Women Employment in Agriculture and Shrimp Industries: Impacts on Lifestyle, Health, Nutrition and Food Security

A Thesis submitted to the Institute of Nutrition and Food Science, University of Dhaka in the partial fulfillment of the requirement for the Degree of Doctor of Philosophy (PhD) in nutrition and Food Science

Submitted by
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ABBREVIATION

ADB	Asian Development Bank
BBS	Bangladesh Bureau of Statistics
BCG	Bacillus calmette–Guérin vaccine
BDHS	Bangladesh Demographic and Health Survey
BMI	Body mass index
CHT	Chittagong hill tracts
DoF	Department of fisheries
DPT	Diptheria, tetanus toxoids and pertussis vaccine
FAO	Food and Agriculture Organization
FCS	Food consumption score
GDP=	Gross domestic product
GO	Government organization
IFPRI	International Food Policy Research Institute
ILO	International labor organization
IPV	Inactivated Polio Vaccine
MoFDM	Ministry of Food and Disaster Management
MoHFW	Ministry of Health and Family Welfare
MoWCA	Ministry of Women and Children Affairs
NGO	Non-government organization
OECD	Organization for economic co-operation and development
PAL	Physical activity level
SIGI	Social institutions and gender index
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

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ABSTRACT

In Bangladesh women play a vital role in the country's economic development. Women are involved in agriculture and shrimp sector to support themselves and their family as well. Questionnaire survey was conducted among the 600 women working in agriculture and shrimp sectors, which comprises 450 agriculture and 150 fisheries households. Among the agricultural households, 346 households were selected from general population and 104 households were recruited from tribal population. The study also recruited 173 agricultural households, 52 tribal households and 75 shrimp households who were non-employed (control) women. Study included employee and non-employee (control) women from Chittagong, Mymensingh, Bandarban, Dinajpur, Khulna and Bagerhat districts. Socio-economic characteristics analysis of the general women in agriculture revealed that medium household size (61.9% employed and 57.8% non-employed), primary education level (employed 51.4% and non-employed 49.1%), married (employed 93.6% and non-employed 91.3%), Muslim (employed 70.5% and non-employed 66.5%), own house (employed 78.0% and non-employed 60.1%) and Polli biddyut (employed 69.9% and non-employed 68.2%) were most dominants among the employed and non-employed (control), respectively where household size was significant ($P<0.05$). Among the tribal women (employed and non-employed), socio-economic parameters expressed that medium household size (employed 52.0% and non-employed 59.6%), primary education (employed 49.0% and non-employed 48.1%), married (employed 98.1% and non-employed 98.1%), Christian (employed 51.9% and non-employed 44.2%), own house (employed 90.4% and non-employed 80.8%) occupied highest percentage, respectively. Kupi or Hurricane was highest among employee (44.2%) while Polli electricity was highest (38.5%) among the non-employed tribal women. Socio-economic background analysis of the women in shrimp sector showed that medium household size (employed 46% and non-employed 65.3%), primary education level (employed 63.3% and non-employed 48%), married (employed 79.3% and non-employed 97.3%), Muslim (employed 97.3% and non-employed 100%) drinking tube-well water (employed 93.3 % and non-employed 70.7%) and Polli electric facility (employed 77.3% and non-employed 84%) was dominant in both cases. Average household income (BDT) and expenditure (BDT) of the women in agriculture (general) was 11532 and 8926, respectively of the employed and 9686 and 7848, respectively of the non-employed (control) women. In the tribal women monthly average household income (BDT) of the employee and the non-employee was 10842 and 9529, respectively and expenditure (BDT) was employee 8855 and non-employee 7291, respectively. Average monthly household income and expenditure in the shrimp sector found better among the employee (9235 Tk and 7655 Tk, respectively) than the non-employee (9068 Tk and 7208 Tk, respectively). The research revealed that average household and respondent income of the employee was higher than the non-employed women. The research found that completed all the courses of vaccination coverage among the employed and the non-employed (control) women in agriculture (general) was 77.1% and 72.6% while among tribal women was 60.9% and 51%, respectively. Highest (90.4%) and lowest (52%) percentage of vaccination coverage found among the employee and non-employee women in shrimp sector, respectively. Significant hygienic condition at general women home for cooking, eating and others were more or less similar among the employee and the control. Maintenance of hygiene at home for cooking, eating and others were mostly coincided among the employee and the non-employed tribal women workers. Maintaining hygienic condition was observed better in women working in shrimp industry. Body mass index (BMI) of the general women indicated that 22% employed women and 42.8% controlled women were suffering from malnutrition. BMI result of the tribal women indicated that highest 14.4% and 19.2% employee and the non-employed (control) women were underweight, respectively where shrimp sector

expressed that 18% employee and 8% controlled women were malnourished. Breast feeding, Tetanus toxoid coverage during pregnancy, taking of iron tablet, normal delivery process, birth difficulties and vaccination knowledge percentage were above 90% among the employee and non-employee. In shrimp sector, maternal health and breast feeding result was more or less similar in both groups except Tetanus Toxoid coverage (63.9% of employee but 28% of non-employee completed full dose). Colostrums feeding knowledge percentage was highest in tribal controlled women (92.3%) and lowest among controlled shrimp women (76.0%). In all three cases employed women found more knowledgeable than controlled women. In agricultural sector (general) moderate anemia found highest on the basis of hemoglobin (Hb) among the employee (35.8%) while in controlled women it was severe (51.4%). Most of the tribal women also were found moderate anemic and the percentage were 64.4% and 42.3%, respectively for the employee and non-employee (control). Anemia was mild (36.7%) among the employee and severe anemic (66.7%) among the controlled women in shrimp sector. Serum ferritin, zinc, iron and copper level among the employed and the non-employed in agriculture, tribal and shrimp sector was significant ($p<0.05$) except iron level in the employed and non-employed women in agriculture ($p>0.05$). The study revealed positive relationship between hemoglobin (Hb) level and serum ferritin level that is the higher the Hb level the higher the serum ferritin level. Significant ($P<0.05$) food security result found that 31.5% employee and 17.3% control women in agriculture are food secured. In tribal the result was 24% and 15.4%, respectively ($P<0.05$). In shrimp sector, food security was higher among employed women (40%) than the control women (12%). The study indicates that the employed women in agriculture, tribal and shrimp women are in better condition than the non-employed women. The study suggests involving women in the sectors.

Chapter one

INTRODUCTION

INTRODUCTION

1.1 Women employment in Bangladesh

In Asia it is well established that women inhabiting in the countryside play an important role in agricultural industry which has been underestimated yet in formulating policies for development of the sector. Women play significant role mostly in post-harvest processing activities. Traditionally, women are actively involved in post-harvest processing activities. In Bangladesh, women involvement in field crop production i.e. rice farming in plain lands and hilly areas has been increased. The country's second contributor only to agriculture in the overall economoy i.e. fisheries sector involves women in the different nodes of the value chain with varying degrees of intensity (Williams *et al.*, 2001).

In Bangladesh, participation of women in rice and other crops farming has been increasing day by day. Women are engaged in rice planting, fertilizing, harvesting, collecting, husking. In fact, rice husking is fully conducted by women labors at household everywhere in Bangladesh. At commercial level some, man are engaged as day laborer beside women in rice mill and rice drying yards. Many families are depending on basic income of the female member and the number is in an increasing trend (Rahman *et al.*, 2016). According to the International Labour Organization's (ILO) flagship report titled "World Employment and Social Outlook: Trends 2018," Bangladesh had seen a 35% increase in women employment, from 2008 to 2017 reached upto 18.1 million. On the contray male employment had seen an 11% increase and reached upto 45.7 million. Basically, industrial sector encouraged and involved high number of female labors particularly the apparel industry and service sector. Women get good salary in cities by working in industries. However, highest number of women are still employed in agricultural sector approximately 10.9 million. Approximately 45.6% of the total number of women in Bangladesh are directly and indierectly involved with agricultural farming activities (Agricultural Diary, 2012). Unfortunately, huge discrimination between male-female employment ratios are still practicing and the maximum share of employed women are being working in agricultural sector (ILO, 2017).

Tribal and ethnic communities are living along with Bengalis in Chittagong Hill Tracts (CHT) and other areas in Bangladesh. These ethnic communities have distinct cultural identities. Since the independence of Bangladesh, the government

of the People's Republic of Bangladesh has been implementing various development projects for improving the socioeconomic status of the ethnic people in the region. Development projects include safe drinking water supply, aquaculture development, medicare services development, agricultural infrastructure construction and development, enhancement of tourism industry, poverty removal, women's institutionalization and overall livelihood improvement of the ethnic communities in the region (MoCHTA, 2015). The tribal communities are mostly dependent on agricultural sector, for example 80% tribal in plain lands are dependent on agricultural farming (MoHFW, 2017). Tribal people also get additional economic benefit by selling of fruits, firewood, timber, bamboo, vegetables, poultry and dairy milk that contribute in total family income (Miah and Islam, 2007).

In recent years, rapid expansion of shrimp farming has been reported, particularly in south eastern coastal areas. This the industry has provided huge employment opportunities for the female labors in various points of the value chain (Ahmed *et al.*, 2001). The shrimp industry is the second largest export industry and major fisheries foreign exchange earner. About 3% of of the total export earning approximately 400 millions of foreign currency yearly come through this industry, thus contributing 3.78% in GDP. According to BFFEA (2010) there are 88 registered shrimp processing plants in the country. Additionally, there are more than 60 plants located in the country. Shrimp processing plants capacity was estimated 3,00,000 MT/year although the plants are only producing 14-16% of the total volume can supply. However, 3.5 million people under 6,00,000 households are dependent on the income through working in the sector (BFFEA, 2010). Bangladesh exports 39709 MT frozen shrimp in 2016-17 fiscal year and earn BDT 3682.26 crore (DoF, 2018).

The shrimp processing case began with a discussion on the roles performed in the factory. For instance, 80% of the daily labors in shrimp-processing plants are female labors (Neate, 2018). Generally this women perform skinning, grading, washing, deveining, de-heading, packging etc. as part time basis. On the other hand, men labors are responsible for loading and unloading packages from trucks and freezers. Female labors work on permanent basis are involved in counting packages, display on the belt and load packages inside the cartons (Choudhury *et al.*, 2017).

1.2 Women empowerment and nutrition

Women empowerement has been witnessed a sharp increasing awareness of the need to empower women in last thirty years, through measures to increase social, economic and political equity, and broader access to fundamental human rights,

improvements in nutrition, basic health and education. In addition to awareness of the subordinate status of women, the gender concept has come as an overarching socio-cultural variable, seen in realtion to other factors, such as race, class, age and ethnicity (Ali-Reza, 2005). Women's participation is being still considered as a real problem in a very few number of countries, despite worldwide evidence of the low levels of female participation in social, educational, economic and political spheres. In reality no country in the globe has achieved gender equality although the countries are advanced, achived gender equity as measured by comparable decision-making power, equal scope for education and development, and equal participation and status in all sectors of human endeavor (Lopez-Claros and Zahidi, 2005).

Over the last few decades, rapid process of transformation was observed in the research field of the agro-food globalization and other export-oriented industries as well which had affected work and gender relationships in various ways (Busch and Bain, 2004; Daviron and Gibbon 2002; Bair and Peters, 2006). Although the transformation had created new scope for women to enter in new world of paid employment, income, gain independence and participate more actively in the society, it has also created new challenges because much of this employment is informal, with poor working conditions and a lack of labor rights, and has to be carried out in addition to household and family responsibilities (Islam, 2008). In Asia, for example, mechanization packages introduced as part of irrigation schemes provoked changes in the organization of farm work, often replacing female labor with male labor. As a result, women's key role in achieving food security through food crop production and selection has often been bypassed. Neglecting women as agricultural producers and resource managers hinders the attainment of food security goals (Satyavathi *et al.*, 2010).

The nutritional and health status of women is of great concern in the contemporary world, because the multiple roles played by women give rise to serious health and nutritional problems. The lackings between levels of under nutrition in male and female vary from region to region and from nation to nation. Women generally have unique nutritional requirements, and in some cases may need more nutrients than men. Women in some societies are traditionally given less food than men since men are perceived to have heavier workloads (Agugo *et al.*, 2017).

1.3 Gender equality and women empowerment

Gender equity and women's empowerment is the key to achieve all the sustainable development goals (SDG). Despite progress, gender inequality continues to hold

women and girls back and deprive them of basic rights and opportunities. Among SDG, gender equity and women empowerment is goal number 5. Where as in millennium development goals (MDG), gender equity and women empowerment stands in number 3 as described promote gender equality in all levels of education and empower women. A gender is not synonymous with women, nor sits a zero-sum game implying loss for men; rather, it refers to both women and men, and to their status relative to each other. Gender equality refers to that stage of human social development at which "the rights, responsibilities and opportunities of individuals will not be determined by the fact of being born male or female," in other words, a stage when both men and women realize their full potential (Lopez-Claros and Zahidi, 2005). While the concept of "equality" is intuitively easy to understand, "empowerment" is a broad concept that is used differently by various writers, depending on the context or circumstance. For example, the Organization for Economic Co-operation and Development's (OECD) Social Institutions and Gender Index (SIGI) is a measure of gender equality which focuses upon five legal and social institutions and is used to rank countries (Alkire *et al.*, 2013).

Gender equality and women's empowerment is an important development priority, which was highlighted by its inclusion in the Millennium Development Goals (MDGs). Policy interventions that improve women's status and reduce gender inequalities are expected to improve women's and children's well-being, owing to women's important role in childcare and household food preparation in many societies. Smith *et al.* (2003) find that women with higher status relative to men have greater control over household resources, fewer time constraints, better access to information and health services, and better mental health, self-confidence, and higher self-esteem. Women with greater status have better nutritional status, are better cared for themselves, and provide higher quality care to their children. In many societies, women also play an important role in agriculture, although this role has tended to be unrecognized or incorrectly measured (Malapit and Quisumbing, 2015).

There is argument that the motivations for closing the gender gap are not mutually exclusive: rather, they reinforce each other. Closing the gender gap in assets allowing women to own and control productive assets both increases their productivity and increases self-esteem. A woman who is empowered to make decisions regarding what to plant and what (and how many) inputs to apply on her plot will be more productive in agriculture. This means women empowerment has positive impacts on agriculture and family income. However, the importance of relations between women and men, as well as the differential roles, resources, and

responsibilities of women and men of different ages, ethnicity, and social class need to be kept in mind in bot analysis and programming (Quisumbing *et al.*, 2014).

1.4 Women's empowerment: In context of developing countries

Determinants, indicators and outcome of women empowerment (Figure 1.1) are very important for understanding women empowerment in developing countries (Sharma and Sanchita, 2017). It is a commonplace that women's work in developing countries is underrepresented in labor force statistics. Survey and census data consistently under count and underestimate female labor force participation despite women's significant role in domestic tasks as well as their contribution to the survival of peasant households and the national economy. Needless to say, the labor market is not well developed in many developing countries. For instance, many rural women in Bangladesh make kantha (traditional quilts), pankha (hand-made fans), madur (mats), and jhuri (bamboo baskets) and exchange them for cash or kind within the village community or with others who need them. These products, therefore, have definite exchange value, but they are rarely reported as productive or economic in census reports. Other productive activities (e.g., jute processing, production of guror molasses from sugarcane) that women perform in rural Bangladesh have both use and exchange or market value; however, they are again rarely acknowledged in national census and survey data (Zaman, 1995).

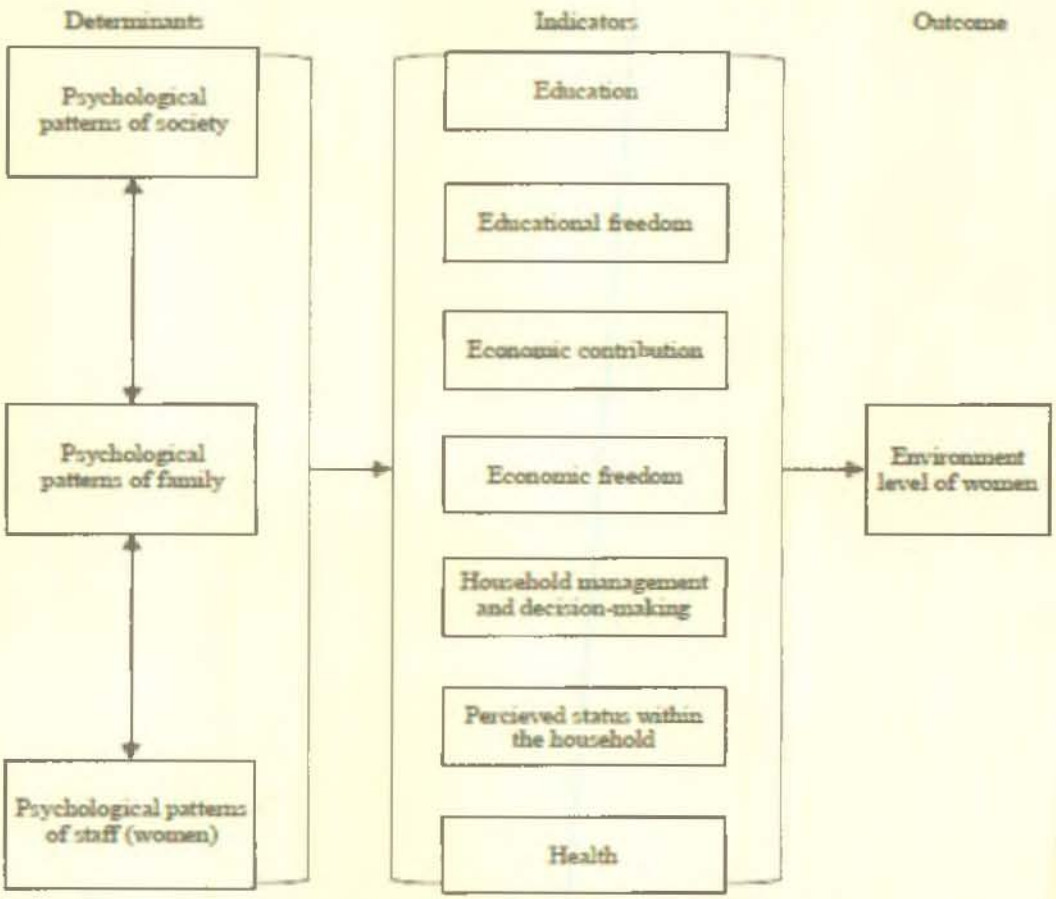


Figure 1.1 Women empowerment determinants, indicators and outcomes as described by (Sharma and Sanchita, 2017)

1.5 Agriculture and women's empowerment

Women have played and continue to play a vital role in every sphere of agricultural activity. Aggregate agricultural growth has been documented to bring disproportionate gains to the poorest in the developing world (Kilic *et al.*, 2014). Operations that involve less physical labor and more drudgery, such as weeding, are left to women, and women undertake these tasks in addition to their primary function as housekeepers and home makers. Women in Bangladesh spent an average of 3.1 hours per day on agricultural work while men spent 5.1 hours (Zaman, 1995). For an economically viable and ecologically sustainable agriculture, the involvement of women in the process of modernization of farming practices is a must (Satyavathi *et al.*, 2010).

Women tend to be "invisible" in the agricultural sector in Bangladesh, owing to the assumption that women are not involved in agricultural production because of cultural norms that value female seclusion and undervalue female labour (Kabeer 1994, Rahman 2000; Sraboni *et al.*, 2014). Although female agricultural labour has a

significant contribution to productivity and technical efficiency (Rahman, 2010), gender biases exist in the labour market remunerative employment of labour remains skewed in favour of men (Zaman, 1995). Women's ability to generate income in the agricultural sector is severely constrained by their limited control and ownership of productive physical and human capital. Bangladeshi women are disadvantaged relative to men with respect to assets brought to marriage (Quisumbing and Maluccio, 2003), productive assets such as land, livestock and agricultural machinery (Quisumbing *et al.*, 2013), and human capital. Ahmed *et al.* (2007) show that lack of education in adult women in Bangladesh is strongly correlated with extreme poverty: 80 per cent of adult women with no education live below half a dollar a day.

Agriculture has direct links to nutrition in that it provides a source of food and nutrients and a broad-based source of income, as well as directly influencing food prices. Arimond *et al.* (2010) have identified five pathways through which agricultural interventions can affect nutrition: increased food for own consumption, increased income, reductions in market prices, shifts in preferences, and shifts in control of resources within households. Gender roles have a substantial influence across all five pathways, particularly in relation to increased food availability and increased income. Thus, another possible pathway through which agricultural development could improve health and nutrition outcomes is by considering gender roles and gender equity in agriculture (Meinzen-Dick *et al.*, 2012). Gillespie *et al.* (2012) highlight the role of the gender division of labor in agriculture, which influences the amount of time women have to take care of themselves and young children; the intra-household allocation of food, which affects women's nutritional status with its intergenerational effects on nutrition outcomes; and women's power in decision making, which influences whether gains in income translate into nutritional improvements (Malapit *et al.*, 2013). In developed countries, agriculture is managed by a small number of manpower because it is mechanized. Although opportunities and work may change, women continue to earn a substantial portion of the family income. They continue to dominate food processing industries, backyard livestock, and vegetable production (Satyavathi *et al.*, 2010).

Women's empowerment in agriculture is considered as a determinant of food and nutrition security is rooted in a body of empirical evidence that demonstrates the ways in which women are essential to improvements in household agricultural productivity, food security, and nutrition security. Considerable evidence exists that households do not act in a unitary manner when making decisions or allocating resources. This means that men and women within households do not always have

the same preferences nor pool their resources. The non-pooling of agricultural resources within the household creates a gender gap in control of agricultural inputs, which has important implications for productivity (Malapit, 2013). Several empirical studies have found that redistributing inputs between men and women in the household has the potential to increase productivity (Peterman *et al.*, 2014; Kilic *et al.*, 2015). There also is a link between women's control of resources and allocation of resources to food, although most empirical studies supporting this claim come from Africa south of the Sahara. Doss (2006) showed that in Ghana, women's share of assets, particularly farmland, significantly increases food expenditure budget shares. In Bangladesh, greater empowerment of women, also measured using the WEAI, has been found to increase per adult-equivalent calorie availability and dietary diversity (Sraboni *et al.*, 2014).

1.6 Women empowerment in agriculture: Bangladesh context

Bangladesh is an agricultural country. Its economy is based on agriculture and related activities like fisheries, livestock rearing, and forestry. Agriculture is the single largest producing sector of the economy of the country's Gross Domestic Product accounting nearly 36% of GDP (BBS, 2011). It employs around 45 percent of the total labor force and 85% peoples are involved in this sector.

Plate 1.1 General women working in agriculture field in Chittagong

Plate 1.2 General women working in agriculture field in Dinajpur

Figure 1.2 Women empowerment in agriculture (Source, MoA)

In Bangladesh, about half of the total population is female and a majority of them, 80 percent live in rural areas. Among the rural women, about 43% are involved in the agricultural sector and they constitute 42% of the total labor force of our country (BBS, 2011). Most of the rural women have little opportunity to participate in intra-household, socio-economic and political decision-making processes as well as very limited interaction with people outside of the home (MOWCA, 2011).

Plate 1.3Women working in rice drying yards

1.7 Tribal people and agriculture

Tribal communities in Bangladesh are known for their distinct culture, belief system, economic activities, political system, customary laws, and languages. Local beliefs and customs influence what food is consumed during pregnancy and given to newborn and children. The socio-economic needs, health-seeking behavior, perception of family planning, practices affecting nutritional intake and aspirations vary from one tribal/ethnic community to another. Bangladesh is a densely populated country of South East Asia that has a rich tribal presence. There are about 58 tribes living in different parts of the country. Bangladesh has 1.2 million tribal people, which is just above 1 percent of the total population (Mullah *et al.*, 2007). Tribal women are less educated compared to their male counterparts as well as compared to national figure of 32.4% as per the 1991 Census. Literacy level among various tribal/ethnic communities is also uneven. From the program point of view diversity of tribal/ethnic community in a geographically contiguous area introduces another challenge. It would not be uncommon to find in one *mouza* if one finds four different tribal/ethnic communities speaking four different languages, practicing four different religions, varying levels of development, variations in educational attainment and having their own sets of world view (MoWCA, 2011).

