numbers, opening hours, services, collections, rules and regulation.		
Web OPAC		
Access to e- books & e-journals		
Access to commercial online databases		
Access to open Access database		
Link to Institutional Repository		
New book list		
FAQ		
Suggestion page		

Feedback & comments		
Others: please specify		

13.10 Bandwidth of library Internet:

<=1.0 Mbps ☐

>1.0 to <=2.0 Mbps ☐

>2.0 Mbps to <=4.0 Mbps ☐

>4.0 Mbps to <=6.0 Mbps ☐

>6.0 Mbps and above ☐

Not Available ☐

13.11 Does your library have Intranet access? Yes ☐ No ☐

13.12 Do you have electronic security system? Yes ☐ No ☐

13.13 If yes, what kind of security system is your library using?

Electronic Surveillance System ☐

Radio Frequency Identification System (RFID) Gate ☐

Electronic Access Gate ☐

CC Camera ☐

Smoke Detector System ☐

Fire Alarm System ☐

Smart Card Facility ☐

Maintain the record of the Visitors ☐

Any other:_____

14. DIGITIZATION ACTIVITIES

14.1 Have you taken any digital initiatives in your library? Yes ☐ No ☐

14.2 Please check the following table and provide the number of different technological equipment, currently available in your library.

Hardware	**NOs**
Servers	
Computers	
Scanners	
Digital Cameras	
Digital Photocopiers	

Printers	
Notepad or Laptop	
WiFi Routers	
LCD Projector	
CCTV Camera	
Barcode printers	
Television	
Other (Please specify)	

14.3 How much of your collection is digitized?

Resources	**NOs**
Books/book chapters	
Journal articles	
Photographs	
Maps	
Thesis/Dissertations	
Audio visual	
Newspapers	
Reports/Protocols	
Governments publications	
Others (Please specify)	

14.4 Are you measuring usage of Electronic Resources? Yes ☐ No ☐

If yes, please specify the method applied

Methods	**Yes**	**No**
Project COUNTER		
ICOLC		
ISO		
NISO		
SUSHI		

14.5 Are you using digital library software? Yes ☐ No ☐

If yes, then answer the following questions:

14.6 What kind of digital library software do you use?

Commercial software ☐
In-house developed ☐
Open-Source software ☐

14.7 Please tick √ the appropriate specialized software that your library used/will be used to manage digitized contents?

Software name	**Please Tick**
DSpace	
GreenStone	
DigiTool	
E-Prints	
CONTENTdm	
ETD-db	
Fedora	
DIGIBIB	
Not decided	
Not Available	

15. INSTITUTIONAL REPOSITORY (IR)

15.1 Does your library have Institutional Repository (IR)? Yes ☐ No ☐

If yes, then please answer the following questions:

15.2 Name of your IR: _____
15.3 Inception year of IR:_____
15.4 Web address of IR: _____
15.5 Is your IR is enlisted with OpenDOAR (Directory of Open Access Repositories)?

Yes ☐ No ☐

15.6 Total number of items being uploaded to the IR: _____

15.7 Which software do you follow/will follow for building up your IR?

Software name	
DSpace	
GreenStone	
DigiTool	
E-Prints	
Bepress	
ETD-db	
Fedora	
DIGIBIB	
Not Decided	
Not Available	

16. WEB BASED LIBRARY SERVICES

16.1 Please tick the Web based library services / facilities in the library which are operational (You may tick more than one)

Web based library services	**Please tick √**
OPAC	
Web OPAC	
Online renewal service	
Institutional Repository (IR)/Digital Repository (DR) service	
Online SDI service	
Online reservation	
Library Services through Social Networking Sites	
Library 2.0 (RSS Feeds, Blogs and Wikis etc.)	
Electronic Document Delivery service	
Mobile-based services	
Remote access service	
RFID-based services	
Wifi service	
Virtual reference service	
Distance learning service	
Internet service	
Intranet service	
Electronic Thesis and Dissertations (ETD) service	
CD-ROM/DVD read/search service	
E-CAS (Current Awareness Service)	
Electronic Conferencing Services	
Research Data Services	
Systematic Review service	
Webometric Analysis service	
Online Literature Searching service	
Evidence-Based Practice (EBP) service	
Plagiarism detection service	
E-indexing and abstracting service	
Ask-A-Librarian service	
Online e-Journal Service	
Online e-Book Service	
Online Database Service	