Bangladesh has one of the highest malnutrition rates among women in the world. Malnutrition has serious implication for the productivity as well as overall development of the country. But it varies from urban to rural area or Bangle to tribal people. Tribal people of our country enjoy less opportunity than local people (MOWCA, 2011). In Bangladesh, there are about 45 different tribal groups spread across the country. The proportion of the tribal population in the 64 districts varies from less than 1 percent in majority of the districts to 56 percent in Rangamati, 48.9 percent in Khagrachari and 48 percent in Bandarban in the Chittagong Hill Tracts (MoHFW, 2011). The tribal groups belong to different ethno-lingual communities, profess diverse faith, have unique cultures which is different to mainstream culture and are at varied/different levels of development (economically and educationally). Most of them inhabit in hard to reach areas such as hilly terrains or the forest areas where access is generally difficult. Moreover, many of these tribal groups are also characterized by slow/low growth rate compared to the mainstream population. Tribal population in Bangladesh is living in different ecosystems and depends on primitive agricultural practices and they often face uncertainty of food supply and tend to suffer from malnutrition (Haque *et al.*, 2014).

Tribal peoples are indigenous peoples found to live in varied and changing contexts and hence, no single definition can capture their diversity (MoHFW, 2017). Bangladesh has become the dwelling place of different ethnic groups. Cultural diversity is one of the mentionable features of this country. Ethnic people of Bangladesh continue a distinct way of life in different places either plain or tribal area. In Bangladesh, tribal peoples should constitute no more than between 1-2% of the total population of Bangladesh. Although the tribal peoples are scattered all over Bangladesh, they are overwhelmingly concentrated in several geographical pockets; namely North-West (Rajshahi and Dinajpur), North-East (Sylhet), Central region (Dhaka and Mymensingh), South (Barishal and Patuakhali), with the most significant concentration in the Chittagong Hill Tracts (CHT). In North-west region (Rajshahi division - includes Rajshahi, Naogaon, Chapainawabganj, Natore, Sirajganj, Pabna, Joypurhat, Dinajpur, Thakurgaon, Rangpur, Bogra and Gaibandha district): major tribal communities are: Santal, Uraon/Oraon, Munda, Mahato, Paharia, Malo, Pahan, Rajbongshi, Rajooar, Karmakar and Teli); North-east region (Sylhet division - includes Sylhet, Sunamganj, Habiganj and Moulvibazar district: major tribal communities are; Khasia, Patro, Monipuri, Garo, Tripura and tea garden communities); Central region (Greater Mymensingh and Dhaka - includes Gazipur, Tangail, Sherpur, Jamalpur, Netrokona, Mymensingh): major adivasi communities are: Garo, Hajong, Koch, Banai, Rajbangshi, Dalu, Barman and Hodi; Coastal region (Khulna, Chittagong and Barisal division - includes Patuakhali, Barguna, Chandpur, Chittagong, Cox's bazar, Khulna, Satkhira): major tribal communities are Rakhhaine, Tripura, Munda and Ranbangshi (MoHFW, 2017). In CHT the indigenous communities are Chakma, Marma, Tripura, Tanchangya, Mro, Lushai, Khyang, Khumi, Chak, Pangkhua, Bawm, Santal, Rakhaine, Asam/Asamese and Gorkha (BBS, 2009; Das, 2009; Salam and Aktar, 2014; MoHFW, 2017). The tribal communities are mostly dependent on agricultural sector, for example 80% tribal in plain lands are dependent on agricultural farming (MoHFW, 2017). The ethnic households live in the Chittagong Hill Tract (CHT) region are generally very poor, illiterate and their livelihood mostly depends on shifting cultivation and wage earnings (Uddin *et al.*, 2000). Selling of firewood, bamboo, timber, fruits, indigenous vegetables, livestock and poultry also provide additional income for their livelihood (Miah and Islam, 2007). Most households have few assets other than family labor (unskilled) and some land. Although a major share of their income come from agriculture, but this sector is highly constrained by limited cash and modern technology for higher production (Chowdhury *et al.*, 2004).

Steep slopes, low soil fertility, low moisture-holding capacity are also the major constraints of agriculture development in the CHT region (Brammer, 1997).

Most of the ethnic people in the CHTs were not secured throughout the year in relation to food availability. The harvests are often damaged by extreme weather conditions and pests (rats, boars etc). Excessive rains and flooding during the monsoon often results in localized crop losses and it was predicted that the ongoing rat infestation would result in further reductions in harvests and seed stocks, and in some cases had already led to 85% reduction in yield of the annual harvest. Depending on the severity of the food shortages, households adopt a range of coping strategies. Spending may be diverted from education, clothing and medicines towards food purchases. Family members engage in day labour for wages in towns and Jhum field, with labourers earning approximately USD 1.7/day. The households changed their eating patterns, taken smaller meals less regularly, and moved from nutritious foods such as rice, to less nutritious forest foods, some of which are unfit for consumption. The sales of livestock and borrowing from various sometimes exploitive sources support households during particularly poor harvest years. Dutta (2000) indicated that, 77.25% ethnic households were food unsecured.

Plate 1.4 Tribal women in Dinajpur district

Plate 1.5 Tribal women in Bandorbon district

1.8 Shrimp industry in Bangladesh and women empowerment

Bangladesh has achieved remarkable progress in the fisheries sector since its independence in 1971. Fisheries sector have been playing a very significant role and deserve potential for future development in the agrarian economy of Bangladesh. At present the fisheries sector in Bangladesh represents as one of the most productive and dynamic sectors in the country. This sector plays a significant role in employment, nutrition, and foreign exchange earnings in the economy of Bangladesh. About 1.25 million peoples are directly involved in fisheries sector in Bangladesh (Saiful, 2013). Bangladesh is one of the world's leading fish producing countries with a total production of 4134434 MT in the financial year 2016-17 (DoF, 2018). This sector contributes 3.61% to the national GDP and almost one-fourth (24.41%) to the agricultural GDP (DoF, 2018). In recent years, this sector performs the highest GDP growth rate in comparison to other agricultural sectors (crop, livestock and forestry). Besides, Bangladesh is now sufficient in fish production. The growth rate of this sector over the last 10 years is almost steady and encouraging, varying from 4.76% to 7.32% with an average 5.61 percent. The country's export earnings from this sector are 1.51% in 2016-17. It provides about 60% of the animal protein intake and more than 11% of the total population of the country is directly or indirectly involved in this sector for their livelihoods (DoF, 2018).

Plate 1.6 Women in shrimp processing plant

Bangladesh's fish production system has undergone drastic changes mostly for local absorption of fish, technological improvement, people's purchasing power and continuous declining of wild sources changes the country's aquaculture scenario. The changes in the shrimp-prawn based seafood production are due to high international market prices and global demand for shrimp, particularly from the USA, Japan and Europe (Ahmed, 2013). This shrimp and prawn production system has developed through a long period of time, where the majority of shrimp farming area was converted from a single rice cropland (Islam *et al.*, 2014). This introduction will describe the evolution of the export-oriented shrimp production system, the current post-harvest characteristics of this system, then explain how this drastic shift towards an export-orientated product has been criticized in the literature for threatening local food securities. This paper will then provide an evidenced-based rebuttal, showing how export-oriented shrimp culture is actually supporting local food security.

In recent years shrimp aquaculture has expanded rapidly in coastal Bangladesh. It has also made its way in inland areas suitable for fresh water prawn cultivation. As a result, shrimp farming has become the second most economically important activity after rice production in rural Bangladesh. All these changes in the primary industry sector have been due mainly to the highly favorable ecological conditions for exportable shrimp farming, increased costs of shrimping, effects of government priority and various resultant policies for the shrimp industry, significant increase in the application of modern technology, and highly encouraging international market signals both in terms of price and demands (Hamid and Alauddin. 1998).

Shrimp production in the coastal areas (Khulna, Satkhira, Bagerhat and Cox's Bazar districts) has led to the change of the total landscape. It has been created a huge employment opportunity for the people of our country. The direct labor force employed in the shrimp sector is over about 500,000 in our country of where more than half of the labors are women (Halim, 2004).Women in the shrimp production mainly get work as wage laborers, building the embankments around prawn ponds, maintaining service roads and weeding in the shrimp fields. Women do various types of work related to shrimp production like collecting shrimp fry, preparing *gher* as day laborers, clearing the aquatic culture and working in the processing plant (Mehra and Rojas, 2007). It is mostly the poor women who are working in the shrimp sector. Workers who work in shrimp industry, suffer from various diseases such as colds, severe muscle strain, back pain, irritation of the eye, diarrhea, and other stomach related diseases, and cuts and bruises (Halim, 2004).

Plate 1.7 Women in freezing and packing site in shrimp processing plant

1.9 Nutritional status

Nutritional status and dietary nutrient intakes of any population are the outcomes of their living standards, academic and practical education; economic and demographic status. The socio-economic variables directly or indirectly influence nutritional status of the community members by impacting their food consumption pattern and other activities. Income, education and occupation are indirectly influences nutritional status of any population. Nutrition knowledge influence right kind and quality of food consumption which is related to good nutritional status. Medical and scientific study of the measurements and size of the human body is known as anthropometry.

In anthropometry, body mass index (BMI) is one of the best indirect methods for the estimation of body fat and mass (Bhattacharya and Sengupta, 2018). BMI was formerly known as the Quetelet index. It was developed by Adolphe Quetelet during the 19th Century. BMI is very easy to measure and calculate and is therefore the most commonly used tol to correlate risk of health problems with the weight at population level. Weight and height are used for computing BMI. For example, an adult who weighs 50 kg and whose height is 1.60 m will have a BMI of 19.53. According to Asia-Pacific classification of BMI, 25.0 or more is overweight, while the healthy range is 18.5 to 22.9. BMI applies to most adults 18-65 years (WHO, 2004).

1.10 Dietary intake (7 days food intake)

Dietary intake refers to the daily eating patterns of an individual, including specific foods and calories consumed and relative quantities. Dietary intake is evaluated by recording the types and amounts of foods consumed daily by the individual and the health and lifestyle factors that influence eating patterns. Inadequate dietary intake, intestinal parasites, and chronic diarrhea combine to produce poor nutrition. The reasons for inadequate intake include (1) insufficient land to produce enough food to sustain the family; (2) no refrigeration and only limited techniques for food preservation and storage; (3) the rigidity of traditional lifestyles that determine food types, cooking styles, and farming techniques and that obstruct change; and (4) large families and rapid population growth that overburden existing resources. Successful obesity treatment depends on a combination of diet modification and increased physical activity (Ruban *et al.*, 2019).

Dietary intake is an indirect method for measuring nutritional status of the respondents. Knowledge of the regulation of food intake is crucial to an understanding of body weight and obesity. Traditionally the most common dietary

intake monitors the diet for 7 consecutive days. This time period allows for collecting information about the diet minimizing bias related to the day of the week. It also helps collect information about those foods eaten less often (Ortega *et al.*, 2015).

1.11 Physical Activity

The average PAL of healthy, well-nourished adults is a major determinant of their total energy requirement (Erlichman et al., 2011). As growth does not contribute to energy needs in adulthood, PAL can be measured or estimated from the average 24-hour TEE and BMR (i.e. PAL = TEE/BMR) (WHO, 1985). Multiplying the PAL by the BMR gives the actual energy requirements. For example, a male with a PAL of 1.75 and a mean BMR of 7.10 MJ/day (1 697 kcal/day) would have a mean energy requirement of 1.75 × 7.10 = 12.42 MJ/day (2 970 kcal/day)

Overall, strong evidence demonstrates that compared to less active adult men and women, individuals who are more active:

- have lower rates of all-cause mortality, coronary heart disease, high blood pressure, stroke, type 2 diabetes, metabolic syndrome, colon and breast cancer, and depression;
- are likely to have less risk of a hip or vertebral fracture;
- exhibit a higher level of cardiorespiratory and muscular fitness; and
- are more likely to achieve weight maintenance, have a healthier body mass and composition.

1.12 Haemoglobin (Hb), serum ferritin and trace elements in women

1.12.1 Haemoglobin (Hb)

Hemoglobin is made up of four protein molecules (globulin chains) that are connected together. The normal adult hemoglobin (Hbg) molecule contains two alpha-globulin chains and two beta-globulin chains. Two sub units of heam combains with 2 alpha chains and another two sub-units of heam combains with two beta chains. Each alpha chain contains 141 amino-acids. Each beta chain contains 146 amino-acids. WHO (2011) classified anemia status one the basis of Hb level as (<8.0 g/dl) severely anemic, (8.0-10.9g/dl) moderate anemic, (<11.0-11.9 g/dl) mild anemic and (>=12 g/dl) non anemic.

The iron contained in hemoglobin is also responsible for the red color of the blood. Hemoglobin plays an important role in maintaining the shape of the red blood cells. In their natural shape, red blood cells are round with narrow centers resembling a donut without a hole in the middle. The shape of red blodd cells disrupt and obstacle their function through blodd cells due to abnormal hameoglobin structure.

Haemoglobin concentrations are important for the diagnosis of anaemia and assessment of severity. Low or high hemoglobin concentrations were associated with elevated cardiovascular and all-cause mortality. Reaching and maintaining hemoglobin concentrations within the normal range correlated with decreased all-cause mortality (Lee *et al.*, 2018).

1.12.2 Serrum ferritin and trace elements

Ferritin is a protein that stores iron. Ferritin is a ball shaped protein which can store about 4500 iron atoms (Fe^{3+}) in its interior. Ferritin is a globular protein complex consisting of 24 protein subunits and is the primary intracellular iron-storage protein, keeping iron in a soluble and non-toxic form. Inside the sphere, iron is stored in the Fe(III) oxidation state. Inside the ferritin shell, iron ions form crystallites together with phosphate and hydroxideions. The resulting particle is similar to the mineral ferrihydrite, which is attached to the inner wall of the sphere. Up to 4500 ion can be stored although the normal value is about 2000. Low levels of ferritin lead to iron-deficiency anemia. In adults, low iron levels usually happen because of long-term (chronic) blood loss. This can also happen during pregnancy or breastfeeding. High levels of ferritin can damage joints, heart, liver, and pancreas. In women, 10 to 120 ng/mL for adult females, 18 to 39 years 12 to 263 ng/mL for females, 40 years

and older are optimum (Adam, 2008). According to WHO classification cutoff point for ferritin is 15 µg/L i.e. <15 µg/L is below cutoff level whereas >15 µg/L is > cutoff level.

Human needs trace minerals for the body to perform essential metabolic and physiological acti vities. Inflammation and infection cause changes of the levels of iron (Fe), zinc (Zn) and copper (Cu) levels in the sera of human body. Acute phase of proteins, for example ceruloplasmin are associated with these elevated levels (Barber and Cousins, 1988). Iron in haemoglobin is found in Ferrous (Fe^{2+}) condition. Iron is attached to the nitrogen of each pyrrole ring and to the nitrogen of iminazole group in the associated globin, a bond is available for loose union with O_2 (in oxy-haemoglobin), or CO (in carbomonoxy haemoglobin). Iron cutoff point is 11 µg/L i.e. <11 µg/L is below cutoff level while >11 µg/L is above cutoff level. Zinc compound of above 200 enzymes which perform different activities, for example, immunity and metabolic functions (Tudor *et al.*, 2005). For Zn <10.1 µg/L in blood serum consider as above cut off level and >10.1 µg/L is considered as above cut off level. Another essential nutrient, Copper (Cu) is widely found in food and water as well. For oxidative metabolism different metalloenzymes are required, including cytochrome oxidase, feroxidase, amino oxidase, superoxide dismutase, ascorbic acid oxidase and tyrosinase (Panemangalore and Bebe, 1996). Iron plays a very effective role in the oxygenation of tissues that is incorporated in the haemoglobin structure (Peralta *et al.*, 1999).

1.13 Food security

Food security is defined as a state in which "all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life" (USAID, 1992). Food security is a growing concern in current world. In fact, food and livelihood security is a matter of concern for the well-being of the socity. Adequate and sustainable access to income and other resources to meet households daily basic needs is reffered as livelihood security (Frankenberger, 1996). In the society when all people, at all times, have physical and economic access to sufficient, good food which meets daily dietary needs and food preferences for an active and healthy life we can say food security exist in the family. Various exogenous and endogenous factors influence household food security. Since, poor people in rural areas and in the city are involved in agriculture and shrimp processing activities food insecurity might be common scenario among these households. Total farm output is influenced by household size, average food price,

farming experience, education of the respondents, farm size, training, credit, extension contact, etc. which impact on food security (Jamaluddin *et al.*, 2010).

Food and nutrition technical assistance (FANTA) and its partners have identified a set of questions that have been used in several countries and appear to distinguish the food secure from the insecure households across different cultural contexts. Household food insecurity access score (HFIAS) vary from 0-27 and categorized as severely insecure, moderately food insecure, mildly food insecure and food secure. The higher the score, the more food insecurity the household experienced. The lower the score, the less food insecurity a household experienced (USAID, 2007). A food secure household experiences none of the food insecurity (access) conditions, or just experiences worry, but rarely. A mildly food insecure household worries about not having enough food sometimes or often, and/or is unable to eat preferred foods, and/or eats a more monotonous diet than desired and/or some foods considered undesirable, but only rarely. A moderately food insecure household sacrifices quality more frequently, by eating a monotonous diet or undesirable foods sometimes or often, and/or has started to cut back on quantity by reducing the size of meals or number of meals, rarely or sometimes. A severely food insecure household has graduated to cutting back on meal size or number of meals often, and/or experiences any of the three most severe conditions (running out of food, going to bed hungry, or going a whole day and night without eating), even as infrequently as rarely (USAID, 2007).

1.14 Employment impact on agriculture, tribal and shrimp women

The economy of Bangladesh is expected to be self-sufficient (meeting domestic demand) agriculture and shrimp is the 2nd largest export items of Bangladesh. At present Bangladesh agriculture is largely depended on women workers, directly through their involvement in the agricultural production and indirectly through contributing to the family (Smith *et al.*, 2003). It is, therefore, utmost importance to know the actual nutritional, socioeconomic condition and lifestyle of women workers in this sector. Without full understanding of their conditions, the prospects of Bangladesh agriculture may be jeopardized. However, there are gaps in literature in understanding the employment and its impacts on socioeconomic conditions of agricultural women workers. This study fills up the gaps in the literature.

Women make significant contribution to the economy and agriculture. Apart their routine household work, women are very actively involved in agricultural production and fisheries as well as industrial production in Bangladesh. They contribute

enormously to the national development. Women are in general responsible for most of the agricultural work in the homestead, farm activities in the homesteads, ranging from plantation of seed to harvesting and storing of crops, are predominately managed by women. In case of tribal people, the women are responsible of plantation of storing of crops that means they are involved in the whole process. The women's role in nation developing activities, deprive them of equitable economic opportunities, rights and access to resources. Women employment is indispensable in improving the lifestyle quality and national development of Bangladesh.

However, their contributions often remain unattended. Even government programs often fail to focus on women contribution to agriculture, fisheries, manufacturing industries etc. This undermines the potential benefits from programs, especially those related to food production, household income improvements, nutrition literacy, poverty alleviation and population control. There is a lack of primary data on the socioeconomic status of women and particularly on the health, nutrition and lifestyle. By collecting and compiling large scale primary data, this study fills the information gap and contributes to the national development.

Finally, this study makes a novel contribution to the literature by studying the socio-economic status of tribal women in agriculture. Previous studies have examined the core contribution of general rural women in rice production in Bangladesh (Rahman *et al.*, 2016). However, there is no comprehensive study so far on tribal agricultural women. Dearth of information also exists on women's involvement in agricultural production and shrimp industry in Bangladesh. The study would be beneficial for the policy makers, researchers and students to understand the current socioeconomic status of women working and contributing in 1) agriculture, 2) tribal women involved in agriculture sector and 3) shrimp women workers in processing plants. In this study, we investigated the association of essential trace elements such as zinc (Zn), copper (Cu) and iron (Fe) levels in serum of the employed and the non-employed women in agriculture, tribal agriculture and shrimp sector women. In fact, assessing life style pattern, housing condition, income, health, nutritional status, food security and trace elements in women body are very much important for policy formulation. This study covered detailed information on the above issues of the employed and non-employed women from general agriculture, tribal agriculture and women working in shrimp processing plants.

1.15 Conceptual framework and hypothesis

The study is first of its kind to investigate the women health, nutritional and food security impacts of employment using primary data. We hypnotized that significant impact of employment on women health, nutrition and food security, but there could be diversity in terms of demographic characteristics and different sub-sectors, such as general agriculture, tribal agriculture and shrimp workers. Income can directly influence women well-being and indirectly through the improvement of income and empowerment. The main hypothesis to be tested is:

Alternative Hypothesis (Ha): Women employment has significant and positive impacts on women wellbeing and the impact may differ across demographic factors and working sectors

Null Hypothesis (Ho): There is no significant impact of women employment on women wellbeing and the impact does not differ across demographic factors and working sectors

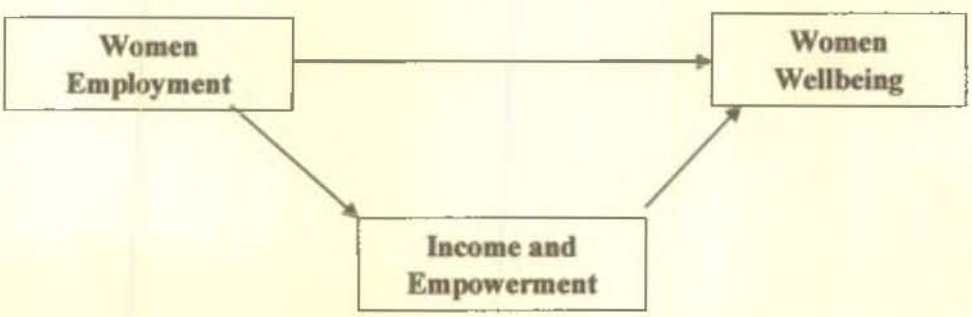


Figure 1.3 Connectional framework of the study

Financial solvency and job security are supposed to ensure more income, better life style, hygiene practice, good maternal health and better nutritional status than the non-employed women in the same community. So hypothesis was as follows:

- Employed women will have more income than the non-employed women
- Women employed in agriculture and shrimp sector have better life style than the non- employed women
- Sanitation (personal hygiene) status are speculated to have better than the non- employed women
- Body mass index are expected to be better in employed women than the non-employed women

1.16 Objectives of the Study

Objectives of the study are to find out the effect of the life style, health, nutrition and food security of the employed and the non-employed (control) women in agriculture and shrimp sectors.

Specific objectives: The specific objectives are to

- assess the lifestyle and socio demographic characteristics of the study population
- assess the health status and health facilities enjoyed by the employed and non-employed (control) women in agriculture (general and tribal) and shrimp sectors
- assess the nutritional status and nutrition knowledge of the employed and non-employed women
- assess dietary food intake and physical activity level of the employed and non-employed women
- evaluation of the food security at households level of the employed women and non-employed women in these sectors, and
- to find out impact of employment on life style, health, nutrition and food security

Chapter two

LITERATURE REVIEW

LITERATURE REVIEW

Food and Agriculture Organization of the United Nations (FAO) (2012) stated that nutritional status of women largely depends on poverty situation and more than 50 percent of women are suffering from chronic energy deficiency in Bangladesh. Whereas Rahman (2011) stated that not only poverty situation but also education, employment, residence and so forth aspects are significantly determining nutritional aspects of women in our country. Bangladesh Bureau of Statistics (BBS) (2011) demonstrated that percentage of malnourished women is different from rural to urban area. Rural area might have more than double malnourished women who are related to agriculture than that of urban areas and the percentage of the malnourished women largely vary according to their educational status. Rahman and Karim (2013) also stated that the rate of hunger and malnutrition is high in Bangladesh where approximately 31 percent of the rural women in Bangladesh suffer from chronic poverty which is characterized by low food consumption, lack of access to foods and under nutrition.

International Food Policy Research Institute (IFPRI) (2000) affirmed that the women of our country spend a large time for cooking and household activities but they take less amount of balanced diet as a result they suffer from malnutrition, especially pregnant and adolescent girls. Ministry of Food and Disaster Management (MoFDM) (2005) also described that the most vulnerable groups are women and children. The deficiency in the intake of micronutrients including iron and vitamin is more acute, particularly among women and children in our country. Mozdalifa (2012) blamed the unequal distributions of wealth and social custom which is responsible for food insecurity of women in Bangladesh. She also described that mothers and wives have to take food at last and girl children are given less food than their male counterparts of the households in rural Bangladesh due to social custom which are making women largely food insecure. Rahman *et al.* (2012) also described that women are largely affected by the social discrimination from the beginning of their life within the family. In a social structure of a patriarchal society like Bangladesh, women and girl child are deprived of improving their nutritional status. They are getting less diet than their male counterparts are and remain malnourished. Whereas Mallick and Rafi (2010) stated that the absence of social and cultural restrictions among the tribal groups permitting their females greater freedom to participate in the labor force coupled with informal redistributive mechanism is attributed to their less food insecurity.

According to Snyder (1990) as the composition and structure of rural household's changes, gender responsibilities are under-going rapid change, typically with rural

women becoming more responsible for household food security and children's welfare. One powerful indicator of these changes is the incidence of female-headed rural households, which is on the increase in most developing countries. Hashmi *et al.* (2007) found that working married women have to face more difficulties in their lives like they experienced more stress and depression as compared to non-working married women. According to Gopalan (1999) anemia is the most widely spread disease currently affecting women. It can affect rural women in various ways and thus hampering their physical and mental health. Its clinical manifestations are not spectacular and for this reason the disease is often ignored. Even women also are not much concern about such anemia problems. The working women, performing dual role at home as well as outside in the profession, often undergo the stress and strain and frequently neglect dietary intake and are compelled to neglect their own health due to pressure of work. Such situation gradually leads to the occurrence of anemia, which is not often noticed.

Sultana *et al.* (2014) described that hundred percent of female workers without having any prior idea about garments production and the additional health affecting issue is that they work on an average 12 hours per day. Their reproductive health is at risk due to poor dietary intake, among other reasons. Akhter and Sondhya (2013) also stated that women in Bangladesh are more malnourished than men at every stage of life because they have poor knowledge on what food is enriched with protein, carbohydrates, vitamins or minerals but this phenomenon is more visible in the case of adolescent girls and pregnant mothers. Whereas Dipti *et al.* (2008) demonstrated that malnutrition is not only a problem among the pre-school children but also among households specifically those whose heads belong to the occupational groups that are nutritionally disadvantaged like the factory workers. It adversely affects women's physical and mental development as well as productivity and the span of productive years.

Aich *et al.* (2014) affirmed that socio-economic and nutritional status of women is directly connected with their economic position, which in turn depends on opportunities for participation in economic activities. The economic conditions of women have profound effect not only on women's own but also on that of their children and families and on subsequent generations. Where Afrosea *et al.* (2012) emphasized on education and said that female workers in Bangladesh who are related to agriculture tend to have very little education as they drop out of school early to help support their families, and some are illiterate. Not only agriculture related worker but also female garment workers had inadequate knowledge

regarding nutrition and reproductive health which has long term effect on their life spam. On the other hand, Khatun *et al.* (2013) stated that amongst the workers about 70 percent are women, who work dawn to dusk even up to late night when their wages are not in the satisfactory level. They cannot afford their foods, cloths, housing, medicines and educations of their wards as they are ill paid. In every aspect of life they are receiving less attention, especially in terms of food and health care. Female garments worker are the worst sufferers. During activity nutritional demand of the garment worker are commonly not met and they lose their vigor and strength.

Zaman (2002) stated that in the rural areas, the women form about half of the rural populations are particularly disadvantaged. They have been contributing significantly through their agricultural and household works but, their efforts do not get reflected in the official statistics. The rural women have in particular, been continued to be downtrodden, oppressed and worst sufferers both at home and outside in the society. Zaman (2014) also a large number of female workers often find themselves under compelling conditions where they have to work longer than regular working hours even during the holidays or may have to take an extra load of work which they are not supposed to do. There are many factors behind the helplessness of the female workers at work migration from villages to the cities due to poverty, no earning member in the family, lack of educational qualification, no knowledge of the labor law.

Islam and Mia (2007) conducted a study and described that women are now increasingly participating in labor force in rural areas in Bangladesh. This change is attributed to several factors such as increasing landlessness, population pressure, interventions from government organizations (GOs) and non-government NGOs promoting income-earning activities particularly micro-credit support to cover both conventional and non-conventional vocations. Democracy Watch (2014) reported that in the rural area women are involved in agro based work as a day labor. But now they want to change their occupation and for this purpose a large portion of rural women migrate to urban area which create job opportunities for them to work in variety of occupations for earning money.

Bangladesh Bureau of Statistics (BBS) and Asian Development Bank (ADB) (2010) demonstrated that formally employed women are more likely to be working as professionals, plant machine operators and assemblers, and laborers. On the other hand, informally employed women are predominantly related to agriculture and fishing industry. Islam (2003) stated that many changes have been happened in the lives of women in Bangladesh with the advent of the ready-made garments industry. The social changes include greater acceptance of women's employment, increased

participation of women in decision-making in the house and in decisions around childbearing and a reduction in fertility are taken place in our country. These changes have coincided with other changes such as a decline rural poverty as well as emphasis on girls' education and on women's health.

Sikdar *et al.* (2014) conducted a study on garment worker and stated that housing and trasnporation problems are faced by the female garment workers. Sound ppollution causes regular headache at home and working place. Physical weakness and eye trouble was reported by the workers. They got illness when they work continually onward. But most of the garment industries are lacking proper medical facilities. Ali et al. (2008) also discovered that work at the fish industry is exhausting the health of the female worker. Unhealthy working environment is one of the dominant reasons for most of the worker's illnesses like headache, malnutrition, vomiting tendency, etc. Low level of education among the female workers was responsible for most of the socioeconomic problem facing the female workers in the garment industry.

Kabir *et al.* (2012) stated that rural women play an important role in the highly labor intensive production process, but within the confines of their own front yard. Most of the housewives in rural and urban areas of Bangladesh contribute to their family income through active participation in crop, livestock, poultry, fisheries, nursery, vegetables cultivations, handicrafts as well as participating in non-farm activities. Although women contribute considerably to rural economic activities, women gain neither recognition nor status from their work. Rahman and Davis (2005) also affirmed that in our society assets are individually owned and women tend to have very few in their name. It is noted that additionally some women are involved in marketing, cutting and processing grasses and catching fish using traps in floodplains. Bishwajit *et al.* (2014) also described their study that food security relates directly to nutrition and health of women which consequently influences a nation's health and economic status. Despite Bangladesh has changed its status from a country with chronic malnutrition and poverty but it still faces health security challenges for women and few non-agricultural factors like shrimp industry is responsible for aggravating the food insecurity scenario in our country.

Haque *et al.* (2014) stated that malnutrition in different grades (underweight, wasting, stunting) among women of reproductive age in hilly area is an alarming threat through life because they have very little information about the nutritional status of these women living in hilly area. Whereas, Ministry of Health and Family Welfare (MoHFW) (2011) reported that the socio-economic needs, health-seeking behavior,

perception of family planning, practices affecting nutritional intake and aspirations vary from one tribal community to another. Tribal women are less educated compared to their male counterparts as well as compared to national as a result they face more health vulnerabilities than Bangle women. Mullah *et al.* (2007) conducted a study on tribal and stated that there are many acute problems of the tribal peoples in our country that needs immediate attention and early solution. The problems relate to various aspects of tribal peoples like social, economical, educational, health, religion, land, law and order situation, self-centered tendency. On the other hand Ali (2009) demonstrated that most tribal women's lives remain centered on their traditional roles, and they have limited access to markets, productive services, education, health care, and local government. This lack of opportunities contributes to high fertility patterns, which diminished family well-being, contribute to the malnourishment and generally poor health of children, and frustrated educational and other national development goals.

Women's ability to generate income in the agricultural sector is severely constrained by their limited use, ownership, and control of productive physical and human capital. Moreover, they could not take part in any social decision making or social events independently particularly in developing countries. Bangladeshi women are disadvantaged relative to men with respect to assets brought to marriage, current productive assets (including land, livestock, and agricultural machinery) and human capital. Women lag behind in terms of education in Bangladesh with more than one in three women having no schooling, compared to one in four men. A recent analysis also showed that lack of education in adult women in Bangladesh is a strong correlate of being "ultra-poor": 80% of adult women with no education live below half a dollar a day (Ahmed *et al.*, 2007).

Smith *et al.* (2003) find that women with higher status relative to men have greater control over household resources, fewer time constraints, better access to information and health services, and better mental health, self-confidence, and higher self-esteem. Women with greater status have better nutritional status, are better cared for themselves, and provide higher quality care to their children. In many societies, women also play an important role in agriculture, although this role has tended to be unrecognized or incorrectly measured. Although the biological processes underlying optimal nutrition are relatively well understood, knowledge regarding which dimensions of women's empowerment matter for good nutrition is limited, both because empowerment is culture- and context-specific and because of

the difficulty of measuring empowerment. This lack of knowledge constrains the set of policy options that can be used to empower women and improve nutrition.

A Survey of modern living, examined self-esteem, psychological well-being, and physical health of 389 women (206 employed outside the home and 183 homemakers). Results indicate that working women had higher self-esteem and less psychological anxiety than homemakers. Working women also reported better physical health than home makers (Coleman and Antonucci, 1976). Majority of the literature reported that work has positive impact on women lifestyle, health and nutritional status. Besides their income contribute much in improving family wellbeing status.

Pleck's (1977) research suggests that family-to-work spill-over is stronger for women and the work-to-family spill-over is stronger for men. Research suggests that female respondents in all parts of the world are pressured for time, rarely have time to relax and feel stressed and overworked most of the time, but women in emerging countries feel the strain even more so than women in developed countries. Women in India (87%) are most stressed/pressured for time (Nielsen Survey, 2011).

Sanlier and Arpaci (2007) studied the e□ect of stress on women health. Results reveal that employed women in the stress scale have a higher average score than that of the non- employed women. It has been determined that total stress scores of employed women were higher as compared to non- employed women and that there was a significant deference between women's working status and total stress scores. Employed women had higher level of stress than non- Employed women.

Chaudhari *et al.* (2014) studied that increase in stress levels are found in female health care professionals in the Eastern part of India due to shortage of manpower, lack of infrastructure, long emergency duty hours and inadequate remuneration for their hard work. Practicing relaxation exercises had decreased not only the stress levels but also increased the quality of their life and most important patient care.

Devadarshini (2010) analyzed the impact of shift work on nutritional status, lifestyle and health status of shift workers. The study assesses the nutritional status and life style in shift workers to document their health problems. The software professionals were considered for the study. Information on nutritional status, food habits, lifestyle, and health status were collected by a structured and pre-tested questionnaire. Researcher analyzed that, majority of the day workers (41.7%) were having ideal BMI, whereas, 55.9 per cent shift workers were in obese grade I group. Analysis of diet survey revealed no significant difference in the intake of food as well as nutrients

between the day and shift workers. Tobacco consumption and alcohol consumption was significantly higher in shift workers. Higher consumption of sweet drinks, sweets, baked products, fried items, fast foods and higher frequency of missing meals was found in shift workers than day workers.

Sudo and Ohtsuka (2001) investigated on nutrient intake among female shift workers. Based on a questionnaire survey for all meals and snacks consumed by female workers, the study aimed to clarify the effects of shift work on their nutrient intakes in association with food consumption patterns. The shift workers, particularly the late-shift workers, took smaller amounts of energy and nutrients than the daytime workers. Their inadequate nutrient intake was due to lower meal frequency and poor meal quality, both of which were conditioned by shift work.

Lowden *et al.* (2010) investigated on eating and shift work - effects on habits, metabolism and performance. They investigated that, shift workers were at higher risk of a range of metabolic disorders and diseases (e.g., obesity, cardiovascular disease, peptic ulcers, gastrointestinal problems, failure to control blood sugar levels, and metabolic syndrome). At least some of these complaints may be linked to the quality of diet and irregular timing of eating.

Lee and Kim (2013) studied health-related factors and nutritional status in shift-workers. Study examined the health-related factors and nutritional status of single women workers in their 20's who work night and day shift. The results of the study were summarized as follows: The shift-workers showed lower rate of office tenure, income, job satisfaction, weight and higher rate of weight change than the non-shift-workers. The shift workers showed lower rate of exercise, sleeping hours, good health condition and higher rates of presence of disease, gastric and intestinal illnesses than the non-shift workers.

Reeves (1971) studied on the effect of shift-work on food intake and eating habits. The aim of this study was to investigate the effect of shift work on food intake and eating patterns in order to assess the impact of this on health. The results revealed night workers did not eat more, but ate smaller meals and snacks over a greater time frame. The study suggested that this had the potential to cause difficulties in the establishment of healthy eating patterns.

Most women's lives remained centered on their traditional roles and they had limited access to markets, productive services, education, health care, and local government. The lack of opportunities contributed to high fertility patterns, which diminished family well-being contributed to the malnourishment and generally poor

health of children and frustrated educational and other national development goals. From the above it is found that most of the researcher emphasis on the life style of female garments worker or agricultural worker individually but this study try to find out the relation among shrimp industrial worker, agricultural labor and tribal women comparatively at a time about their health, nutritional and food securities above all their life style.

Chapter three

MATERIALS AND METHODS

MATERIALS AND METHODS

3.1 Study design

This cross sectional study describing the life style, health, nutritional status and the food security among female agricultural worker, female shrimp industry worker and tribal women worker in our country. The study used survey to carry out the study in Chittagong, Mymensingh, Dinajpur, Khulna and Bagerhat of Bangladesh, to solicit authentic and consistent responses directly from the participants to interpret the problems logically and empirically. This study tried to find out the disparity among women about their health, nutritional, status food securities above all the lifestyle on the basis of their occupation and culture. To compare and understand the impacts of agriculture and shrimp industry on women lifestyle the study further interviewed non-employee women within the same community.

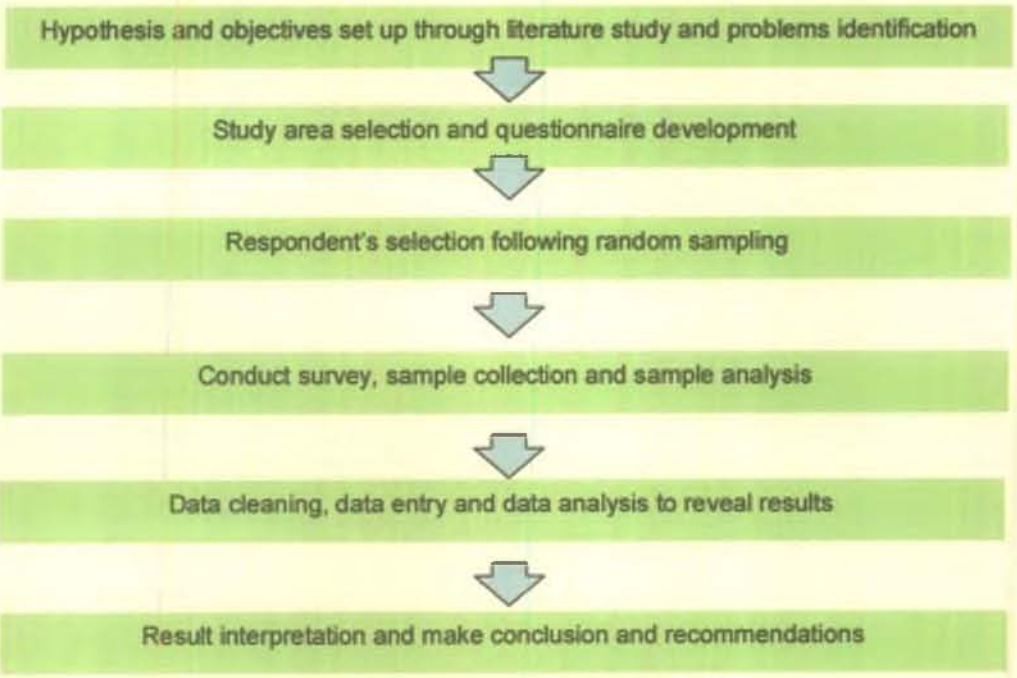


Figure 3.1 Study design framework of the study

3.2 Study Area

This research work was conducted in the selected area of six districts in Bangladesh where Chittagong, Mymensingh, Bandarban and Dinajpur districts were selected due to agricultural production and processing areas where both Bangle and tribal people (Chakma, Garo and Sawtal) were lived. On the other hand Khulna and Bagerhat

district were selected for the availability of shrimp industry where female worker were worked as a labor.

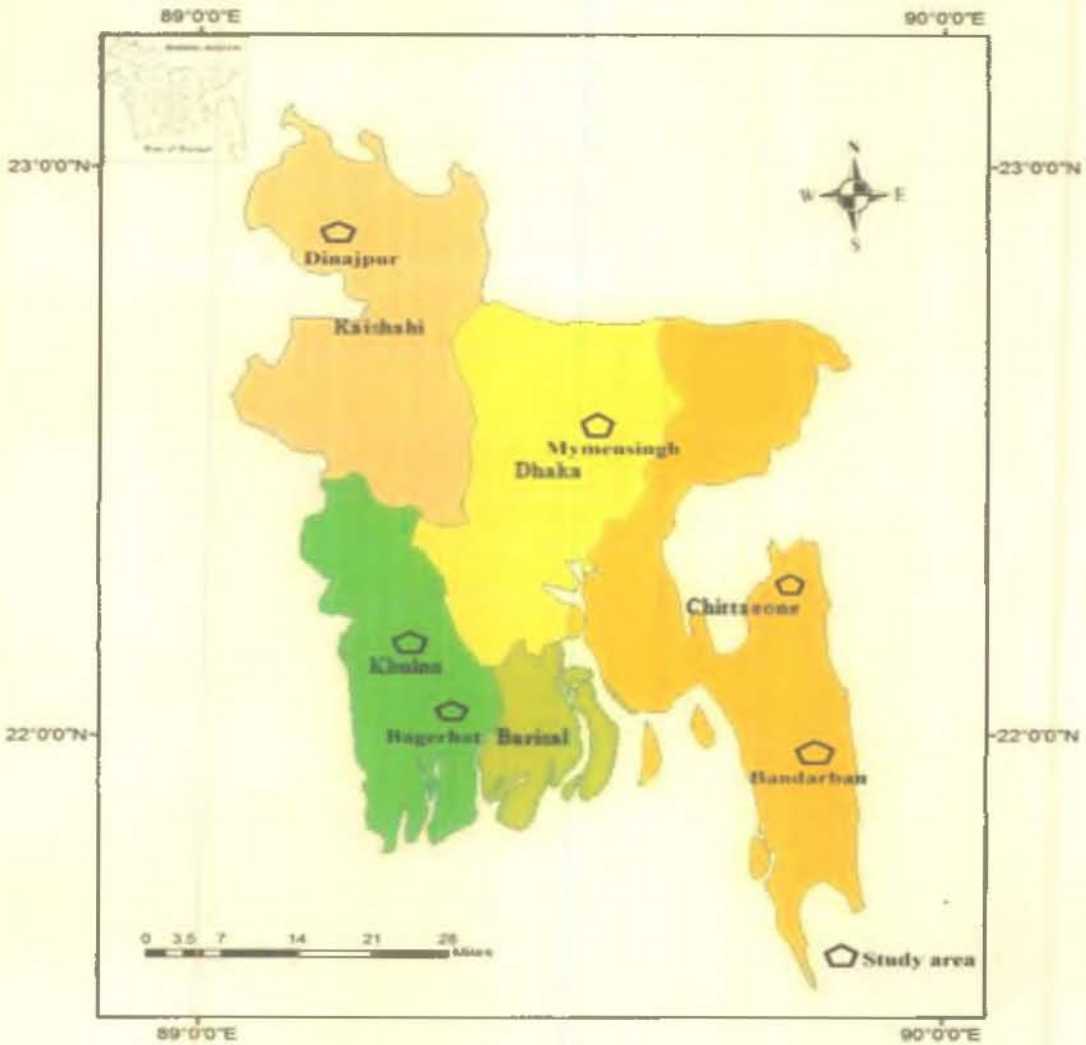


Figure 3.2 Map of the study location

3.3 Study population and sample size determination

The study was conducted on female workers in agriculture and shrimp industry. To achieve the objectives the study was conducted on the female worker whose occupation related to agriculture, tribal and shrimp industry women of Bangladesh. Unit of analysis was selected among the respondents who were 15-50 years old of six selected districts. In non-employed (control) group, women were selected who are

involved in other household income generating activities like seamstress, sewing kantha, dairy farming, poultry farming, servant, rice husking, vegetable farming etc.

The study was conducted on 600 working women and 300 non-employed (control) women comprising agriculture and shrimp workers. Agriculture workers were collected from plain-land population and were from tribal population. The tribal women are involved in whole process of agriculture activities from cultivation to storing of finished products. In general population, women mostly participate in end product processing activities such as sorting out, boiling, husking, drying, storing of harvested product and rice in Chatal.

Plate 3.1 Women labors in agricultural field

Plate 3.2 Women workers in shrimp processing plants

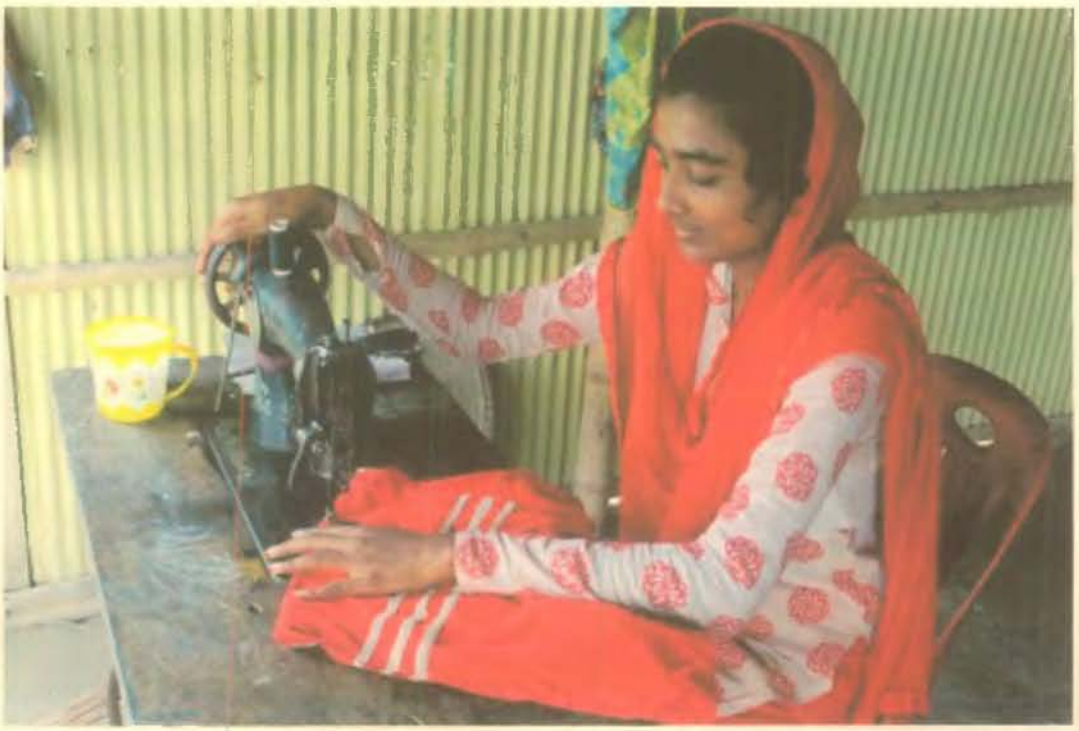


Plate 3.3 Non-employed (control) woman involves in sewing

The objective of the study was to assess the life style, income, health, nutritional status and food security of working (employed) women and non-employed (control) women in agricultural, tribal and shrimp sector. It was very difficult to find out the exact number of female workers related to agriculture and shrimp industry of the selected district. Besides, some areas were very remote to travel and select respondents. So, all the employed and non-employed female respondents in agriculture and tribal sectors were selected from the major districts in agro-ecological zones. Similarly, shrimp women were selected where shrimp processing is maximum in the country.