16.2 How would you assess the performance of your Library? (Please tick)

Excellent ☐ Good ☐ Fair ☐ Poor ☐ Very Poor ☐

17. LIBRARY CONSORTIUM/CO-OPERATION/RESOURCE SHARING

17.1 Is your library a member of any e-resource consortium? Yes ☐ No ☐

17.2 If yes, please write the name of e-resources consortium-

☐ BIPC(Bangladesh INASP-PERI Consortium)

☐ UDL(UGC Digital Library)
☐ BdREN (Bangladesh Research and Education Network)

17.3 If no, does your library have any plan to become a member of the e-resource consortium?

Yes ☐ No ☐

18. LIBRARY BUDGET & EXPENDITURE

18.1 What is the source of funding for your library activities?

☐ Government ☐ Parent Body's Allotment ☐ Local Aids

☐ Foreign Aids ☐ Other sources

18.2 How much the library spent under the following heads of expenditure during the last fiscal year?

Budget	2019-2020
Total library budget	
Printed books	
Printed journals	
Online resources	
Establishment/Maintenance	
Others	

19. IMPACT OF ICT

19.1 Indicate your opinion about Impact of ICT on Library Management & Services.
[5=Strongly Agree, 4=Agree, 3=Neutral, 2= Disagree, 1=Strongly Disagree]

Sl. No.	Impact of ICT	5	4	3	2	1
1	Creates the awareness about library					
2	Improve the quality of library services					
3	Increases the usage of library					
4	Enhance the knowledge and skills of library professionals					
5	Reduce workload of library staff					
6	Increased job satisfaction of Library staff					
7	ICT eliminate duplication of efforts					
8	Introduce wide range of new services					
9	Perform tasks that can't be done in manual system					
10	ICT facilitate resource sharing and library networking					
11	ICT make possible rapid communication with other libraries					
12	Generate better management information reports					
13	Facilitate marketing of information products & services					

14	Keeps user updated on current information					
15	ICT improve easy access to online library resources					
16	ICT provide gateway to global information resources					
17	Meet the tech savvy users in complex information needs					
18	Best tool for usage statistics of online resources					

20. SKILLS/COMPETENCIES OF LIBRARY STAFF

20.1 How would you rate the level of competencies/skills of your library team for the following applications/services?

Applications/Services	Excellent	Very good	Good	Poor	Don't know
Online medical databases					
Licensing					
Electronic Resource Management (ERM)					
Web page design					
ILS management					
Communication with Vendors/publishers/aggregators					
Installation and customization of software					
System Administration &Maintenance					
Maintenance of Library Website					
Development of Institutional Repository (IR)					

21. FUTURE LIBRARY PLANS

21.1 Do you have future plans for overall modernization of library services?

Yes ☐ No ☐

21.2 What are your future plans for providing better library services to academic community? (Please tick)

(Please also note that, if any of the activities/services mentioned below is already available in your library please indicate the same and also specify the importance of the service. Indicate the importance on a scale 1 to 5 as given below)
[5 - Strongly agree 4- Agree 3-Neutral 2-Disagree 1-Strongly Disagree]

No.	Actions	Existing	5	4	3	2	1
1.	Library plans to automate all its functions						
2.	Plan to have Campus wide Local Area Network						
3.	Become a part of national and International library networks						

4.	Web-based access to catalog						
S.	Want to be a part of consortia						
6.	Create & provide access to library web page						
7.	Provide Electronic Document Delivery / Full text services						
8.	Provide access to electronic resources through Internet						
9.	Providing access to Electronic Journals						
10.	Digitization of unique materials in the library						
11.	Improve access time with high speed connectivity						
12.	Developing Institutional repository						
13.	Cataloguing of digital resources						
14.	Educate the users on online information literacy						