Sample size was determined using the following formula

$$n=\frac{Z^2 \times p \times q}{d^2}$$

$$n = \frac{(1.96)^2 \times 0.34 \times 0.66}{(0.05)^2}$$

n=335

Since the study would be a multicluster sampling so design effect 1.80 is applied. Then the desired sample to be selected is

335^1.80≅603

Where,
n= minimum sample size prevalence of malnutrition among women
p= 34% estimated prevalence of malnutrition (Child and maternal nutrition survey, 2006, UNICEF)
d= precision level = 0.05
Z= normal variable of 95% Confidence level= 1.96
Design effect= 1.80

3.4 Sampling distribution

Data were collected from the field by using simple random sampling technique. Women with age between 15-50 years were selected for the survey. A total of 900 (Table 3.1, Table 3.2 and Figure 3.3) women were selected from six districts in Bangladesh which include Chittagong, Mymensingh, Bandarban, Dinajpur, Khulna and Bagerhat. Respondents were selected following the ration of the number of respondents in the community.

Table 3.1 Number of women selected from different sectors

	Agriculture	Tribal	Shrimp	Total
Employee	346	104	150	900
Non-employee (control)	173	52	75	

Table 3.2 Women selected from different sectors from different districts

District	Employed women				Non-employed (Control) women				Total women			
	General	Tribal	Shrimp	All	General	Tribal	Shrimp	All	General	Tribal	Shrimp	Total
Chittagong	125	-	-	125	65	-	-	65	190	-	-	190
Dinajpur	135	39	-	174	66	21	-	87	201	60	-	261
Khulna	-	-	123	123	-	-	60	60	-	-	183	183
Bandarban	-	40	-	40	-	11	-	11	-	51	-	51
Mymensingh	86	25	-	111	42	20	-	62	128	45	-	173
Bagerhat	-	-	27	27	-	-	15	15	-	-	42	42
Total	**346**	**104**	**150**	**600**	**173**	**52**	**75**	**300**	**519**	**156**	**225**	**900**

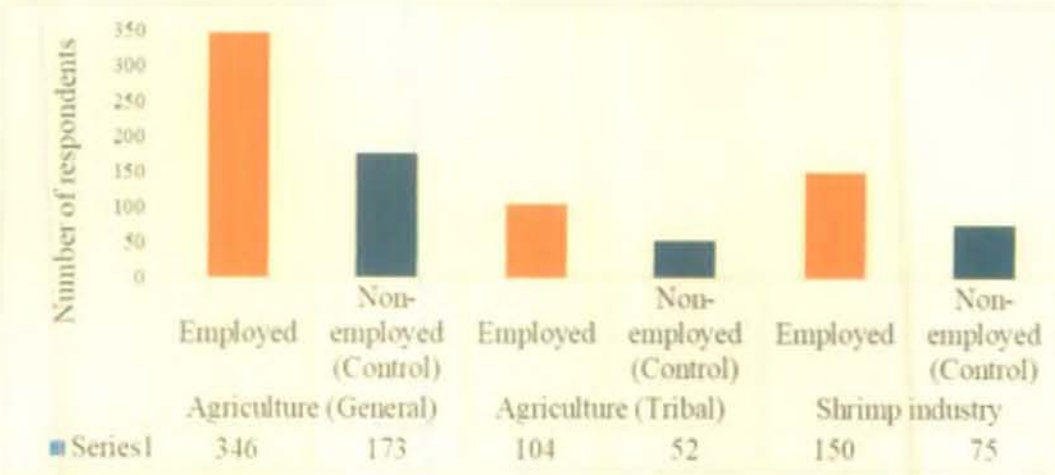


Figure 3.3 Number of respondents from different groups in the study

3.5 Study period

The study was conducted during the period of January 2013 to December 2015. During January 2013 to June 2014 information and samples were collected and analyzed from the employed women. In the second half that is July 2014 to December 2015, information and samples were collected and analyzed from the non-employed (control) women.

Activities	Year	
	Jan 2013-Jun 2014	Jul 2014-Dec 2015
Interview and sample collection from employed women and analysis		
Interview and sample collection from the non employed women and analysis		

3.6 Ethical permission

In the research which involves to human participants need ethical approval to collect blood sample, skin/muscle tissue. This ensures that the dignity, rights, safety and well-being of all participants were in the primary consideration under the project. Study protocol had a description of ethical considerations relating to the study. Ethical approval was obtained from ethical committee of the faculty of Biological Science, University of Dhaka while signature of the respondents were collected on the consent forms on field. Without signature on the consent form this study did not conduct survey and collect sample from any respondent.

3.7 Questionnaire development

The structural questionnaire was prepared after observing the employed and the non-employed communities: identification and informal conversations with key stakeholders helped researchers build positive relationships with respondents as well as understand community dynamics. A questionnaire was designed and prepared to collect and record the life style and socio-demographic, health and nutritional status, food consumption, physical activity data, biochemical analytical data and food security status. Prior to the main survey exercise, a pilot study was carried out with 5 questionnaires in each group, and randomly selected different groups to test for the viability of the questionnaire. After this exercise, the questionnaire was corrected and rightly validated to suit the objectives of the study. Trained personnel engaged along with the author in collecting field data and blood samples form the respondents. Physical activity data of agriculture, tribal and shrimp women were collected according to FAO/WHO Guidelines (FAO, 2001).

3.8 Sources of data

All data collected in this study were primary data. Information and samples were collected directed from the respondents through questionnaire survey and in-situ collection. Data collected were categorized into employed and the non-employed (control). Key informants in each of the areas identified the communities and respondents randomly in each area. Due to time restrictions on the project and remote location of some communities, only the easy accessible communities in both cases were visited in each region.

Plate 3.4 Agricultural women in Moymonsing district

3.9 Process of data collection

In each community focus group discussion (FGD) was conducted before data collection. Normally, an FGD is conducetd through gathering similar background/expertise people in a particular place to discuss a particular topic. FGD is a kind of qualitative research where respondents are asked about their perceptions attitudes, beliefs, opinion or ideas on the topic

Data were collected by direct interviews of selected women using the processed questionnaire and eye observation for understanding the situtaion. Nutritional status of the respondents were measured in both direct (anthropometric, biochemical and clinical) and indirect (dietary intake) methods. Blood samples from women workers were collected by using biochemical indices for analyzing nutritional status. Data on anthropometric parameters (height in cm and weight in kg) were collected from women workers. Among biochemical parameters specially blood glucose (mmol/L),

blood pressure and hemoglobin level (mmol/L) of women of 15-50 years of age were analyzed.

Plate 3.5 Data collection from the agriculture (general) women respondents using semi-structured questionnaire

Plate 3.6Data collection from the agriculture (semi-structured questionnaire tribal) women respondents using

Pate-3.7 Focus group discussion with tribal communittee (FDD) before data collection.

Plate 3.8 Data collection from the shrimp women respondents using semi-structured questionnaire

3.10 Data collection tools

3.10.1 Interview schedule

An interview schedule was prepared to collect data and to construct the interview schedule for data collection, relevant journals, periodicals, reports and books were reviewed to identify the variables related to the study objectives. The variables were incorporated into a structured interview schedule, in English, containing close ended questions in five different sections, focusing on various aspects –

1. Lifestyle: Lifestyle of household of the women working in agriculture and shrimp industries included socioeconomic condition, housing pattern, resource condition, communication facilities, hygiene and sanitation practices. Sources of water, lighting facilities, etc.
2. Health profile: Health profile of these women investigated morbidity, treatment systems, primary health care facilities, maternal health, vaccination, 24 hour activities, dietary habit etc.
3. Nutrition: Nutritional status of the women assessed by measuring anthropometry indices, biochemical indices, blood hemoglobin level, serum ferritin, iron, zinc and copper.
4. Dietary intake: Dietary intake (7 days food intake) of the respondent were calculated to understand the food consumption pattern.
5. Physical activity level (PAL) was assessed by measuring daily activities performed by the respondents
6. Food security: Food security of the respondent households was assessed addressing food availability, shortage and distribution to the household members throughout the year.

3.11 Measurement of anthropometric indices

3.11.1 Body weight: A UNISCALE was used to record the subjects' body weight. It was measured to the nearest 0.5 kg. The balance was placed on hard flat surface. The body weight was recorded by standing unassisted in the centre of the platform of the weighing machine bare footed with straight look head and with minimum cloth wearing.

Plate 3.9 Weight measurement of the respondent women

3.11.2 Height: Standing height was measured using a wooden height scale developed by BBS to the nearest 1cm. Height of the subject was measured bare footed in standing position with heels, buttocks, shoulders and back of the head touching the upright stand, with straight legs and relaxed shoulder and arms hanging by the sides in natural manner.

Plate 3.10 Measurement of height of the respondent women

3.11.3 Body mass index (BMI): The nutritional status of the employed and non-employed (control) was assessed using Body Mass Index (BMI). The BMI is used to measure thinness or obesity (Table 3.3). Weight and height were used for computing BMI in accordance with the reference of WHO using following formula.

$$\text{BMI} = \frac{\text{Weight of the respondent (in kg)}}{[\text{Height of the respondent (in meter)}]^2}$$

Table 3.3 Nutritional status (BMI) estimation units according to WHO (2004)

Nutritional status	BMI
Under Weight	> 18.5
Normal	18.6-22.9
Over Weight	23.0-24.9
Obesity	< 25

3.11.4 Advantages of BMI method

1. BMI are accurate measurements across a group, help physician to gauge general risk of obesity-related diseases
2. The method is simple safe and use non-invasive techniques. The method need cheaper, portable and durable equipment
3. The method is precise and accurate and provided that standard techniques are used
4. The method may be used to changes of nutritional status over time, from one generation to next, known as secular trends

3.11.5 Disadvantages of BMI method

1. Disadvantages are BMI misses' normal weight obesity, overestimates risks for some

3.12 Dietary intake (7 days food intake)

Food consumption score (FCS) was calculated from composite score based on dietary frequency, food frequency and relative nutrition importance of different food groups. Using recall period over the past 7 days food frequency household FCS was grouped into poor (score 1-28), borderline (score 29-42), acceptable low (score 43-52) and acceptable high (score >52). Food items were grouped into 8 standard groups with maximum values of days/week. To calculate FCS, consumption

frequencies of food items were sum and record the value of each group. After that, the obtained value was multiplied by its weight. Finally, weighed food groups scores were sum again to find the FCS. Maximum FCS could be 112 which means respondents ate all food groups in last 7 days.

3.13 Physical activity data collection

Physical activity level (PAL) is a numeric method of expressing one's daily energy expenditure. PAL data in both employed and non-employed women in agriculture, tribal and shrimp sector were collected according to FAO/WHO Guidelines (FAO, 2001). PAL was categorized as: low activity (<1.40), sedentary or light activity (1.40-1.69), active or moderate activity (1.70-1.99), vigorous activity (2.00-2.40) and High activity (>2.40).

3.14 Estimation of biochemical indices

3.14.1 Collection of blood sample: 20µl of blood collected from the tip of the finger with the help of blood lancets. Then blood was taken up in a micropipette tip and dropped on to a strip of filter paper (2.5× 2cm) for hemoglobin estimation.

Plate 3.1 Health status check before blood sample collection

Plate 3.12 Blood sample collection from respondents

3.14.2 Method of measuring hemoglobin concentration

The cyanmethemoglobin is a suggested method of choice because (1) the pigment (cyanmethemoglobin) is stable in dilute solutions, (2) the method measures the hemoglobin derivatives, (3) certified cyanmethemoglobin standards are available and (4) the spectral curve of cyanmethemoglobin is such as to allow the use of many different types of spectrophotometers.

The method has some disadvantages that we consider rather minor; these will be enumerated in the subsequent discussion on erroneous results. The referee laboratory report in the College of American Pathologists' Survey Program for 1971 points out that 97% of all laboratories reporting manual hemoglobin determinations utilize the cyanmethemoglobin method.

Reagent: Diluting solution

Potassium dihydrogen phoaphate, anhydrous (KH_2PO_4)	140 mg
Potassium ferricyanide	200 mg
Potassium cyanide	50 mg
Sterox SE	0.5 mg
Distilled water	to 1100 ml

This diluting solution reaches equilibrium absorption within 2 min after the blood has been added, making rapid determinations possible. Solutions containing surface-active agents such as Sterox should not be shaken violently, since this may cause formation of troublesome air bubbles. Sterox may also cause difficulty in some types of automatic dilutors.

Method

Accurately pipette 0.020 ml well-mixed EDTA-anticoagulated blood into 5 ml diluting fluid, rinsing out the pipette well by repeatedly sucking up the diluting fluid and blowing it out again. Automatic dilutors should be used for this step of the procedure. Mix by swirling or gentle inversion and allow standing for the required length of time. Longer standing does no harm. Read in colorimeter at 540nm. Water blank is usually satisfactory, especially if the photometer is calibrated with this blank, as the absorption of the diluting fluid is very low at 540nm.Obtain the grams of hemoglobin per 100 ml of blood from the calibration curve. This solution for final measurement must be perfectly clear. Any turbidity will cause a positive error. In blood samples containing a very high percentage of gamma globulins (paraproteinemia), turbidity

will occasionally persist. It can be cleared by adding 1 or 2 drops of 1N ammonium hydroxide (7 ml concentrated ammonium hydroxide diluted to100 ml with water).

3.14.3 Estimation of hemoglobin level

The cyanmethemoglobin method was employed to estimate blood haemoglobin using a commercial kit of Human, Germany.

Contents of kit

RGTA	10×25 ml Reagent concentrate A	
	Potassium hexacyanoferrate (iii)	12 mmol/l
	Potassium bicarbonate	230 mmol/l
RGTB	10×25 ml Reagent concentrate B	
	Potassium cyanide	14 mmol/l
	Potassium bicarbonate	230 mmol/l

Preparation of working reagent and stability

One bottle of RGTA and one bottle of RGTB were mixed together with 450 ml deionised water and stored in a close dark glass container at 15 to 25 ° c. This working reagent is stable for 12 months in the dark.

Principle of the method

The method is based on the determination of cyanmethemoglobin which has been adopted as a standard method. Haemoglobin from whole blood sample is released from erythrocytes and is oxidised by ferricyanide to methemoglobin. The methemoglobin is further converted by cyanide to stable cyanmethemoglobin. The absorbance of cyanmethemoglobin is measured at 540 nm and is directly proportional to the haemoglobin concentration in the sample.

Procedure for analysis

Collected and processed blood in a filter paper as stated earlier was soaked in 5 ml of working reagent in a glass test tube for 30 minutes and then centrifuged at 3000rpm for 10 minutes. A 2ml of the clear supernatant was taken into a cuvette of spectrophotometer and the absorbance was recorded after 3 minutes at earliest against reagent blank (ΔA) at 540 nm in a spectrophotometer (UV-1201, UV-VIS, spectrophotometer, Shimadzu Corporation, Japan).

Calculation of haemoglobin concentration

The concentration of haemoglobin in blood was calculated as follows:

Concentration, C= Haemoglobin/4 (Hb/4) (mmol/l) = $22.8 \times \Delta A$

Plate 3.13 Spectrophotometer (UV-1201, UV-VIS, spectrophotometer, Shimadzu Corporation, Japan) and Cuvette

Table 3.4 Anemia status estimation level recommended by WHO

Anemia Status	Level
Severally anemic	> 8.0
Moderate anemic	8.0-10.9
Mild anemic	11.0-11.9
Non anemic	< 12

3.15 Estimation of serum ferritin level

Contents of the kit

1. Microtitre Plate 12×8 wells
   Breakable wells coated with specific antibody contained in a resalable foil bag.
2. Cal A 0 ng/ml 0.5 ml
   Reference standard: Human serum free of ferritin (colourless)
3. Cal B 15 ng/ml 0.5 ml
   Reference standard: ferritin diluted in human serum (colourless).
4. Cal C 80 ng/ml 0.5 ml
   Reference standard: ferritin diluted in human serum (colourless).
5. Cal D 250 ng/ml 0.5 ml
   Reference standard: ferritin diluted in human serum (colourless).
6. Cal E 500 ng/ml 0.5 ml
   Reference standard: ferritin diluted in human serum (colourless).
7. Cal F 1000 ng/ml 0.5 ml
   Reference standard: ferritin diluted in human serum (colourless).
8. Conjugate 11 ml
   Anti-ferritin HRP conjugate: Anti-ferritin conjugate to Horseradish peroxidise. (Pink colour).
9. Substrate Solution 11 ml
   3,3', 5,5' TetramethylBenzidine in a citrate buffer (colourless)
10. Stop solution 11 ml
    Hydrochloric Acid diluted in purified water (colourless)

All these elements are in ready to use condition.

Reagent preparation

All reagents were brought to room temperature (20-25°C) and mixed gently prior to use.

Principle of the method

A specific anti-ferritin antibody is coated on to microtitration wells. Test serums are applied. Then monoclonal anti-ferritin labelled with Horseradish peroxidise enzyme (conjugate) is added. If serum ferritin is present in the sample, it will combine with the antibody on the well and the enzyme conjugate, resulting in the ferritin molecules being sandwiched between the solid phase and the enzyme linked antibodies. After incubation, the wells are washed with distilled water to remove unbound labelled antibodies. On addition of the substrate (TMB), a colour will develop only in those wells in which enzyme are present, indicating the presence of ferritin. The reaction is stopped by the addition of dilute Hydrochloric acid and the absorbance is then measured at 450 nm. The concentration of ferritin is directly proportional to the colour intensity of the test sample.

The Enzyme immunoassay method was used for the quantitative determination of ferritin in human serum using a commercial kit of omega Diagnostics, UK. As described in White D, 1986.

Procedure for analysis

1. A volume of 20 µl Serum was thawed and mixed well prior to testing.
2. All the kit components and the test serum were brought to room temperature (20-25 °C) prior to the start of the assay.
3. One set of standards was being run with each batch of test serum.
4. 20 µl of standards and test serum were pipetted into the assigned wells.
5. 100 µl of Anti-Ferritin HRP conjugate was dispensed into each well with multi channel pipette.
6. These solutions were mixed thoroughly for 30 seconds and the plate was incubated for 45 minutes at room temperature (20-25°C).
7. At the end of the incubation period, the contents of the wells were discarded by flicking into a biohazard container. Then the plate was stroked sharply against absorbent paper.
8. Next the wells were being filled with a minimum of 350 µl of distilled water per well and plate contents were flicked into a biohazard container; and stroked sharply against absorbent paper. This process was done 5 times. The residual water droplets were removed by striking the plate sharply onto absorbent paper.
9. 100 µl substrate solutions was distributed into each well with micro pipette and mixed gently for 5 seconds. This mixture was incubated in the dark for 20 minutes at room temperature. The colour of the mixture was turned into blue colour.
10. 100 µl stop solution was added to each well to stop the reaction.
11. To ensure that the blue colour changed completely to a yellow colour it was mixed gently for 30 seconds.
12. At last the optical density was immediately read by using a ELISA plate reader machine with a 450 nm filter. (Labsystems, Multiskan EX, Finland).

Calculation

Concentration of serum ferritin was calculated as follows

$$\text{Concentration, C} = \frac{\text{Sample OD}}{\text{Standard OD}} \times \text{Standard Concentration}$$

Preparation of standard curve

The pathozyme ferritin kit of omega diagnostics contains six reference standards. First one is human serum free of ferritin and other five are ferritin diluted human serum with the concentration of 0 ng/ml and 15 ng/ml, 80ng/ml, 250 ng/ml, 500 ng/ml and 1000 ng/ml respectively. Accurately measured 20 µl of each standard were pipette into the assigned wells of microtitre ELISA plate. Duplicate wells were prepared for each standard. The remaining steps were exactly the same as described in procedure for analysis. Software package for the ELISA machine constructed curve for serum ferritin standards. To construct a calibration curve for each of the standard serum ferritin, the mean absorbances read were plotted against their respective concentrations. It gave a straight or linear line.

3.16 Estimation of microminerals (zinc, iron and copper)

Serum zinc, copper and iron levels of ethnic people were estimated by atomic absorption spectrophotometric method (I> perkin Elmer, Atomic Absorption Spectrometer AAnalyst, 200, version-8.0, copy right -2013) as described by Hossain

Calibration of standard curve

Calibration curve was obtained using standard samples (containing 0.2, 0.4, 0.8, 1 and 1.6 mg/L for copper; 0.1, 0.2, 0.5, 1, 2 and 3 mg/L for iron; and 0.1, 0.2, 0.4 and 0.8 mg/L for zinc). All standard solutions were dissolved in nano pure water. Standards were aspirated through nebulizer and the absorbance was measured with a blank as reference, read in the atomic absorption spectrophotometer at 324.8 nm, 248.3 nm and 213.9 nm wavelengths respectively for copper, iron and zinc. Blank sample was Nitric acid (HNO3) without any mineral. A software package for the spectrophotometer constructed calibration curves for copper, iron and zinc by plotting absorbance against their respective concentrations. It gave straight lines. The correlation coefficient was found for copper 0.999, for iron 0.998 and for zinc 0.996.

Preparation of standard solutions

Standard solutions containing 0.1, 0.2, 0.4, 0.5, 0.8, 1, 1.6, 2 and 3 mg/L mineral concentrations (Cu, Fe and Zn): 10, 20, 40, 50, 80, 100, 160, 200 and 300 µl standards dissolved in 100 ml nano pure water in a volumetric flux.

Procedure for serum analysis

Ethnic serum was centrifuged at 3000rpm for 10 minutes to make a clear supernatant. A volume of 150 µl serum samples were collected in eppendrof tubes for the analysis of copper, iron and zinc separately. A volume of 150 µl serum was diluted in 1350 µl nano pure water for separate mineral analysis and vortexed for half minutes. Within two hour of mixing, absorbances were read at 324.8 nm, 248.3 nm and 213.9 nm wavelengths respectively for copper, iron and zinc in the atomic absorption spectrophotometer. Machine software calibrated standard curve with standard preparation at every 10- sample interval. Specific hollow cathode lamps were used to analyze the samples. The instrument has minimum detected limit of 0.03 mg/L for copper, 0.04 mg/L for iron and 0.01 mg/L for zinc.

Calculation

Concentration of minerals was calculated as follows

Concentration, C = Absorbance of sample × dilution factor (10 fold) × F µmole/L

F= 0.1574, 0.1791 and 0.1530 were factors for copper, iron and zinc respectively

3.17 Food security data collection

The household food insecurity access score (HFIAS) mentioned in FANTA III guideline by USAID (2007) indicator was used to report household food insecurity score. The food security indicator categorizes households into four levels of households food insecurity such as food secure, mild, moderately and severely food insecure. The HFIAS score was measured of the degree of food insecurity in the households in the past four weeks (30 days).

Average HFIAS score= Sum of HFIAS scores in the sample /Number of HFIAS scores

3.18 Data processing and data analysis

Raw data, collected from the field, were processed by removing illegal codes, reducing logical inconsistencies, dropping improbabilities and by solving ambiguities. The processed data were tabulated on the basis of similarities and intervals by using IBM SPSS Statistics 21 software packages and Microsoft excel was used for data entry. Descriptive statistics (frequencies, cross tables, descriptive) and compare means (t-test) were used to calculate all variables. Values were expressed as frequency, percentage, mean and standard deviation. Tables, diagrams and figures were used to present the data. The statistical analysis was performed by chi-square and fisher's exact test to assess any association. The significance of the difference was tested using one sample t-test with the 5% level of confident interval, test statistic and its variance for categorical variables. Fisher exact tests were applied to estimate the level of significance when a cell value of any category was less than 5.