22. MODEL FOR INTEGRATED LIBRARY AND INFORMATION SYSTEM

22.1 In your opinion please state the importance of the following in making your library a model health library to serve the library users in this new ICT era. Indicate the importance on a scale of 1 to 5 as given below:
[5 - Strongly agree ; 4- Agree; 3-Neutral; 2-Disagree; 1-Strongly Disagree]

No.	ACTIVITY	5	4	3	2	1
1.	Develop and implement an integrated library information system					
2.	Library should have required infrastructure for ICT applications					
3.	Library should have trained manpower for all ICT applications					
4.	Library should automate all library housekeeping functions					
5.	Enhance the staff skills in modern library tools and technologies					
6.	Training of end users in the search of online databases					
7.	Implement of RFID system					
8.	Develop Institutional Repository for global access					
9.	Use standard software for its automated functions					
10.	Provide online OPAC access to library users					
11.	Provide web-based library services					
12.	Design and develop of library website					
13.	Create demand for online access to other databases					
14.	Need based information services for particular user community (viz. CAS / SDI etc)					
15.	Develop Digital Library System					
16.	Create a rich learning environment for library users					
17.	Digitization of library materials					
18.	Develop Knowledge Management System					
19.	Online access to e-resources through library website					
20.	Follow definite market research strategies					
21.	Formation of library networking and resource sharing					
22.	OPAC Compatibility with Z 39.50 & other communications standards					

23.	Join the library consortium					
24.	Develop and implement mobile-based library services					
25.	Library should have high speed data network connectivity					
26.	Library should follow the standard for its various functions					

23. LIBRARY PROBLEMS

23.1 Please rate the library problems applying the following five-point Likert scale) (Importance level: 5 = Extremely important; 4 = Very important; 3 = Important; 2 = Somewhat important; 1 = Not important)

Problems	5	4	3	2	1
1. Lack of sufficient budget					
2.Lack of IT staff					
3. Lack of professional staff					
4.Lack of training to make staff efficient					
5. Lack of modern library software					
6. Lack of National Policy for medical libraries in Bangladesh					
7. Ignorance of the authorities about library and its services					
8. Lack of ICT infrastructural facilities					
9. Low speed of internet connection					
10. Lack of knowledge about latest tools and technologies in library field					
11. Lack of library separate building and architectural plan					
12. Lack of ICT resources to modernize library services					
13. Inadequacy of ICT facilities					
14. Administrative bureaucracy complexity					
15. Inadequate salaries for library personnel					
16. Lack of government concentration					
17. Others (please specify):					

24. Please provide your valuable suggestions (if any) for the improvement of the library systems and services in the medical libraries of Bangladesh:
_____
_____
_____
_____
_____

THANK YOU VERY MUCH FOR YOUR TIME, SUPPORT AND KIND COOPERATION

Signature:_____

Date:_____

APPENDIX 2:

QUESTIONNAIRE - 2 (USERS)

QUESTIONNAIRE ON "HEALTH INFORMATION SYSTEMS AND SERVICES IN THE MEDICAL LIBRARIES OF BANGLADESH: PROBLEMS AND PROSPECTS"

(For Library Users)

[Please mark your answer with tick (√) in the appropriate box]

USER PROFILE

1. Organization:_____

2. Sex: Male: ☐ Female: ☐

3. Please indicate which category of user you belong to:

☐ Teacher ☐ Student

☐ Doctor ☐ Scientist

☐ Researcher ☐ Staff

☐ Others; please specify: _____

4. Age group: (Please tick mark(√) the appropriate box):

☐ 21-25 ☐ 26-35 ☐ 36-45 ☐ 46-55 ☐ 56-65

5. If you are a professional, would you please mention your highest level of educational qualification:

☐ MBBS ☐ MPhil ☐ MPH ☐ MS ☐ MD ☐ FCPS ☐ MRCP ☐ PhD

☐ Others; please specify: _____

USE OF LIBRARY

6. Please indicate the purpose of your visit to the library using the following scale

[5= Daily; 4 = Weekly; 3 = Fortnightly; 2=Monthly; 1=Once in a while]

Purpose	**5**	**4**	**3**	**2**	**1**
To borrow/return library materials					
To read journals/periodicals					
To consult reference books					
To read general books					
To read subject books					
To improve subject knowledge					
To complete assignments					
To consult research materials					
To access online resources					
To browse Internet/search web resources					
To write a research paper for publication					
To keep abreast with latest developments					