Chapter four

RESULTS

RESULTS

4.1 Lifestyle and sociodemography of agricultural, tribal and shrimp women

4.1.1 Socio-demography profile of agricultural, tribal and shrimp women

Table 4.1 and Figure 4.1 present the effect of employment on socio-demographic profile of employed and non-employed women in general agriculture as well as tribal and shrimp women. The average household size for the general agricultural women is found to be 4.34 persons for both the employed and non-employed women. For the tribal women the average household size is 4.68, which is not significantly different from the non-employed women, which is 4.54. However, a significant difference in the mean household size is found to be in the Shrimp sector. The mean household size of the Shrimp employed women is 3.97 persons compared to the non-employed women 4.47 persons and the difference is statistically significant at the 1% level (p value <0.01). The result is consistent with the literacy results where 87.3% (63.3+24.0) of the employed women having primary and secondary qualifications as compared to 73.3% of the non-employed women in the shrimp sector. Shrimp sector has greater proportion of educated women than the general agriculture.

Table 4.1 Association of employment on socio-demography profile of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

N	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed n(%)	Non-employed (control)n(%)	p-value	Employed n(%)	Non-employed (control)n(%)	p-value	Employed n(%)	Non-employed (control)n(%)	p-value
Household size									
2-3	80 (23.1)	44 (25.4)		23 (22.1)	10 (19.2)		62 (41.3)	12 (16.0)	
4-5	214 (61.9)	100 (57.8)	p= 0.662	54 (52.0)	31 (59.6)	p= 0.686	69 (46.0)	49 (65.3)	
6-9	52 (15.0)	29 (16.8)		27 (26.1)	11 (21.2)		19 (12.7)	14 (18.7)	p= <0.01*
Mean	**4.34**	**4.34**		**4.68**	**4.54**		**3.97**	**4.47**	
Age									
15-24	72 (20.8)	5 (2.9)		23 (22.1)	1 (1.9)		32 (21.3)	1 (1.3)	
25-34	126 (36.4)	32 (18.5)	p=	30 (28.8)	15 (28.8)		73 (48.7)	12 (16.0)	
35-44	114 (32.9)	64 (37.0)	<0.01*	36 (34.6)	18 (34.6)	p= <0.01*	37 (24.7)	30 (40.0)	p= <0.01*
45 and above	34 (9.8)	72 (41.6)		15 (14.4)	18 (34.6)		8 (5.3)	32 (42.7)	
Marital status									
Married	324 (93.6)	158 (91.3)		102 (98.1)	51 (98.1)		119 (79.3)	73 (97.3)	
Unmarried	0 (0.0)	0 (0.0)		0 (0.0)	0 (0.0)		2 (1.3)	1 (1.3)	
Widow	12 (3.5)	9 (5.2)	p= 0.695	2 (1.9)	1 (1.9)	p= 1.000	11 (7.3)	0 (0.0)	p= 0.002*
Left /separated	6 (1.7)	3 (1.7)		0 (0.0)	0 (0.0)		11 (7.3)	1 (1.3)	
Divorced	4 (1.2)	3 (1.7)		0 (0.0)	0 (0.0)		7 (4.7)	0 (0.0)	
Religion									
Muslim	244 (70.5)	115 (66.5)		6 (5.8)	15 (28.8)		146 (97.3)	75 (100.0)	
Hindu	70 (20.2)	39 (22.5)		30 (28.8)	11 (21.2)		4 (2.7)	0 (0.0)	
Buddhist	28 (8.1)	14 (8.1)	p= 0.452	14 (13.5)	3 (5.8)	p= 0.001*	0 (0.0)	0 (0.0)	p= 0.304
Christian	4 (1.2)	5 (2.9)		54 (51.9)	23 (44.2)		0 (0.0)	0 (0.0)	

Chi-square test, Fisher's exact test p <0.05*

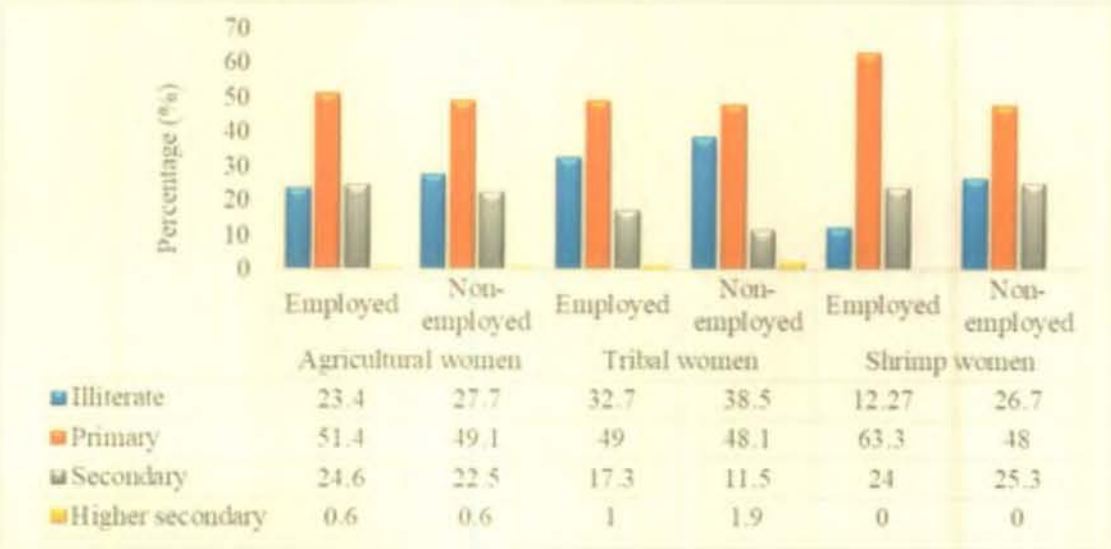


Figure 4.1 Educational status of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

4.1.2 Income and expenditure pattern of agriculture, tribal and shrimp women

Table 4.2 and Figure 4.2 present the comparative results for income and expenditure. As expected, the Shrimp sector women have relatively higher income (Tk. 4103) than the general agricultural women. Women employed in agriculture found highest income than the tribal women and shrimp industry women (Table 4.2). However, the study found that the employed women contribute economically more than the non-employed women. Similarly, expenditure was also found more among the employed women than the non-employed women. Average household income and average household expenditure was significant among agriculture and tribal women ($P<0.05^*$) while in shrimp average respondent's income and average household expenditure was significant ($P<0.05^*$).

Table 4.2 Association of employment on income and expenditure status of agricultural (employed n=450 and non-employee n=225) and shrimp women (employed n=150 and non-employed n=75)

Variables	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed	Non-employed (control)	Significance P<0.05*	Employed	Non-employed (control)	Significance P<0.05*	Employed	Non-employed (control)	Significance P<0.05*
Monthly income (Tk)									
Avg. respondent's income	3053	2975	0.620	3029	2990	0.665	4103	3099	<0.01*
Per capita income	2800	2479	<0.001*	2536	2329	0.605	2501	2126	0.024*
Monthly expenditure (Tk)									
Per capita expenditure	2162	2006	0.763	2034	1775	0.052	2075	1733	0.126

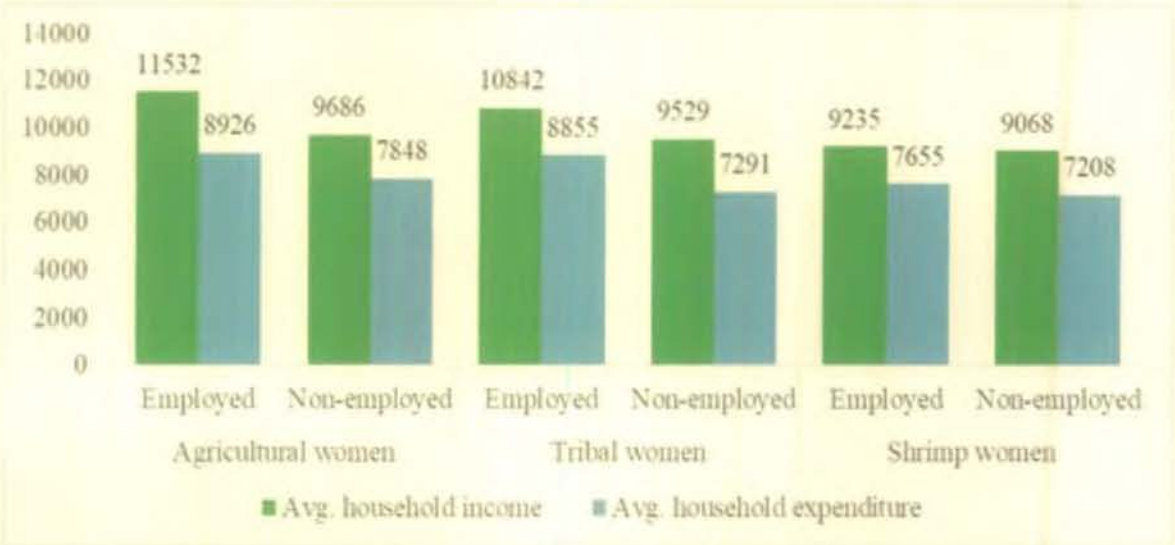


Figure 4.2 Average household income and expenditure of agricultural (employed n=450 and non-employee n=325) and shrimp women (employed n=150 and non-employed *n*=75)

This study identified that the community mostly spend money on two types: food items and non-food items (Figure 4.3). Expenditure on food items in employed and non-employed women found more than double than non-food items in agricultural, tribal and shrimp women. Average highest expenditure on food items found in agricultural employee women and lowest in non-employee shrimp women. On the other hand,the highest expenditure on non-food items found in non-employed agricultural women and the lowest in non-employed tribal women.

Figure 4.3 Average household expenditure on food and non-food items of agricultural (employed n=450 and non-employee n=325) and shrimp women (employed n=150 and non-employed n=75)

Table 4.3 shows expenditure by the employed and the non-employed women in agriculture, tribal and shrimp women on non-food items. The result showed that the employed women in agriculture spend highest amount for medicine while the non-employed women spend most on agriculture items. Among tribal community employed and non-employed women spend most money on agriculture (Tk. 422) and clothing (Tk. 394), respectively. In shrimp industry employed women spend highest amount on education (Tk. 326) while non-employed women spend most of the amount on agriculture (Tk. 616).The highest total expenditure on non-food items was found in the non-employed agricultural women (Tk. 2546) and the lowest was found in non-employed tribal women (Tk. 1892).

Table 4.3 Expenditure (Tk) on non-food items status of agricultural (employed n=450 and non-employee n=225) and shrimp women (employed n=150 and non-employed n=75)

Variables	Agricultural women		Tribal women		Shrimp women	
	Employed	Non-employed	Employed	Non-employed	Employed	Non-employed
Non-food items						
Education	460	331	429	207	461	159
Medicine	566	164	460	266	429	232
Transport	375	513	355	333	330	393
Living exp.	207	427	137	169	338	122
Clothing	385	369	392	394	341	351
Agriculture	508	636	482	280	617	616
Fisheries	917	0	1000	0	1400	0
Others	619	106	326	242	588	280
Total	**2357**	**2546**	**1901**	**1892**	**1894**	**2153**

4.1.3 Loan pattern of agriculture, tribal and shrimp women

In this study, Figure 4.4 describes the association of bank loan status of agricultural, tribal and shrimp women. In agriculture the employed and the non-employed, 48.3% and 42.2% took loan from different government and non-government organizations. This was higher in tribal women which were 48.1% and 63.5%, respectively. However, among the shrimp women loan taking trend was very low. In fact, non-employee (control) women did not take any loan from GOs and NGOs. The study also found that the non-employed

tribal women had highest percentage of taking loan (63.5%) while in shrimp employee women it was the lowest (32.0%).

	Agriculture women		Tribal women		Shrimp women	
Yes	48.3	42.2	48.1	63.5	32.0	0.0
No	51.7	57.8	51.9	36.5	68.0	100.0

Figure 4.4 Bank loan status of agricultural (employed n=450 and non-employee n=225) and shrimp women (employed n=150 and non-employed n=75)

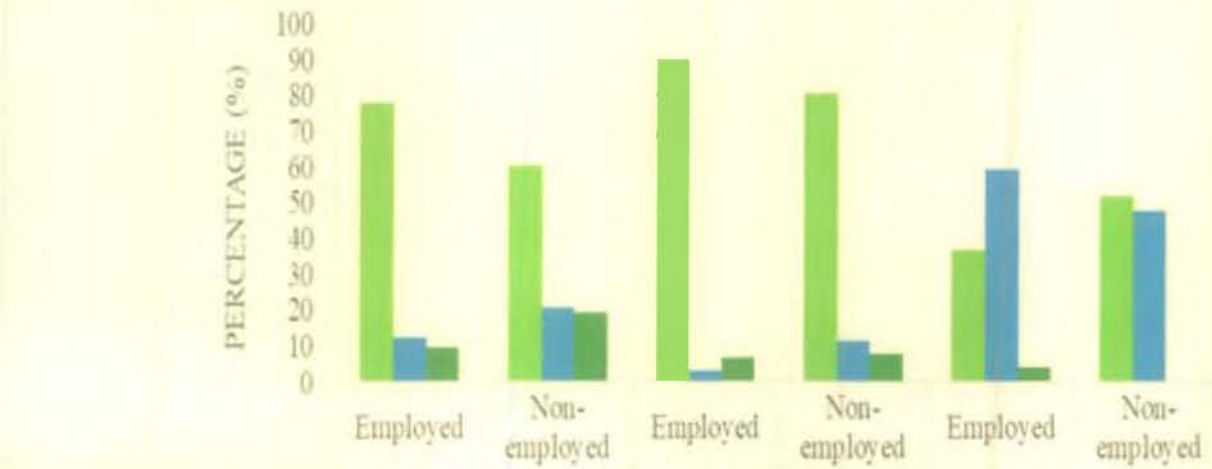
Table 4.4 shows mean loan taken by the employed and the non-employed (control) women in agriculture, tribal and shrimp women. Employed and non-employed women in agriculture took maximum loan from Sonali Bank (Tk. 160000) and Lender (Tk. 40000), respectively. Tribal women engaged in agriculture took highest mean loan from other organization (Tk. 22857) while non-employed women took from Brac (Tk. 22885). In shrimp industry, both the employed and the non-employed women took highest average loan from Brac and lender (Tk. 23913 and Tk. 30000, respectively). The table shows that Brac provided highest loan among the employed and non-employed women in the study areas followed by Grameen and Asa organization. Average loan showed that the employed women in agriculture took the highest loan (Tk. 330517) and tribal non-employed women took lowest loan (Tk. 92885) in all three groups.

Table 4.4 Loan taken from different organizations by agricultural (employed n=450 and non-employee n=225) and shrimp women (employed n=150 and non-employed n=75)

Organization	Agriculture women		Tribal women		Shrimp women	
	Employed (Tk.)	Non-employed (Tk.)	Employed (Tk.)	Non-employed (Tk.)	Employed (Tk.)	Non-employed (Tk.)
Brac	19918	16097	16750	22885	23813	18944
Krishi	19769	18000	-	-	-	18000
Sonali	160000	-	13000	13000	-	13000
Agrani	20000	20000	10000	5000	-	12500
Grameen	19540	14700	2000	2000	17500	14095
Asa	15762	14200	17200	15000	16571	14253
Uddipon	13500	-	-	15000	12000	15000
Proshika	16250	15000	-	-	13000	15000
Lender	23333	40000	20000	20000	-	30000
Others	22444	-	22857	-	13176	-
Total	**330517**	**137997**	**101807**	**92885**	**96060**	**150792**

4.1.4 Housing and lighting facilities of agricultural, tribal and shrimp women

Housing condition and lighting facility results (Figure 4.5 and Table 4.5) revealed that among the employed women 78.0%, 90.4% and 36.7% in agriculture, tribal and shrimp sector are used to live in own house, respectively. On the other hand, 60.1%, 80.8% and 52.0% non-employed women in agriculture, tribal and shrimp sector were found having own house. Among the housing material wooden was found least in all three sectors. Tin and concrete house was more in agriculture and shrimp sector while in tribal mud wall was very common. Maximum household in both the employed and the non-employed had lighting facility where Polli electricity dominated in the area over kupi/hurricane and road side lights. Lighting of the house was found significant in all the three sectors ($P<0.05^*$).



	Agricultural women		Tribal women		Shrimp women	
	Employed	Non-employed	Employed	Non-employed	Employed	Non-employed
Own	78	60.1	90.4	80.8	36.7	52
Rented house	12.4	20.8	2.9	11.5	59.3	48
Others (Parental house)	9.5	19.1	6.7	7.7	4	0

Figure 4.5 Housing status of agricultural (employed n=450 and non-employee n=225) and shrimp women (employed n=150 and non-employed n=75)

Table 4.5 Association of employment on housing condition and lighting facility of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Variables	Agriculture women		Tribal Agriculture women		Shrimp women	
	Employed n(%)	Non-employed (control) n(%)	Employed n(%)	Non-employed (control)n(%)	Employed n(%)	Non-employed (control)n(%)
House wall material						
Bamboo fencing /plump leafs	101 (29.2)	54 (31.2)	28 (26.9)	24 (46.2)	57 (38.0)	6 (8.0)
Tin	86 (24.9)	48 (27.7)	14 (13.5)	3 (5.8)	21 (14.0)	30 (40.0)
Concrete	99 (28.6)	39 (22.5)	7 (6.7)	2 (3.8)	50 (33.3)	21 (28.0)
Mud wall	46 (13.3)	25 (14.5)	49 (47.1)	21 (40.4)	6 (4.0)	12 (16.0)
Wooden wall	14 (4.0)	7 (4.0)	6 (5.8)	2 (3.8)	16 (10.7)	6 (8.0)
p-value	p=0.681		p=0.166		p=<0.01*	
Lighting of the house						
Yes	298 (86.1)	133 (76.9)	93 (89.4)	32 (61.5)	120 (80.0)	42 (56.0)
No	48 (13.9)	40 (23.1)	11 (10.6)	20 (38.5)	30 (20.0)	33 (44.0)
p-value	p=0.006*		p=<0.01*		p=<0.01*	
House lighting						
Polli electricity	242 (69.9)	118 (68.2)	33 (31.7)	20 (38.5)	116 (77.3)	63 (84.0)
Kupi /hurican	90 (26.0)	40 (23.0)	46 (44.2)	19 (36.5)	27 (18.0)	6 (8.0)
Others (road side light)	14 (4.0)	15 (8.7)	25 (24.0)	13 (25.0)	7 (4.7)	6 (8.0)
p-value	p=0.093		p=0.615		p=<0.01	

Chi-square test, Fisher's exact test p <0.05*

4.1.5 Drinking water and cooking facilities of agricultural, tribal and shrimp women

The results revealed that tube well water was used by substantial percentage of the households (Figure 4.6 and Table 4.6). In agriculture, 91.9% employed and 81.5% non-employed women, in tribal 76.9% employed and 65.4% non-employed and in shrimp industry 93.3% employed and 70.7% women use tube well water for drinking purpose (P<0.05*). Tube well water also significantly dominated in source for cooking and utensils washing among the employed and the non-employed in agriculture, tribal and shrimp women. Separate kitchen percentage was higher among agriculture and tribal employed women whereas in shrimp both the employed and the non-employed women had separate kitchen.

Figure 4.6 Separate kitchen of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Table 4.6 Association of employment on source of drinking water and cooking facilities of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Variables	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed n(%)	Non-employed (control)n(%)	p-value	Employed n(%)	Non-employed (control)n(%)	p-value	Employed n(%)	Non-employed (control)n(%)	p-value
Main sources of drinking water									
Tube well	318 (91.9)	141 (81.5)		80 (76.9)	34 (65.4)		140 (93.3)	53 (70.7)	
Tap	18 (5.2)	26 (15.0)	p=0.001*	3 (2.9)	9 (17.3)	p=0.001*	6 (4.0)	13 (17.3)	p=<0.01*
Others (spring water, ponds, river)	10 (2.9)	6 (3.5)		21 (20.2)	9 (17.3)		4 (2.7)	9 (12.0)	
Source water for cooking and utensils washing									
Tube well	264 (76.3)	78 (45.1)		72 (69.2)	22 (42.3)		102 (68.0)	51 (68.0)	
Pond /doba	50 (14.5)	45 (26.0)	p=<0.01*	8 (7.7)	2 (3.8)	p=0.001*	15 (10.0)	24 (32.0)	p=<0.01*
Others (tap, well, spring water)	32 (9.2)	50 (28.9)		24 (23.1)	28 (53.8)		33 (22.0)	0 (0.0)	

Chi-square test, Fisher's exact test p <0.05*

4.2 Health status of agricultural, tribal and shrimp women

4.2.1 Prenatal care of agricultural, tribal and shrimp women

In prenatal care, more employed women found with health check during pregnancy than the non-employed women although the difference was not very larged. Trends of health check during pregnancy were better among the employed women than the non-employed (control) women in the survey (Figure 4.7). Similar trends found in Tetanus toxoid full and incomplete dose completion which was significant in shrimp women ($P<0.05^*$). Higher percentage of the employed women completed full dose timely thanthe non-employed women (Figure 4.8). Significantly higher normal delivery process observed among the employed women in agriculture (94.0%), tribal (96.6%) and shrimp (84.3%) which were 87.6%, 86.6% and 80.0%, respectively for the non-employed women (Table 4.7). In the employed and the non-employed cases, very few women faced birth difficulties which were insignificant.