7. Please indicate the frequency of your visit to the library

- Everyday ☐
- Once in a week ☐
- More than once in a week ☐
- Once in a fortnight ☐
- Once in a month ☐
- Occasionally ☐
- Never ☐

8. How much time do you spend on an average in the library per week?

- Less than one hour ☐
- One hour ☐
- Two hours ☐
- Three hours ☐
- More than three hours ☐

LIBRARY BUILDING/SPACE

9. Please indicate your opinion about Library Infrastructural Facilities using the following scale

[1 = Strongly Disagree; 2 = Disagree; 3 = Fairly Agree; 4 = Agree; 5 = Strongly Agree]

SL#	Category/Item	5	4	3	2	1
1	Location of the library is very convenient to the students and faculties					
2	Building exterior view is excellent [i.e. color, design and architectural view]					
3	Library internal environment is pleasant [i.e. AC is installed]					
4	Other facilities are available [i.e. sufficient ventilation , humidity and dust controlling system, entrance of daylight, and sound control etc.]					
5	Sufficient space for reading					
6	Sufficient space for safekeeping area					
7	Close Circuit Cameras are installed to protect library materials					
8	Library furniture like chair, table and book shelves are standard					
9	Silent reading facilities with individual reading booth/cabinet					
10	Group study facilities are available					
11	Library provides wash room and water supply properly					
12	Library provides pure drinking water for users					

LIBRARY SERVICES

10. Please choose the most preferred information formats for accessing information and rank them in the order of preference (1,2,3,4 and 5) (Importance level: 5 = Extremely important; 4 = Very important; 3 = Important; 2 = Somewhat important; 1 = Not important)
Please Tick (√))

Information sources on medical and related areas	**5**	**4**	**3**	**2**	**1**
Printed journals					
Printed text books					
Discussion with faculty / other experts					
Theses / Research reports					
Online Medical Databases					
Seminar / Workshop / Conference					
Medical Library Websites					
E-books / E-journals/E-Theses					

11. Please mention your level of satisfaction with the library collection/ resources.

Excellent ☐ Good ☐ Fair ☐ Poor ☐ Very Poor ☐

12. Do you avail the following library services? [Please (√) in the appropriate box using the scale: 5 = Excellent; 4 = Good; 3 = Fair; 2 = Poor; 1= Very Poor]

Sl. No.	**Type of Services**	**Level of Satisfaction**				
		Excellent	**Good**	**Fair**	**Poor**	**Very Poor**
1	Reading Room Service					
2	Book Circulation Service					
3	Online Public Access Catalogue/ Web OPAC					
4	Internet Access					
5	E-Resources Access					
6	Audio-Visual Service					
7	Reference Service					
8	Current Awareness Service					
9	Photocopying Service					
10	Subject Bibliography Service					
11	Abstracting/ Indexing					
12	Newspaper Clippings					
13	Inter-Library Loan					
14.	Institutional Repository (IR)/Digital Repository (DR) service					
15.	Electronic document delivery service					
16.	Any other services : (Please specify)					

13. Please mention your level of satisfaction with the library services.

Excellent ☐ Good ☐ Fair ☐ Poor ☐ Very Poor ☐

ICT ENABLED SERVICES

14. Do you feel that the medical professionals need ICT enabled library facilities?

Strongly Agree ☐ Agree ☐ Neutral ☐ Mildly Disagree ☐ Strongly Disagree ☐

15. Are your library services ICT enabled?

Fully ☐ Partially ☐ In progress ☐ Not yet started ☐ Don't Know ☐

16. Does your library have a library portal / Website?

Yes ☐ No ☐ Don't Know ☐

17. Do you use web-based resources?

☐ Yes ☐ No

18. If Yes, please specify which of the following e-resources you use. (You can choose as many as you use)

Name of e-resources	Yes	No
E-books		
E-journals		
E-newspapers		
E-maps		
E-thesis/dissertation		
E-research reports		
CD- ROM bibliographic databases		