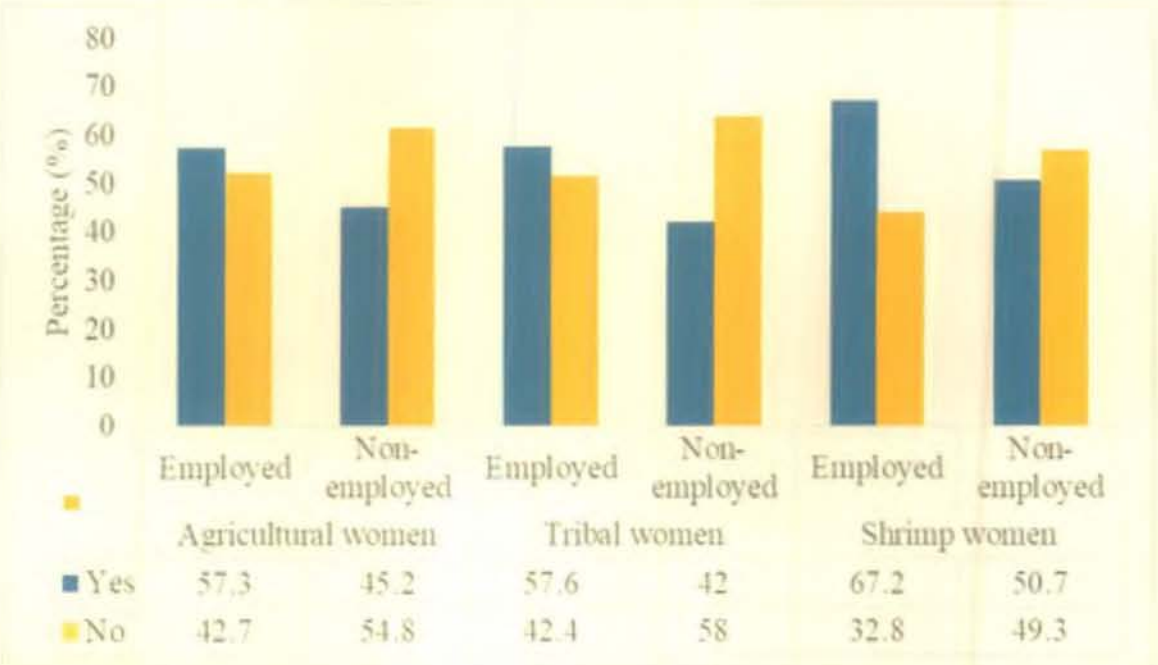


Figure 4.7 Health checking during pregnancy of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

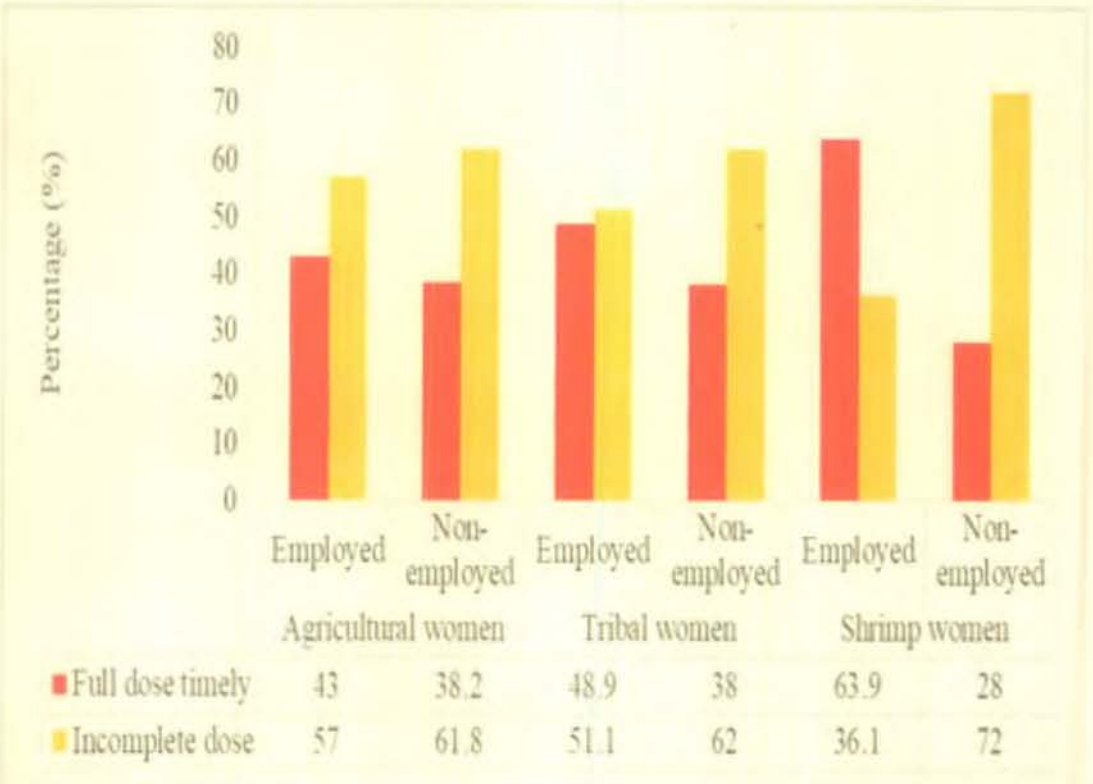


Figure 4.8 Vaccine dose completion status of agricultural (employed n=450 and non- employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Table 4.7 Association of employment on prenatal care of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Variables	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed n(%)	Non-employed (control)n(%)	P-value	Employed n(%)	Non-employed (control)n(%)	P-value	Employed n(%)	Non-employed (control)n(%)	P-value
Delivery process									
Normal	300 (94.0)	134 (87.6)		85 (96.6)	38 (86.6)	P=0.059*	102 (84.3)	60 (80.0)	
Cesarean	13 (4.1)	15 (9.8)	P=0.038*	3 (3.4)	6 (13.6)		11 (9.1)	15 (20.0)	P=0.007*
Others (forceps)	6 (1.9)	4 (2.6)					8 (6.6)	0 (0.0)	
Birth difficulties									
Yes	37 (11.3)	24 (15.3)	P=0.242	7 (7.6)	5 (10.0)	P=0.754	19 (15.6)	12 (16.0)	P=1.000
No	291 (88.7)	133 (84.7)		85 (92.4)	45 (90.0)		103 (84.4)	63 (84.0)	

Chi-square test, Fisher's exact test $p < 0.05^*$

4.2.2 Postnatal care of agricultural, tribal and shrimp women

Breast feeding practice was more among employed women than non-employed women (Table 4.8 and Figure 4.9). The study found that in agriculture, tribal and shrimp 91.0%, 82.7% and 92.7% employed women, respectively practice breast feeding. Among the non-employed the percentage was a little lower. Colostrum feeding response was found among substantial number of women while feeding of liquid food after 3 days was very less.

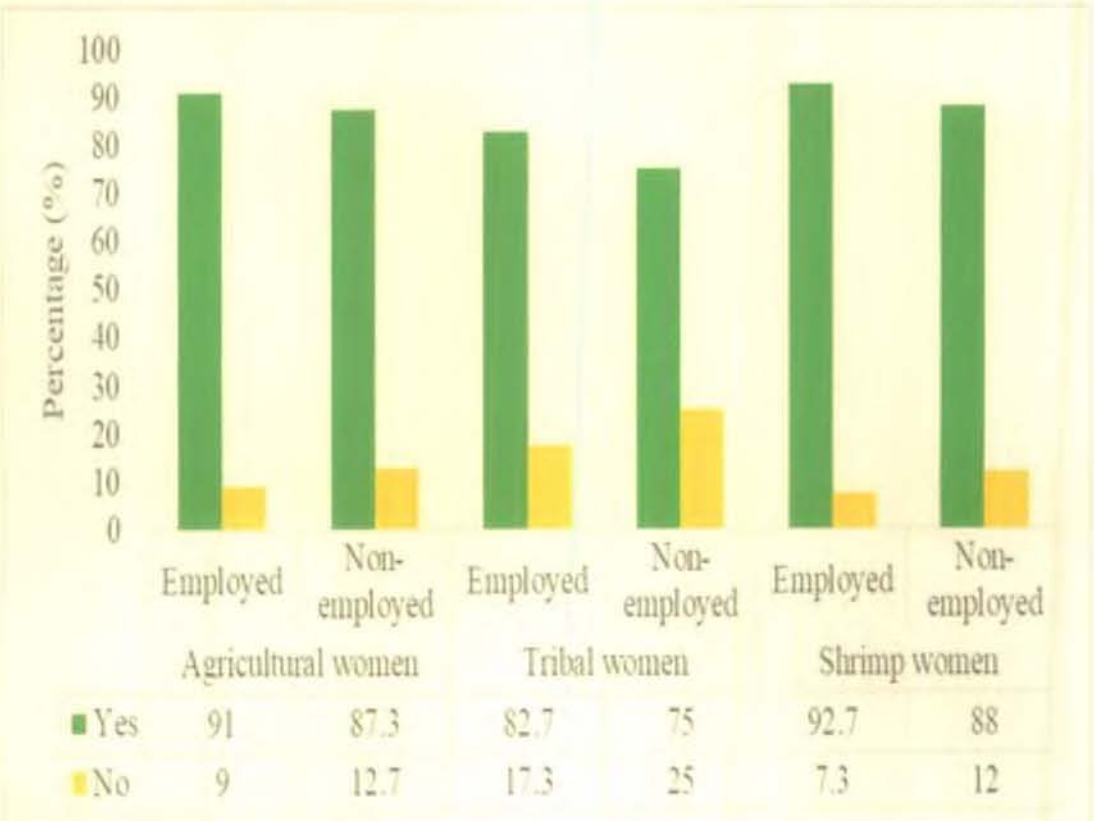


Figure 4.9 Breast feeding (%) of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Table 4.8 Association of employment on postnatal care of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Variables	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed n(%)	Non-employed (control) n (%)	P-value	Employed n(%)	Non-employed (control) n (%)	P-value	Employed n(%)	Non-employed (control)n(%)	P-value
Feeding of liquid food after 3 days									
Yes	106 (30.6)	45 (26.0)	P=0.306	28 (26.9)	10 (19.2)	P=0.328	35 (23.3)	15 (20.0)	P=0.614
No	240 (69.4)	128 (74.0)		76 (73.1)	42 (81.8)		115 (76.7)	60 (80.0)	
Colostrum feeding									
Yes	304 (87.9)	145 (83.8)	P=0.221	83 (79.8)	37 (71.2)	P=0.234	98 (65.3)	45 (60.0)	P=0.464
No	42 (12.1)	28 (16.2)		21 (20.2)	15 (28.8)		52 (34.7)	30 (40.0)	

Chi-square test, Fisher's exact test $p < 0.05$

4.2.3 Vaccination coverage for children of agricultural, tribal and shrimp women

Vaccination coverage for children results revealed that respondents immunized but incomplete doses of vaccine provided in both the employed and the non-employed women group in agriculture, tribal and shrimp workers. Mostly injected vaccines were BCG, Polio, DPT, Measles, Typhoid and Pneuomonia (Table 4.9). Vaccination percentage trend was very less among the non-employed shrimp women where maximum 40% respondents covered Polio while nobody has given Hepatitis-1, Hepatitis-2 and Hepatitis-3.

Table 4.9 Vaccination coverage completion for children of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Variables	Agriculture women		Tribal women		Shrimp women	
	Employed (%)	Non-employed (%)	Employed (%)	Non-employed (%)	Employed (%)	Non-employed (%)
BCG	77.5	74.6	60.6	61.5	78.0	36.0
Polio	85.8	82.7	67.3	71.2	78.0	40.0
DPT	73.1	68.2	57.7	65.4	77.3	28.0
Measles	73.7	70.5	61.5	65.4	74.7	32.0
Pox	19.4	22.0	16.3	11.5	12.0	20.0
Mums	21.1	22.5	9.6	11.5	5.3	12.0
Typhoid	73.7	71.1	57.7	48.1	68.0	8.0
Pneuomonia	70.2	64.2	51.9	59.6	70.7	28.0
Hepatities-1	10.7	9.2	10.6	5.8	14.7	0.0
Hepatities-2	4.9	2.9	6.7	3.8	6.7	0.0
Hepatities-3	4.6	2.9	4.8	3.8	4.0	0.0

Vaccination coverage for children results revealed that respondents completed doses of vaccine provided in both employed and non-employed women group in agriculture, tribal and shrimp workers. Similar to immunized but incomplete doses, here also BCG, Polio, DPT, Measles, Typhoid and Pneuomonia are mostly covered vaccines (Table 4.10). In shrimp non-employed women nobody covered typhoid, Hepatitis-1, Hepatitis-2 and Hepatitis-3 while other vaccines were covered by substantial percentage of the respondents.

Table 4.10 Vaccination completion of all doses for children of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Variables	Agriculture women		Tribal women		Shrimp women	
	Employed (%)	Non-employed (%)	Employed (%)	Non-employed (%)	Employed (%)	Non-employed (%)
BCG	76.3	74.6	57.7	61.5	69.3	66.7
Polio	82.9	79.8	65.4	71.2	73.3	80.0
DPT	70.2	65.9	54.8	61.5	74.0	75.0
Measles	70.2	67.1	59.6	65.4	70.7	80.0
Pox	16.5	19.1	15.4	11.5	11.3	50.0
Mums	18.5	20.2	8.7	11.5	0.7	50.0
Typhoid	70.5	67.1	53.8	57.7	61.3	0.0
Pneuomonia	68.5	62.4	50.0	59.6	62.0	75.0
Hepatities-1	8.7	6.4	7.7	3.8	11.3	0.0
Hepatities-2	4.6	2.9	5.8	3.8	4.7	0.0
Hepatities-3	4.3	2.9	4.8	3.8	2.7	0.0

4.2.4 Primary health care of agricultural, tribal and shrimp women

Table 4.11 shows that below 50% women in agriculture, tribal and shrimp insignificantly took vitamin A capsule less than 5 years for their children. However, vaccination completion percentage was higher among the employed and the non-employed women. For employed women in agriculture, tribal and shrimp results were 77.1%, 60.9% and 90.4%, respectively while for the non-employed women were 72.6%, 51.0% and 52.0%, respectively. Figure 4.10 shows that taking of vitamin A capsule within 24 hours of birth was also less than 50% in employed and non-employed women of agriculture, tribal and shrimp women where shrimp women were significant ($P<0.05^*$). the highest percentage was 64% shrimp employed women and the lowest percentage was also shrimp non-employed women (20%) (Figure 4.10).

Table 4.11 Association of employment on primary health care of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Variables	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed n(%)	Non-employed (control) n (%)	p-value	Employed N (%)	Non-employed (control) n (%)	p-value	Employed n(%)	Non-employed (control)n(%)	p-value
Vitamin A capsule to < 5 yr									
Yes	136 (41.5)	60 (38.2)	p=0.553	31 (33.7)	15 (29.7)	p=0.709	61 (48.8)	30 (40.0)	p=0.305
No	192 (58.5)	97 (61.8)		61 (66.3)	36 (70.6)		64 (51.2)	45 (60.0)	
Completed vaccination									
Yes	253 (77.1)	114 (72.6)	p=0.309	56 (60.9)	26 (51.0)	p=0.291	113 (90.4)	39 (52.0)	p=<0.01*
No	75 (22.9)	43 (27.4)		36 (39.1)	25 (49.0)		12 (9.6)	36 (48.0)	

Chi-square test, Fisher's exact test p <0.05*

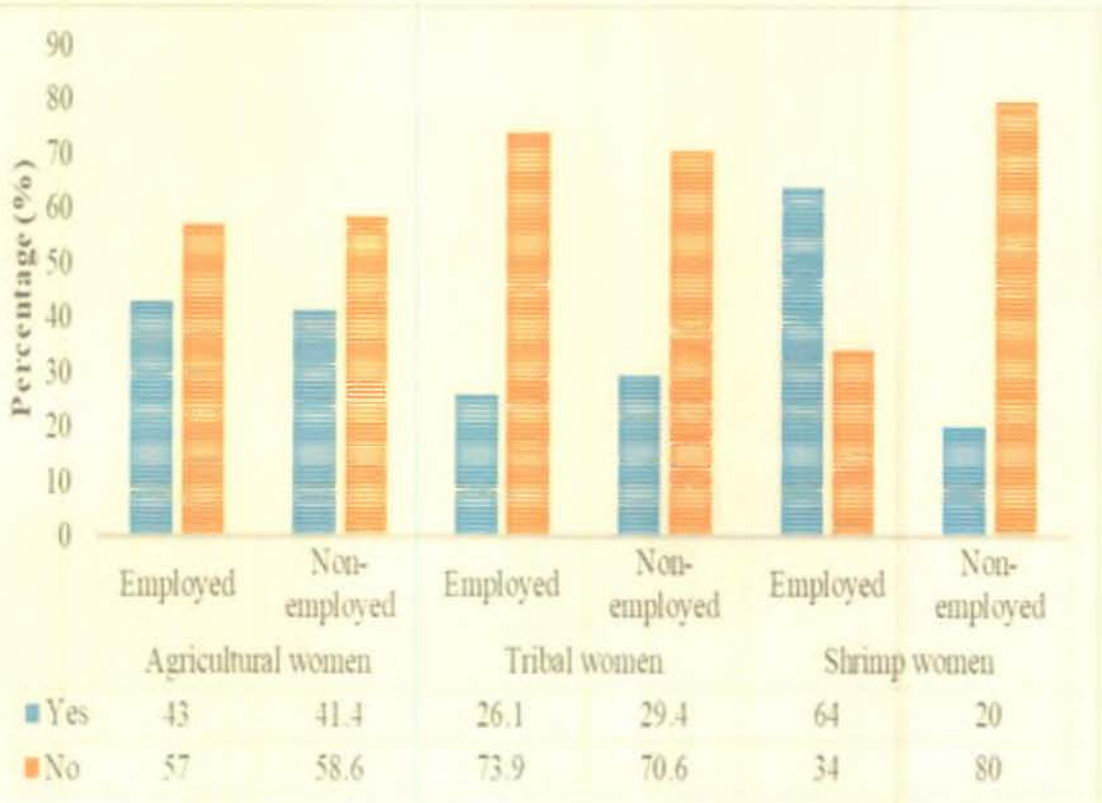
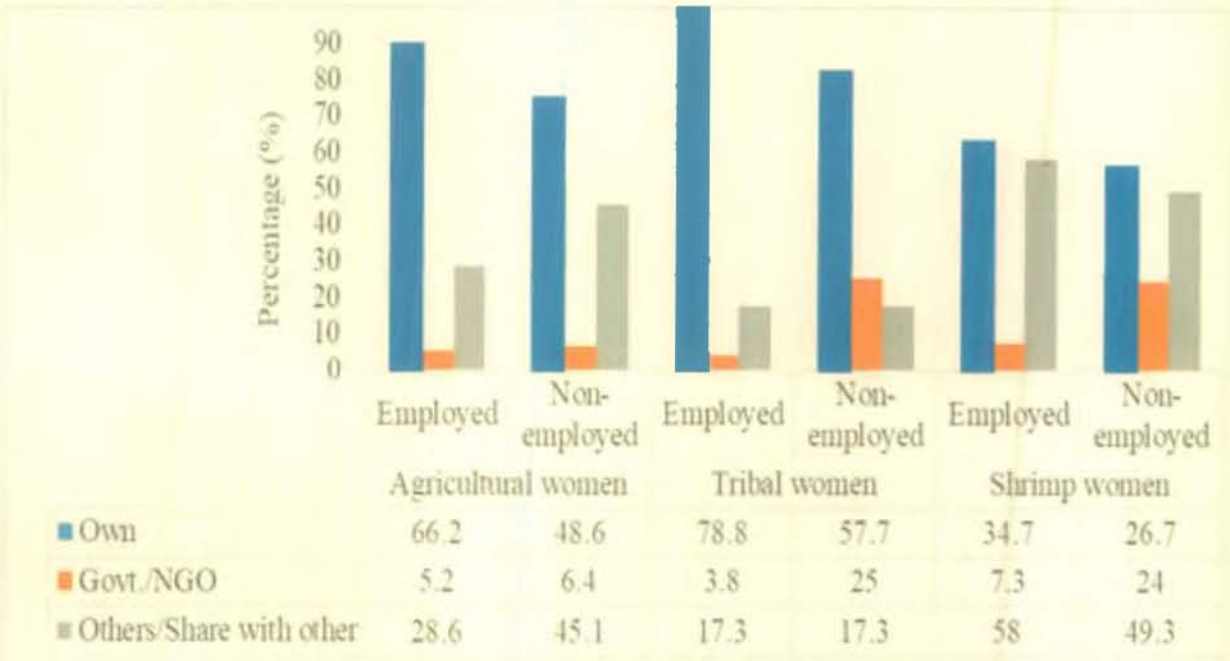


Figure 4.10 Vitamin A capsule within 24 hrs of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

4.2.5 Hygiene and sanitation status of agricultural, tribal and shrimp women

Among agricultural, tribal and shrimp women the research found better hygiene and sanitation condition in the employed than the non-employed. Figure 4.11 shows that significant ownership of latrine was 66.2%, 78.8% and 34.7%, respectively for employed women whereas it was 48.6%, 57.7% and 26.7%, respectively for non-employed women ($P<0.05^*$). Among the shrimp women latrine provided by govt./NGO placed highest percentage (58.0% and 49.3%, respectively). Table 4.12 elaborates that type of latrine used by majority percent of the employed and the non-employed women latrine type was well based except non-employed women in shrimp area (44.0% well based and 52.0% others). Hand washing before eating and after toilet was more or less than 50% except the non-employed women in shrimp where it was 16.7% and 20%, respectively. For garbage disposal, 64.5% and 52.0% agricultural women use specific dish, 51.0% tribal women use specific dish and 51.9% women throw in open space. In shrimp women, 76.7% use specific dish while 44.0% women use specific dish and 44.0% women throw in open space (Figure 4.12).



	Agricultural women		Tribal women		Shrimp women	
	Employed	Non-employed	Employed	Non-employed	Employed	Non-employed
Own	66.2	48.6	78.8	57.7	34.7	26.7
Govt./NGO	5.2	6.4	3.8	25	7.3	24
Others/Share with other	28.6	45.1	17.3	17.3	58	49.3

Figure 4.11 Ownership of latrine of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

	Agricultural women		Tribal women		Shrimp women	
	Employed	Non-employed	Employed	Non-employed	Employed	Non-employed
Specific dish/space	64.5	52	51	38.5	76.7	44
Open space	32.1	43.9	38.5	51.9	18	44
Here and there/others	3.5	4	10.6	9.6	5.3	12

Figure 4.12 Garbage disposal of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Table 4.12 Association of employment on hygiene and sanitation status of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Variables	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed n(%)	Non-employed (control) n(%)	p-value	Employed n(%)	Non-employed (control)n(%)	p-value	Employed n(%)	Non-employed (control)n(%)	p-value
Type of latrine									
Well based	296 (85.5)	140 (80.9)	p= 0.181	89 (85.6)	40 (76.9)	p= 0.356	111 (74.0)	33 (44.0)	p= <0.01*
Flash based	28 (8.1)	14 (8.1)		4 (3.8)	3 (5.8)		6 (4.0)	3 (4.0)	
Others (reserved water)	22 (6.4)	19 (11.0)		11 (10.6)	9 (17.3)		33 (22.0)	39 (52.0)	
Hand washing									
Before eating	162 (46.8)	75 (43.4)	p= 0.717	41 (39.4)	20 (38.5)	p= 0.088	99 (66.0)	42 (56.0)	p= 0.315
After toilet	155 (44.8)	84 (48.6)		62 (59.6)	26 (53.8)		25 (16.7)	15 (20.0)	
Others (after raw foods)	29 (8.4)	14 (8.1)		1 (1.0)	4 (7.7)		26 (17.3)	18 (24.0)	

Chi-square test, Fisher's exact test p <0.05

4.2.6 Common diseases of agricultural, tribal and shrimp women

This study found five common diseases among the employed and non-employed women in agriculture, tribal and shrimp sector (Table 4.13). Among the diseases skin problem and back pain were more severe in agricultural and tribal women. In shrimp women, significant highest percentage had influenza among the employed women (52.6%) while asthma was the highest (42.9%) among the non-employed women ($p<0.05^*$). Dermatitis secured lowest percentage among the women except the non-employed shrimp women where back pain was absent.

4.3 Nutritional status of agricultural, tribal and shrimp women

4.3.1 Food consumption score of agricultural, tribal and shrimp women

In this study rice was taken most of the time by the respondents (Table 4.14). Carbohydrate intake was within 5.5-8.5 among the employed and non-employed women in agriculture, tribal and shrimp women. Protein, vitamin and minerals intake of the employed and the non-employed agriculture women, employed and non-employed tribal women and employed and non-employed shrimp women was 12.8±7.9, 12.2±4.9, 13.1±6.5, 16.4±8.6, 11.1±4.7 and 12.2±9.3, respectively.

Table 4.15 shows food consumption score (FCS) of the respondents which revealed that the employed women had better condition (acceptable high) than the non-employed women. At the same time, FCS was significant in agriculture, tribal and shrimp women ($p<0.05$). The study found that highest 98.0% shrimp employed women was highly acceptable high followed by 97.1% tribal women and 94.5% agricultural women. Among the nonemployed the highest 78.7% shrimp women was found highly acceptable high followed by 41.6% agricultural women with acceptable low and 40.4% tribal women with acceptable high.

4.3.2 Physical activity level (PAL) of agricultural, tribal and shrimp women

Table 4.16 shows that significant physical activity level observed among the respondents ($p<0.05^*$). Among the agricultural women, 44.8% in employed women found with vigorous activity while 67.6% non-employed women found with active or moderate level. In tribal, 40.4% employed women found with vigorous activity whereas highest 57.7% women found with sedentary or light activity. In shrimp, active or moderate PAL found highest (43.3%) among the employed and low activity level found most (53.3%) among the non-employed women.

Table 4.13 Association of employment on common diseases of agricultural (employed n=259 and non-employed n=123) and shrimp women (employed n=38 and non-employed n=21)

Variables	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed n(%)	Non-employed (control) n(%)	Anova	Employed n(%)	Non-employed (control) n(%)	Anova	Employed n(%)	Non-employed (control) n(%)	Anova
Skin iseases	77(41.4)	42(49.4)	f=2.588 p=0.109	26(35.6)	11(28.9)	f=1.081 p=0.301	2(5.3)	3(14.3)	f=7.630 p=0.008*
Dermatitis	5(2.7)	3(3.5)		2(2.7)	1(2.6)		1(2.6)	3(14.3)	
Influenza	11(5.9)	3(3.5)		6(8.2)	2(5.3)		20(52.6)	6(28.6)	
Asthma	38(20.4)	23(27.1)		14(19.2)	6(15.8)		5(13.2)	9(42.9)	
Back pain	55(29.6)	14(16.5)		25(34.2)	18(47.4)		10(26.3)	0(0.0)	

Significance p <0.05*

Table 4.14 Effect of employment on 7 days food intake of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Parameter (Food)	General agriculture women		Tribal agriculture women		Shrimp women	
	Employed	Non-employed (control)	Employed	Non-employed (control)	Employed	Non-employed (control)
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Rice	6.5±1.5	6.9±0.7	6.6±1.3	6.8±0.9	6.8±0.8	5.7±2.4
Maize	2.7±2.2	4.7±2.9	7.0±0.0	0.0	5.4±2.7	7.0±0.0
Bread	4.5±2.3	4.3±2.5	4.2±2.3	4.9±2.3	3.7±2.4	3.8±2.6
Carbohydrate	6.7±1.5	7.0±0.6	6.8±1.2	7.1±0.8	7.0±0.8	5.8±2.6
Pulse	2.9±1.5	3.2±1.8	3.2±1.5	2.9±1.4	3.3±1.9	2.8±1.6
Fish	3.5±1.9	3.9±1.9	3.1±1.6	3.5±2.0	3.9±2.0	3.0±2.1
Meat	1.3±0.8	1.4±0.8	1.4±0.8	1.1±0.5	1.6±1.1	1.5±0.7
Milk	3.3±2.4	3.7±2.2	2.4±1.4	3.8±2.7	2.2±1.8	2.5±1.9
Dairy products	3.4±1.8	3.3±2.6	2.4±0.8	5.8±1.3	2.4±0.8	2.3±0.8
Leafy egetables	3.1±1.8	3.4±1.6	3.4±1.7	3.6±1.7	3.3±1.6	2.9±1.9
Non leafy vegetables	3.7±2.1	4.3±2.1	4.1±2.2	4.9±2.0	4.2±2.1	3.1±2.2
Fruits	2.5±1.6	1.9±1.0	3.1±2.2	2.7±1.4	2.1±1.3	3.7±2.5
Protein, vitamins and minerals	12.8±7.9	12.2±4.9	13.1±6.5	16.4±8.6	11.1±4.7	12.2±9.3
Total	**19.4±8.5**	**19.1±5.1**	**19.6±6.9**	**23.4±8.8**	**18.0±4.8**	**17.9±11.0**

Table 4.15 Association of employment on food consumption score of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Variables	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed n(%)	Non-employed n (%)	P-value	Employed n(%)	Non-employed n (%)	P-value	Employed n(%)	Non-employed n (%)	P-value
Food consumption score									
Poor (0-28)	12 (3.5)	1 (0.6)	P= <0.01*	1 (1.0)	0 (0.0)	P= <0.01*	1 (0.7)	9 (12.0)	P=<0.01*
Borderline (29-42)	7 (2.0)	51 (29.5)		2 (1.9)	17 (32.7)		1 (0.7)	7 (9.3)	
Low (43-52)	0 (0.0)	72 (4.6)		0 (0.0)	14 (26.9)		1 (0.7)	0 (0.0)	
High >52	327 (94.5)	49 (28.3)		101 (97.1)	21 (40.4)		147 (98.0)	59 (78.7)	

Chi-square test, Fisher's exact test p <0.05*

Table 4.16 Association of employment on physical activity level (PAL) of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Variables	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed n(%)	Non-employed n (%)	P-value	Employed n (%)	Non-employed n (%)	P-value	Employed n %)	Non-employed n (%)	P-value
(<1.40) Low	1 (0.3)	10 (5.8)		0 (0.0)	0 (0.0)		0 (0.0)	40 (53.3)	
(1.40-1.69) Sedentary or light activity	36 (10.4)	23 (13.3)		13 (12.5)	30 (57.7)		16 (10.7)	21 (28.0)	
(1.70-1.99) Active or moderate	126 (36.4)	117 (67.6)		39 (37.5)	15 (28.8)		65 (43.3)	6 (8.0)	
(2.00-2.40) Vigorous activity	155 (44.8)	15 (8.7)	P=<0.01*	42 (40.4)	5 (9.6)	P=<0.01*	56 (37.3)	6 (8.0)	P=<0.01*
(>2.4) High	28 (8.1)	8 (4.6)		10 (9.6)	2 (3.8)		13 (8.7)	2 (2.7)	

Chi-square test, Fisher's exact test p <0.05*

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Table 4.17 Distribution of respondent women by mean PAL value according to the occupation of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Occupation	General agriculture women		Tribal agriculture women		Shrimp women	
	Employed	Non-employed (control)	Employed	Non-employed (control)	Employed	Non-employed (control)
	N (Mean±SD)	N (Mean±SD)	N (Mean±SD)	N (Mean±SD)	N (Mean±SD)	N (Mean±SD)
Job at company	-	5 (1.96±0.23)	-	1 (1.76)	150 (2.02±0.29)	18 (2.04±0.27)
Job at mill	45 (2.05±0.26)	19 (2.15±0.38)	-	1(1.40)	-	17 (2.04±0.25)
In field	281 (2.01±0.26)	-	96 (2.05±0.38)	45 (2.06±0.43)	-	-
Labor	20 (2.12±0.32)	26 (2.09±0.25)	8 (1.96±0.27)	-	-	21 (1.98±0.39)
Business	-	118 (2.03±0.27)	-	5 (1.95±0.17)	-	10 (1.81±0.13)
Others	-	5 (1.99±0.20)	-	-	-	9 (1.98±0.26)
Total	**346 (2.03±0.26)**	**173 (2.05±0.28)**	**104 (2.05±0.37)**	**52 (2.03±0.41)**	**150 (2.02±0.29)**	**75 (1.99±0.29)**

4.3.3 Body Mass Index (BMI) of agricultural, tribal and shrimp women

Table 4.18 shows height, weight and BMI of the respondents from agriculture, tribal and shrimp women. Height result revealed that the highest 48.3% employed agriculture women were between 126cm to 150 cm and 80% non-employed shrimp women were between 150 cm to 180 cm. Maximum women that is more than 50% in agriculture, tribal and shrimp women group were between 150 cm to 180 cm. In shrimp women both the employed and the non-employed groups were significant ($p<0.05$). Weight result showed that the highest 72.5% non-employed agriculture women were between 31-50 kg and 73.3% non-employed shrimp women were between 51-75 kg ($p<0.05$).

BMI results in Table 4.19 showed that 58.4% employed agricultural women, 65.4% employed tribal women and 60.7% employed shrimp women had normal weight ($p<0.05$*). The research also found that the maximum non-employed women are suffering from underweight, overweight and obese. For example, in agriculture area 42.8% women are underweight and 32.4% are obese.

Results from logistic regressions estimates and odd ratio of different socio-economic and demographic variables on nutritional status decreased in un-adjusted (Odd ratio (OR)= 95.0% confidence Interval (CI) 1.00, 0.994); and in adjusted increased (OR=95.0% CI 1.00, 1.045, respectively) (Table 19). In un-adjusted condition, normal nutritional status decreased while malnutrition event increased. In adjusted condition, both the normal and malnutrition status increased. In both cases, results were insignificant ($p> 0.05$).

This study was conducted to find out the relationship between BMI and socio-demography status, income and food security of the agricultural, tribal and shrimp women (Table 4.21). Level of education and food security of agriculture, tribal and shrimp employed and the non-employed women showed significant relationship with BMI ($p<0.05$). All groups showed significant relationship with BMI ($p<0.05$) except the non-employed shrimp women.

Table 4.18 Association of employment on height, weight and BMI of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75) according to Asia-Pacific

Variables	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed n(%)	Non-employed n (%)	p-value	Employed n(%)	Non-employed n (%)	p-value	Employed n(%)	Non-employed n (%)	p-value
Height (cm)									
126-150	167 (48.3)	60 (45.5%)	p= 0.61	42 (40.4)	14 (32.6)	p=0.46	67 (44.7)	15 (20.0)	p=0.00*
150-180	179 (51.7)	72 (54.5%)		62 (59.6)	29 (67.4)		83 (55.3)	60 (80.0)	
Weight									
31-50	222 (64.2)	124 (72.5)	p= 0.06	65 (62.5)	25 (50.0)	p= 0.16	94 (62.7)	20 (26.7)	p= 0.00*
51-75	124 (35.8)	47 (27.5)		39 (37.5)	25 (50.0)		56 (37.3)	55 (73.3)	
BMI									
<18.5	76 (22.0)	74 (42.8)		15 (14.4)	10 (19.2)		27 (18.0)	6 (8.0)	
18.5-24.9	229 (66.2)	43 (24.9)	p= 0.00*	76 (73.1)	26 (50.0)	p= 0.01*	100 (66.7)	53 (70.7)	p= 0.10
>=25	41 (11.8)	56 (32.4)		13 (12.5)	16 (30.8)		23 (15.3)	16 (21.3)	

Chi-square test, Fisher's exact test p <0.05*

Table 4.19 Multiple logistic regression estimates and odds ratio of different socioeconomic and demographic variables on nutritional status

Variables	Un-adjusted			Adjusted		
	OR	95.0% C.I.for OR	p-value	OR	95.0% C.I.for OR	p-value
Age						
Below 20	1			1		
20-34	1.275	(0.720, 2.260)	0.404	1.208	(0.652,2.240)	0.548
35 & above	1.341	(0.755, 2.384)	0.317	1.103	(0.587,2.072)	0.761
Marital Status						
Married	1	(0.170,	0.606	1	(0.206,36.320)	0.446
Unmarried	1.883	20.842)		2.735		
Religion						
Muslim	1	(0.670, 1.167)	0.384	1		
Non-Muslim	0.884			0.907	(0.628,1.308)	0.600
Education						
Illiterate	1			1		
Primary	1.000	(0.698, 1.432)	1.000	1.183	(0.802,1.746)	0.397
Secondary & >	1.143	(0.825, 1.583)	0.421	1.324	(0.922,1.902)	0.129
Income expenditure (Tk)						
Below 9000	1			1		
Above 9000	1.005	(0.772, 1.307)	0.973	1.019	(0.766,1.356)	0.896
Household size						
6-9 Members	1			1		
4-5 Members	1.147	(0.799, 1.647)	0.458	1.146	(0.773,1.699)	0.497
2-3 Members	1.276	(0.847, 1.923)	0.244	1.469	(0.938,2.300)	0.093*
Body mass index						
Normal	1			1		
Malnutrition	0.994	(0.714, 1.383)	0.970	1.045	(0.722,1.511)	0.816
Food security						
Food secure	1		0.214	1		
Food insecure	1.206	(0.897, 1.620)		0.932	(0.676,1.284)	0.666
Employment status						
Employment	1		<0.001***	1		
Non-employment	4.531	(3.329, 6.167)		4.875	(3.529,6.733)	<0.001***
Area of respondents						
Agriculture	1			1		
Tribal	0.733	(0.512, 1.050)	0.090*	0.793	(0.505,1.245)	0.313
Shrimp	0.770	(0.563, 1.053)	0.102	0.676	(0.469,0.975)	0.036**

*p < 0.10; **p < 0.05; ***p < 0.01.

OR=1 indicates no effect of the event.
OR>1 indicates increased occurrence of event.
OR<1 indicates decreased occurrence of event.
Look at CI and P value for statistical significance of value.
P<0.05 indicates the statistical significance of the event.
P>0.05 indicates the statistical non-significance of the event.

Table 4.20 Association of employment on Body Mass Index (BMI) classification of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75) according to Asia-Pacific

Variables	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed n (%)	Non-employed n (%)	p-value	Employed n (%)	Non-employed n (%)	p-value	Employed n (%)	Non-employed n (%)	p-value
(<18.5) Underweight	76(22.0)	74(42.8)		15(14.4)	10(19.2)		27(18.0)	6(8.0)	
(18.5-22.9) Normal	202(58.4)	34(19.7)		68(65.4)	15(28.8)		91(60.7)	26(34.7)	
(23.0-24.9) Overweight	27(7.8)	9(5.2)	P= <0.01*	8(7.7)	11(21.2)	P= <0.01*	9(6.0)	27(36.0)	P= <0.01*
(>=25)Obese	41(11.8)	56(32.4)		13(12.5)	16(30.8)		23(15.3)	16(21.3)	

Chi-square test, Fisher's exact test p <0.05*

Table 4.21 Association of employment on BMI and socio-demography profile, income and food security of agricultural, tribal and shrimp women according to WHO Asia-Pacific

Variables	Agriculture women							Tribal women							Shrimp women						
	<18.5		18.5-24.9		>25.0		P-value	<18.5		18.5-24.9		>25.0		P-value	<18.5		18.5-24.9		>25.0		P-value
	Case	Control	Case	Control	Case	Control		Case	Control	Case	Control	Case	Control		Case	Control	Case	Control	Case	Control	
Education																					
Illiterate	22.4	25.7	24.5	34.9	19.5	25.0		40.0	60.0	30.3	34.6	38.5	31.3		7.4	50.0	15.0	26.4	8.7	18.8	
Primary	18.4	33.8	29.3	27.9	26.8	28.6	0.00*	33.3	20.0	32.9	30.8	46.2	18.8	0.04*	37.0	16.7	31.0	15.1	39.1	31.3	0.03*
Secondary & above	59.2	40.5	46.3	37.2	53.7	46.4		26.7	20.0	36.8	34.6	15.4	50.0		55.6	33.3	54.0	58.5	52.2	50.0	
Age																					
<20	11.8	4.1	7.9	0	2.4	5.4		0	0	6.6	0	7.7	0		3.7	0	8.0	7.5	0	0	
20-34	48.7	41.9	48.5	41.9	53.7	41.1	0.00*	40.0	40.0	43.4	30.8	61.5	62.5	0.04*	66.7	66.7	63.0	47.2	65.2	50.0	0.19
35 & above	39.5	54.1	43.7	58.1	43.9	53.6		60.0	60.0	50.0	69.2	30.8	37.5		29.6	33.3	29.0	45.3	34.8	50.0	
Marital status																					
Married	100	100	100	100	100	100	0.00*	100	100	100	100	100	100	0.00*	96.3	100.0	99.0	98.1	100	100.0	0.29
unmarried	0	0	0	0	0	0		0	0	0	0	0	0		3.7	0	1.0	1.9	0	0	
Income (Tk)																					
<=9000	38.2	47.3	42.4	48.8	56.1	35.7	0.00*	46.7	40.0	42.1	42.3	61.5	37.5	0.04*	59.3	50.0	49.0	43.4	39.1	56.3	0.27
>9000	61.8	52.7	57.6	51.2	43.9	64.3		53.3	60.0	57.9	57.7	38.5	62.5		40.7	50.0	51.0	56.6	60.9	43.8	
Food security	39.5	16.2	28.4	18.6	34.1	17.9	0.00*	13.3	10.0	28.9	11.5	7.7	25.0	0.01*	33.3	0	41.0	5.7	43.5	37.5	0.00*
Secure	60.5	83.8	71.6	81.4	65.9	82.1		86.7	90.0	71.1	88.5	92.3	75.0		66.7	100.0	59.0	94.3	56.5	62.5	
Insecure																					

Chi-square test, Fisher's exact test p <0.05*

4.3.4 Anemia status of agricultural, tribal and shrimp women

Table 4.22 showed that severe anemia was found among non-employed women such as in agriculture 51.4% women, in tribal 38.5% women and in shrimp 66.7% women ($p<0.05^*$). Anemia status among the employed women was moderate to mild anemic. Highest 33.2% employed agriculture women found non-anemic followed by 8.0% shrimp women and 4.8% tribal women. Association of employment on anemia status and serum ferritin level found significant in employed and non-employed agriculture, tribal and shrimp women ($P<0.05$) (Table 4.23). Multiple logistic regression result revealed that in un-adjusted condition, anemia status in agriculture, tribal and shrimp was 1, 0.134, 0.216, respectively whereas in adjusted condition it was 1, 0.142 and 0.205, respectively (Table 4.24).

Ferritin of employed and non-employed women from agriculture and shrimp, zinc of employed and non-employed agriculture women and iron of employed agriculture women found significant with association of anemia status ($p<0.05$) (Table 4.25). After finding out anemia status of the employed and non-employed women, this study conducted analysis to find out the relationship of anemia status with socio-demography profile, income, food security and BMI of the respondents (Table 4.26). Fisher's exact test found insignificant relationship in all groups ($p> 0.05$).

Table 4.22 Association of employment on anemia status of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75) on the basis of Hb

Anemia	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed n (%)	Non-employed n (%)	p-value	Employed n (%)	Non-employed n (%)	p-value	Employed n (%)	Non-employed n (%)	p-value
(<8.0 g/dl) severe	52(15.0)	89(51.4)		15(14.4)	20(38.5)		43(28.7)	50(66.7)	
(8.0-10.9g/dl) moderate	124(35.8)	22(12.7)	p= <0.01*	67(64.4)	22(42.3)	p= 0.007*	40(26.7)	8(10.7)	p= <0.01*
(<11.0-11.9 g/dl) mild	55(15.9)	28(16.2)		17(16.3)	7(13.5)		55(36.7)	11(14.7)	
(>=12 g/dl) non anemic	115(33.2)	34(19.7)		5(4.8)	3(5.8)		12(8.0)	6(8.0)	

Chi-square test, Fisher's exact test p <0.05*

Table 4.23 Association of employment on anemia status and serum ferritin level of agricultural (employed n=108 and non-employed n=53) and shrimp women (employed n=50 and non-employed n=24)

Variables	Agriculture women					Tribal women					Shrimp women				
	E mployed		Non-employed		p-value	E mployed		Non-employed		p-value	E mployed		Non-employed		p-value
	%	Mean±Std	%	Mean±Std		%	Mean±Std	%	Mean±Std		%	Mean±Std	%	Mean±Std	
Haemoglobin															
<cutoff (< 12)	64.3	9.6±1.6	78.6	8.5±1.9	0.00	100	9.4±1.4	100	8.9±1.4		80.0	8.7±1.6	91.7	7.7±2.3	
>cutoff (>= 12)	35.7	13.7±1.7	21.4	20.6±8.7		0.0	–	0.0	–		20.0	17.4±2.9	8.3	17.3±2.1	0.00
Total	**100**	**11.0±2.6**	**100**	**11.1±6.5**		**100**	**9.4±1.4**	**100**	**8.9±1.4**		**100**	**10.4±4.0**	**100**	**8.5±3.8**	
Ferritin					0.00					0.00					
<cutoff (< 15)	83.3	13.4±1.1	50.0	13.6±0.6		91.7	12.7±1.3	45.5	11.5±0.6		98.0	12.8±1.4	70.8	12.7±12.7	0.00
> cutoff (>= 15)	16.7	63.6±29.5	50.0	48.0±31.5		8.3	29.9±7.6	54.5	35.3±32.4		2.0	18. ±0	29.2	29.1±29.1	
Total	**100**	**21.8±22.2**	**100**	**30.8±28.0**		**100**	**23.9±5.2**	**100**	**24.5±26.1**		**100**	**12.9±1.6**	**100**	**17.5±14.4**	

Chi-square test, Fisher's exact test p <0.05*

Table 4.24 Multiple logistic regression estimates and odds ratio of different socioeconomic and demographic variables on anemia

Variables	OR	Un-adjusted 95.0% C.I.for OR	p-value	OR	Adjusted 95.0% C.I.for OR	p-valu
Education						
Illiterate	1			1		
Primary	1.349	(0.841,2.162)	0.214	1.357	(0.825,2.235)	0.22
Secondary & above	1.416	(0.921,2.179)	0.113	1.392	(0.871,2.224)	0.16
Age						
Below 20	1			1		
20-34	0.989	(0.477,2.048)	0.975	1.154	(0.537,2.482)	0.71
35 & above	1.098	(0.530,2.278)	0.801	1.384	(0.634,3.020)	0.41
Religion						
Muslim	1			1		
Non-Muslim	0.846	(0.592,1.209)	0.358	0.963	(0.636,1.457)	0.85
Income expenditure(Tk)						
Below 9000	1			1		
9000 & above	0.849	(0.607,1.188)	0.339	0.769	(0.538,1.099)	0.15
Food security						
Food secure	1			1		
Food insecure	1.070	(0.735,1.560)	0.723	1.182	(0.788,1.771)	0.41
Physical activity level						
Low Pal	1			1		
Moderate Pal	0.721	(0.432,1.203)	0.210	0.767	(0.446,1.319)	0.33
High Pal	0.888	(0.532,1.482)	0.650	0.858	(0.489,1.503)	0.59
Body mass index						
Normal	1	(0.714,1.383)	0.970	1		
Malnutrition	0.994			1.075	(0.742,1.556)	0.70
Employment status						
Employment	1		0.007***	1	(0.349,0.841)	0.006
Non-employment	0.593	(0.407, 0.864)		0.541		
Source of Drinking						
Tube well	1		0.059*	1		
Others	1.875	(0.976,3.602)		1.520	(0.753,3.067)	0.24
Area of respondents						
Agriculture	1		<0.001***	1		
Tribal	0.134	(0.064,0.280)	<0.001***	0.142	(0.065,0.309)	<0.00
Shrimp	0.216	(0.129,0.362)		0.205	(0.120,0.352)	<0.00

*p < 0.10; **p < 0.05; ***p < 0.01.
OR=1 indicates no effect of the event.
OR>1 indicates increased occurrence of event.
OR<1 indicates decreased occurrence of event.
P<0.05 indicates the statistical significance of the event.
P>0.05 indicates the statistical non-significance of the event.