Name of e-resources	Yes	No
Internet/web resources		
Online Public Access Catalogue (OPAC)		
Institutional Repository (IR)		
Online databases		
Professional Association Websites		
International / Regional Institution Websites		

19. Please give your opinion about the use of Information and Communication Technology in your medical library. Please rate by five-point Likert scale:
[5 = Excellent; 4 = Good; 3 = Moderate; 2 = Poor; 1= Very Poor] [Please (√) in the appropriate box]

Library Resources/Services	Excellent	Good	Moderate	Poor	Very Poor
ICT facilities					
Traditional library services					
Web-based library services					
Library collections					
Online library resources					

Library timing					
Library reading environment					
Internet/WiFi services					

20. Whether you are aware of the following ICT enabled library services offered by your library?

ICT based library services	**Please tick √**
OPAC	
Web OPAC	
Online renewal service	
Institutional Repository (IR)/Digital Repository (DR) service	
Online SDI service	
Online reservation	
Library Services through Social Networking Sites	
Library 2.0 (RSS Feeds, Blogs and Wikis etc.)	
Electronic document delivery service	
Mobile based services	
Remote access service	
RFID based services	
Wifi service	
Virtual reference service	
Internet service	
Intranet service	
Electronic Thesis and Dissertations (ETD)	
E-CAS (Current Awareness Service)	
Electronic Conferencing Services	
Research Data Services	
Systematic Reviews	
Webometric Analysis Service	
Online Literature Searching Service	
Evidence-Based Practice (EBP) Service	
Plagiarism Detection Service	
Predatory Journal Selection Service	

21. Please mention which one of the following medical online databases are used by you. (Please indicate as many as you use)

Name of different databases	Yes	No
PubMed		
Hinari e-journals		
ScienceDirect		
Web of Science		
EBSCOhost		
ProQuest Medical Database		
Springer Link		
Oxford e-journals		
JSTOR		
ResearchGate		
BanglaJOL		
DOAJ(Directory of Open Access Journals)		
Cochrane Library		
Scopus		
ARDI		
UpToDate		
DOAB (Directory of Open Access Books)		
Wilely Online Books		

Name of different databases	Yes	No
PLoS Journals		
Hinari e-books		
BioMed Central (BMC)		
PubMed e-journals		
PubMed e-books		
Indian Journals		
Wilely Online Journals		
Medical Subject Headings (MeSH)		
Cambridge e-journals		
POPLINE		
Google scholar		
ClinicalKey		
Embase		
CINAHL		
Free Medical Journals		
J-Stage		
WHO Medicines Bookshelf		
FreeBooks4Doctors		

22.Which search engines you have found most effective for accessing the web-based information resources?

☐ Google ☐Yahoo ☐ Bing ☐ Baidu ☐ AOL ☐Ask.com ☐ Excite ☐Lycos

☐ Others (please specify): _____

23. Please indicate the problems that you have faced while accessing web-based information resources in your library (Importance level: 5 = Extremely important; 4 = Very important; 3 = Important; 2 = Somewhat important; 1 = Not important) Please tick (√))

Barriers	5	4	3	2	1
Lack of adequate learning resources					
Absence of modern technologies in the library					
Low bandwidth					
Information overload					
High cost of access					
Lack of Knowledge of online information sources					
No Internet access					
Poor database searching skills					
No training of use of library resources					
Retrieval of irrelevant information					
Inconvenient working hours of library					

24. Please give your opinion for the overall improvement of your institution library. Please rate by five-point Likert

scale: [Strongly Agree = 5; Agree= 4; Undecided = 3; Disagree = 2; Disagree strongly = 1] Please tick (√))

Statement	5	4	3	2	1
Library networking and resource sharing system should be established					
Online access to more e-resources for library users					
ICT Skills and competencies of library personnel need improvement					
Library must be automated immediately					
Library budget need to be increased to improve library facilities					
All modern technological facilities should be installed in the library					
Library should have own website					
Professional and qualified library staff should be appointed					
Library should develop Institutional Repository (IR)					

25. If you have any suggestions or comments on development of medical libraries in Bangladesh, please, mention below:

Thank you so much for your kind efforts and cooperation!