Table 4.25 Relationship of anemia status with ferritin, iron, zinc and copper level of agricultural, tribal and shrimp women according to Asia-Pacific

Variables	Anemia status																	
	Agriculture women						Tribal women						Shrimp women					
	Employed (%)			Non-employed (%)			Employed (%)			Non-employed (%)			Employed (%)			Non-employed (%)		
	<12	>=12	P-value	<12	>=12	P-value	<12	>=12	P-value	<12	>=12	P-value	<12	>=12	P-value	<12	>=12	P-value
Ferritin																		
<15 µg/L	90.7	70.0	0.01*	60.6	11.1	0.00*	91.7	-	-	45.5	-	-	100	90.0	0.04*	77.3	0.0	0.02*
>15 µg/L	9.3	30.0		39.4	88.9		8.3	-		54.5	-		0.0	10.0		22.7	100	
Zinc																		
<10.1 µmol/L	88.9	70.0	0.03*	6.1	0.0	0.449	83.3	-	-	0.0	-	-	65.0	100	0.02*	0.0	0.0	-
>10.1 µmol/L	11.1	30.0		93.9	100		16.7	-		100	-		35.0	0.0		100	100	
Iron																		
<11 µmol/L	20.4	90.0	0.00*	51.5	33.3	0.333	91.7	-	-	36.4	-	-	67.5	70.0	0.88	22.7	0.0	0.449
>11 µmol/L	79.6	10.0		48.5	66.7		8.3	-		63.6	-		32.5	30.0		77.3	100	
Copper																		
<10.1 µmol/L	85.2	96.7	0.103	51.5	55.6	0.83	75.0	-	-	18.2	-	-	72.5	80.0	0.629	27.3	0.0	0.394
>10.1 µmol/L	14.8	3.3		48.5	44.4		25.0	-		81.8	-		27.5	20.0		72.7	100	

Chi-square test, Fisher's exact test p <0.05*

4.26 Relationship of anemia status with socio-demography profile, income, food security and BMI of the agricultural, tribal and shrimp women according to WHO Asia-Pacific

Variables	Anemia status																	
	Agriculture women						Tribal women						Shrimp women					
	Employed (%)			Non-employed (%)			Employed (%)			Non-employed (%)			Employed (%)			Non-employed (%)		
	<12	>=12	P-value	<12	>=12	P-value	<12	>=12	P-value	<12	>=12	P-value	<12	>=12	P-value	<12	>=12	P-value
Education																		
Illiterate	26.4	17.4	0.14	28.8	23.5	0.53	31.3	60.0	0.58	38.8	33.8	1.00	12.3	16.7	0.62	27.5	16.7	1.00
Primary	24.7	30.4		31.7	26.5		35.4	20.0		24.5	33.3		32.6	41.7		18.8	16.7	
Secondary & >	48.9	52.2		39.6	50.0		33.3	20.0		36.7	33.3		55.1	41.7		53.6	66.7	
Age																		
<20	8.7	7.0	0.90	2.9	5.9	0.51	6.1	0	1.00	0	0	1.00	6.5	0	0.10	5.8	0	1.00
20-34	48.9	49.6		41.0	44.1		45.5	40.0		42.9	33.3		65.9	41.7		49.3	50.0	
35 & above	42.4	43.5		56.1	50.0		48.5	60.0		57.1	66.7		27.5	58.3		44.9	50.0	
Marital status																		
Married	100	100		100	100		100	100		100	100		98.6	100	1.00	98.6	100.0	1.00
unmarried	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		1.4	0.0		1.4	0.0	
Income (Tk.)																		
<=9000	41.6	46.1	0.49	41.0	55.9	0.13	43.4	80.0	0.17	40.8	33.3	1.00	48.6	58.3	0.56	47.8	33.3	0.68
>9000	58.4	53.9		59.0	44.1		56.6	20.0		59.2	66.7		51.4	41.7		52.2	66.7	
Food security																		
Secure	34.2	26.1	0.14	15.1	26.5	0.13	24.2	20.0	1.00	16.3	0.0	1.00	41.3	25.0	0.36	10.1	33.3	0.15
Insecure	65.8	73.9		84.9	73.5		75.8	80.0		83.7	100.0		58.7	75.0		89.9	66.7	
BMI																		
<Normal																		
Normal (18.5-24.9)	25.1	15.7	0.09	42.4	44.1	0.36	14.1	20.0	0.41	18.4	33.3	0.17	17.4	25.0	0.74	8.7	0.0	0.46
	64.5	69.6		23.0	32.4		73.7	60.0		53.1	0.0		66.7	66.7		68.1	100.0	
> Normal	10.4	14.8		34.5	23.5		12.1	20.0		28.6	66.7		15.9	8.3		23.2	0.0	

Chi-square test, Fisher's exact test $p < 0.05^*$

4.3.5 Serum ferritin, zinc, iron and copper status of agricultural, tribal and shrimp women

Table 4.27 shows serum ferritin, zinc, iron and copper in blood sample of the respondents in agriculture, tribal and shrimp sector. Among the employed agriculture, tribal and shrimp women serum ferritin level <15 µg/L was 83.3%, 91.7% and 98.0%, respectively. Zinc level in employed women from all the three sectors has higher percentage <10.1 µmol/L than the non-employed women. However, serum ferritin, zinc, iron and copper level among the employed and non-employed in agriculture, tribal and shrimp sectors was significant ($p<0.05$) except iron level in the employed and the non-employed women in agriculture ($p>0.05$).

Table 4.27 Association of employment on serum ferritin, zinc, iron and copper status of agricultural and shrimp

Variables	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed n(%)	Non-employed (control) n(%)	p-value	Employed n(%)	Non-employed (control) n(%)	p-value	Employed n(%)	Non-employed (control) n(%)	p-value
Serum ferritin (cut off 15 µg/L)									
<15 µg/L	70(83.3)	21(50.0)	p=0.000*	22(91.7)	5(45.5)	p=0.002*	49(98.0)	17(70.8)	p=0.000*
>15 µg/L	14(16.7)	21(50.0)		2 (8.3)	6(54.5)		1(2.0)	7(29.2)	
Zinc (Cut off 10.1 µmol/L)									
<10.1	69(82.1)	2(4.8)	p=0.000*	20(83.3)	0(0.0)	p=0.000*	36 (72.0)	0 (0.0)	p=0.000*
>10.1	15(17.9)	40(95.2)		4(16.7)	11(100.0)		14 (28.0)	24 (100.0)	
Iron (Cut off 11 µmol/L)									
<11	38(45.2)	20(47.6)	p=0.802	22(91.7)	4(36.4)	p=0.000*	34(68.0)	5(20.8)	p=0.000*
>11	46(54.8)	22(52.4)		2(8.3)	7(63.6)		16(32.0)	19(79.2)	
Copper (Cut off 11 µmol/L)									
<11	75(89.3)	22(52.4)	p=0.000*	18(75.0)	2(18.2)	p=0.001*	37(74.0)	6(25.0)	p=0.000*
>11	9(10.7)	20(47.6)		6(25.0)	9(81.8)		13(26.0)	18(75.0)	

Significance p <0.05*

4.4 Food security status of agricultural, tribal and shrimp women

Food security status was found mostly insecured in all employed and non-employed women (Table 4.28). Among agricultural women 0nly 31.5% and 17.3% employed and non-employed women, respectively found with food secure. In tribal, it was 24.0% and 15.4%, respectively while in shrimp it was 40.0% and 12.0%, respectively. The results were found significant with P<0.05*. After finding out anemia status of the employed and non-employed women, this study conducted analysis to find out the relationship of food security status with socio-demography profile, income and BMI of the respondents (Table 4.29). Food security status showed significant relationship with education, age, marital status, income of the employed and non-employed agriculture and shrimp women ($p<0.05$). Tribal women did not show any significant relationships with the above variables ($p>0.05$). BMI of all the groups of employed and non-employed women showed significant relationship with food security status ($p<0.05$).

Table 4.28 Association of employment on food security status of agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Variables	Agriculture women			Tribal agriculture women			Shrimp women		
	Employed n (%)	Non-employed n(%)	P-value	Employed n(%)	Non-employed n(%)	P-value	Employed n(%)	Non-employed n(%)	P-value
Food security									
food secure	109 (31.5)	30 (17.3)	<0.01*	25 (24.0)	8 (15.4)	<0.01*	66 (40.0)	9 (12.0)	<0.01*
mild insecure	157 (45.4)	103 (59.5)		49 (47.1)	10 (19.2)		63 (42.0)	39 (52.0)	
moderate insecure	69 (19.94)	23 (13.5)		22 (21.2)	18 (34.6)		21 (14.0)	21 (28.0)	
severely insecure	11 (3.2)	17 (9.8)		8 (7.7)	16 (30.8)		6 (0.4)	6 (8.0)	

Chi-square test, Fisher's exact test p <0.05

Table 4.29 Relationship of food security status with socio-demography profile, income and BMI of the agricultural (employed n=450 and non-employed n=225) and shrimp women (employed n=150 and non-employed n=75)

Variables	Food security																	
	Agriculture women						Tribal women						Shrimp women					
	Food secure			Food insecure			Food secure			Food insecure			Food secure			Food insecure		
	Case	Control	P	Case	Control	P	Case	Control	P	Case	Control	P	Case	Control	P	Case	Control	P
Education																		
Illiterate	22.9	23.3		23.6	28.7		36.0	50.0		31.6	36.4		11.7	11.1		13.3	28.8	
Primary	22.0	20.0	0.01*	48.7	32.9	0.01*	40.0	37.5	0.60	32.9	22.7	0.60	33.3	33.3	0.00*	33.3	16.7	0.00*
Secondary & >	55.0	56.7		47.7	38.5		24.0	12.5		35.4	40.9		55.0	55.6		53.3	54.5	
Age																		
<20	13.8	10.0		5.5	2.1		4.0	0.0		6.3	0.0		5.0	0.0		6.7	6.1	
20-34	50.5	53.3	0.00*	48.5	39.2	0.00*	52.0	25.0	0.25	43.0	45.5	0.25	63.3	44.4	0.00*	64.4	50.0	0.00*
35 & above	35.8	36.7		46.0	58.7		44.0	75.0		50.6	54.5		31.7	55.6		28.9	43.9	
Marital status																		
Married	100	100	0.00*	100	100	0.00*	100	100		100	100	0.21*	98.3	100	0.00*	98.9	98.5	0.00*
unmarried	0.0	0.0		0.0	0.0		0.0	0.0	0.21	0.0	0.0		1.7	0.0		1.1	1.5	
Income (Tk)																		
<=9000	37.6	50.0	0.04*	45.6	42.7	0.04*	36.0	37.5	0.538	48.1	40.9	0.538	40.0	55.6	0.00*	55.6	45.5	0.00*
>9000	62.4	50.0		54.4	57.3		64.0	62.5		51.9	59.1		60.0	44.4		44.4	54.5	
BMI																		
<18.5	27.5	40.0		19.4	43.4		8.0	12.5		16.5	20.5		15.0	0.0		20.0	9.1	
18.5-24.9	59.6	26.7	0.00*	69.2	24.5	0.00*	88.0	37.5	0.01*	68.4	52.3	0.01*	68.3	33.3	0.00*	65.6	75.8	0.00*
> 25.0	12.8	33.3		11.4	32.2		4.0	50.0		15.2	27.3		16.7	66.7		14.4	15.2	

Chi-square test, Fisher's exact test $p < 0.05$

Chapter five

DISCUSSION

DISCUSSION

This study is first of its kind of independent studies (using primary data) to examine the employment status of women in agriculture, tribal and shrimp industry and its impacts on women health, nutrition and lifestyle indicators. Using a random sample of more than 900 women in agriculture and Shrimp sector and covering data for six districts, this study provides a very comprehensive picture and unique value to the literature. Results were comprehensively compared across three different groups, i.e., general agriculture, shrimp sector and tribal women. This study examines, not only the general agricultural women, but also the shrimp sector and tribal women, which is an important value in addition to the literature. To compare the findings and fulfill the objectives the study conducted with employed and non-employed women (control) in all three groups.

5.1 Lifestyle and socio-demography of agricultural, tribal and shrimp women

Salehin *et al.* (2009) found that 54% of the agricultural farmers are middle aged (36-50) and the highest 28% completed their primary education. Substantial portion of the women finished their study at primary level because people think women donot need to study more (Rahman *et al.*, 2016).The highest 47.9% of the farmers are found old aged and 65.4% was literate from primary to above secondary by Hoque and Haque (2014). Roy *et al.* (2015) reported a positive and significant relationship of participants in farming. It is expected that education is must to improve in all spheres of activities including agriculture since education level has significant impact on raising farming efficiency and boosting potential output (Ali and Finn, 1989; Seyoum *et al.*, 1998). One year household-head's education increased rice production by 4 percent (Asadullah and Rahman, 2005). Researchers also reported insignificant effect of education on agricultural production efficiency in Bangladesh due to the education system (Wadud and White, 2000; Rahman, 2004). It was also reported that education has negative impact in participating agricultural works that is the higher the education level the lower the number of participants (Roy *et al.*, 2015). Salehin *et al.* (2009) revealed that maximum 41% family is medium sized in agriculture similar to this study among employee and non-employee women 61.9% and 57.8%, respectively. Hoque and Haque (2014) and Rahman *et al.* (2016) found medium family with highest proportion 38.9% and 65%, respectively. In the study, substantial portion of the employee and non-employee women was married and involved in household works including agriculture

and other income generating sources. The earning of the employee and non-employee women income in our study was lower than the national average of Tk. 13258 (BBS, 2017). Salehin *et al.* (2009) reported that 40% of the farmers were having low income and 43% having medium income while Hoque and Haque (2014) found 47.4% farmers having medium income and 38.4% having high.

Tribal women are less educated compared to their male counterparts as well as compared to national figure of 32.4% as per the 1991 Census (MoWCA, 2011). Maxmimum percentage was found with no education and primary education by Mullah *et al.* (2007). The study also found poor education facilities among the tribal living in the villages. Tribal people are engaged in different types of work however, majority of the women are found involved in agriculture (Mullah et al., 2007). Source of drinking water was tube well and ponds dominated in the study. It is found that among the tribal people, 60.94% households are involved in agricultural day labor activities. Around 22.14% household depend on their own cultivable land for production, 5.99% in various formal and non-formal service sectors (Offices support staff, Security guard and Garments factory), 2.34% of total sample HHs are involved in livestock rearing. 2.86% tribal households were found involved with small business activities (Petty shop, tea stall) (Toppo *et al.*, 2016). Average respondent income was highest above Tk. 3000 (Mullah *et al.*, 2007). Regarding average monthly income of the households, majority (50.26%) of the households are up to 4000.00 BDT (U$ 50) per month. Only 3.13% reported that their income is more than 6000.00 BDT (U$ 75) (Toppo *et al.*, 2016). Another research shows that the average annual income of tribal households was around US$ 350 (28,000.00 tk.) in 2007(Pant *et al.*, 2014); this number grew significantly reaching over US$ 570 (45600.00) in 2009. The estimated was average incomes of US$ 1702 for a rural household in Bangladesh in 2010 (BBS, 2012).

A total of 52% of the fishermen in Rajshahi had 4-5 family members (Ali *et al.*, 2008) and 65% of the fishermen had 4-6 family members in south-western region of Bangladesh (Das *et al.*, 2015). Zarin (2014) reported that 40% and 17.5% of the women workers in shrimp processing industry are married and unmarried, respectively. The percentage of married workers in our study was higher than Zarin (2014). In a study, 61% and 83% of fisherman at Shirajgonj district had own house and own tube-well, respectively (Rahman *et al.*, 2014). Compared to the fisherman of different regions of Bangladesh the shrimp industry women found a better life style. Other social advantages in terms of access to

safe drinking water, sanitary facility and electricity were available among the respondents. Zarin (2014) reported that 29.2%, 43.3% and 13.3% of shrimp industry women were 21-30, 31-40 and 41-50 years old, respectively. Moreover, the study also mentioned that 65%, 30% and 5% respondents were illiterate in primary and secondary Our study suggests that educational status of the women workers are increasing. This might be due to the increasing educational facilities from GOs and NGOs. Income level of the shrimp industry women is very low for the survival and support family (Halim, 2004). Zarin (2014) found that the income 62.5% of the employed in shrimp industry was below 2000 BDT and only 15% had income 3500 BDT and above. In the current study, expenditure was also higher among the employees.

This study found that agricultural women in general, tribal and shrimp industry spend substantial portion of their income on food items. In fact, the difference between food and non-food items was double. Among food items, rice, fish and vegetables were most common. Employed respondents use highest money for fisheries whereas non-employed women donot spend on fisheries. They spend highest money on agriculture. In tribal, highest expenditure by employed women and lowest expenditure by non-employed women was same as general agriculture. This is similar in shrimp industry women. Insignificant relationship between household expenditure and women participation in rice production was reported by Roy *et al.* (2015). This is similar to our study. Following fisheries, respondent spend money on education and medicine. Agricultural women spend highest money on medicine while shrimp employed women spend highest money for education. Most of the women reported that they spend income for medicine for the oldest person while they are aware of children education so they spend money for education. However, our study found that agricultural women expenditure was the highest among the employed and the non-employed women from three groups. Besides the study found that women have spent highest money on food and non-food items. However, this study revealed that employed women,highly contributing to their family income, thus reduce the economic pressure of the family. Thus the result of the current study shows that women employed in agriculture and shrimp industry are greatly contributing in total production as well as in total family income.

In our study we that found near fifty percent women take loan from different GOs and NGOs. Generally women take loan to finance their lifestyles which are gradually

increasing because women are becoming independent when it comes to making financial decisions (Chakraborty, 2019). (Khondkar, 2002) found that loan taking by women paly positive and negative results in changing the quantity and quality of assets as women borrow money for investment. However, in some cases women donot invest in business instead they spend it for household requirements. A study found that 68.5% of the respondents could change their empowerment situation by taking loan. By the estimated change in empowerment it was realized that 15.8 percent of the respondents experienced positive change in their empowerment situation. The main factors affecting the change in women empowerment were membership of different micro-credit organizations, poverty change due to micro-credit and use of loaned money (Hossain *et al.*, 2016). Our study found that women take loan to improve their business which was similar to other findings. Women prefer both GOs (Banks) and NGOs (BRAC, Grameen, Proshika, etc.). This study found that women employed in agriculture took highest loan for agricultural purposes while non-employed tribal women took lowest loan. Respondents choose Proshika, Asa and BRAC NGOs mostly for taking loan which is due to easy access for women for taking loan.

This study found that more than three-fourth of women in agriculture and tribal sector live in their own house. On the other hand, one-third of shrimp women live in their own house. Among the non-employed women own house percentage was lower in agriculture and tribal sector but higher in shrimp sector. Among the housing material wooden was found least in all three sectors which is similar to Akhtaruzzaman *et al.* (2011). Tin and concrete house was more in agriculture and shrimp sector while in tribal mud house was very common. The survey study reported that nationally 66.15% households made of tin wall which is higher than current study. In nutrition, health and demographic survey of Bangladesh-2011, Akhtaruzzaman *et al.* (2011) found 88.3% household with tin roofing which is higher than the current study. Maximum household in both employed and non-employed had lighting facility where Polli electricity dominated in the area over kupi/hurricane and road side lights which is similar to Akhtaruzzaman *et al.* (2011). The study also reported that nationally 81.2% households have separate kitchen for cooking which higher than the current study. In the current study,The shrimp women had highest percentage of separate kitchen.Those who have no separate kitchen, they usually cook in open space or share with others or do it in the living room which (Akhtaruzzaman *et al.*, 2011). This statement is very similar to the current study. Main sources of drinking water in this study was highest than other studies conducted on

agriculture, tribal and shrimp workers livelihood. The use of tube well water for drinking percentage was more than use of tube-well water for cooking. For cooking the respondents found using pond water and tube well water.

5.2 Health status of agricultural, tribal and shrimp women

Many women are advantaged by prenatal care which provides numerous secondary prevention opportunities such as maternal influenza vaccine to prevent pregnancy complications (Moos, 2006). The use of progesterone to prevent a subsequent preterm birth in control women who have previously given premature birth is a new example of the primary prevention opportunities of prenatal care (Meis *et al.*, 2003). In the current study, health checking during pregnancy was higher in employed women in all the three sectors.Employed women are more aware than the non-employed women in this regard. Similar trends found in Tetanus toxoid full and incomplete dose completion which was significant in shrimp women. Also the study found, higher percentage of the employed women completed full dose timely than non-employed women. Higher normal delivery and lower birth difficulties reported among the employed women than non-employed women in agriculture, tribal and shrimp industry women. This indicates that, employed women are more concerned about prenatal care of their health than the non-employed women. Also during the survey, employed women reported that they got information from different NGOs who provide them loan for conducting works and business. During the time, they also provide information on advantages of prenatal care. Thus NGO encourages women in the sectors.

The postnatal period is defined as the first six weeks after birth which is a very critical period to the health and survival of a mother and her newborn. More importantly, provide postnatal care in the first 24 hours to all mothers and babies regardless of where the birth occurs and all mothers and babies need at least four postnatal checkups in the first 6 weeks suggested by WHO (2015). About 18% of mothers received postnatal care from the health care facility (Shahjahan *et al.*, 2015). The authors also reported that mother's education appears to have a strong and significant association with postnatal care practices in rural Bangladesh. Newborns of mothers having a skilled delivery were significantly more likely to receive PNC (Singh *et al.*, 2017). In this study, higher percentage of employed women in agriculture, tribal and shrimp industry are found concerned about postnatal care of them and their children than the non-employed

women. Therefore, breast feeding practices, vaccination coverage for the new born, complete doses of immunization, and percentage trends of vaccination like BCG, Polio, Pneuomonia was higher among the employed women in the study. This study found that less than half of the women in the three sectors did not complete Vitamin A capsule for their children less than five years. On the other hand, more than half of the women completed all courses of vaccination which was higher among the employed women. The study found significant result among shrimp women. Majority of the women did not take Vitamin A capsule within 24 hrs of newborn except in employed shrimp industry women.

Sanitation status of the respondents revealed that majority of the women in agriculture and tribal employed and non-employed use own toilet while in shrimp industry most of the women use shared toilets. This might be due to shrimp women live in rented house mostly and in the slum of the city. In Bangladesh between 1994 and 2009 sanitation using have significantly increased, the percentage of households openly defecating declined at a rate of about 1.8% per year from 30% in 1994 to 6.8% in 2009 in rural areas (Zheng *et al.*, 2013). This means an increase in number of accessing sanitation facilities which is similar to our study. On the other hand, access to individual improved sanitation facilities nearly doubled from about 30% in 2006 to 57% in 2009, with both rural and urban areas showing impressive progress. In 2007, 20% of the poorest households still openly defecated, although many of them (38%) shared a latrine of any type. Both the researches reveal that open defecation still remain 39.40% among the tribal and poor rural people in Bangladesh. In the current study, very few women use toilet provided by government or NGOs. Garbage disposal result revealed that most of the non-employed and employed women in agriculture, tribal and shrimp industries use specific dish and open space for disposal. The women keep all types of garbage in one packet and then throw it. Women don't keep plastic or non-degradable garbage in separate.

Current study found skin diseases and asthma in most of the employed and non-employed women in all three sectors. Nuruzzaman and Uddin (2017) reported that diseases such as colds, coughs, asthma, backache and musculoskeletal pains are the common ailments perceived to be prevalent in shrimp processing workers. The finding is similar to the current study. It was also reported that tribal communities are immensely

burdened with various diseases like malaria, diarrhoea and acute respiratory infection (MoCHTA, 2015) which is similar to current study.

5.3 Nutritional status of agricultural, tribal and shrimp women

Women are the key actors within the agriculture and food system in Bangladesh. The argument for focusing on gender inequality in agriculture is strengthened by empirical evidence that demonstrates the role of women in improving household agricultural productivity, food and nutrition security. Considerable evidence also suggests that mothers' greater control over resources like agriculture improves child outcomes in particular, nutrition and education (Hallman, 2003). These disease occurrences also depend on nutritional status that is determined by income and food consumption of the respondents. In this study income and food consumption status found better among employeed women which might positively impacted disease occurrences and nutritional status of the women respondents.Tribal women employed in agriculture and tribal employee women enjoy more expenditure on food items which definitely provide more nutrition and keep them healthy than the non-employed women.

In shrimp industry, Zarin (2014) reported that BMI between 18.5 and 25 tend to have fewer diseases and to live longer than persons with lower or higher BMI. A person who is unhealthy and thin is said to be wasted and the phenomena is generally known as wasting. By contrast a person who is unhealthy and fat is said to be overweight or obese. A BMI >25 indicates overweight but this is not necessarily equivalent to obesity, as athletes with great muscle mass will also have a high BMI. Overweight is usually classified as grade 1: 25-30; grade 2: 30-40; grade 3: >40. Recent data indicate that 24% of married women nationwide are undernourished BMI < 18.5, while 17% of this same cohort are overweight or obese BMI > 25.0 (Arsenault *et al.*, 2010). However, women's empowerment, experienced an increase in women's BMI (Murshed-E-Jahan, 2010). These are supporting current study, hence employed women in shrimp industry found mostly normal weight. Better income and more expenditure on food might contribute in nutritional status of the women. If the number of individuals with low BMI in a population is increasing, it is likely that there is a food shortage (Zarin, 2014). In non-employee community, most of the women reported food shortage at home due to financial problem. This study found maximum non-employeed women with underweight. In Bangladesh, studies have demonstrated that anemia status of the women is a significant public health concern (Bishwajit et al., 2016; Ahmed, 2000). It was stated that

sociodemographic and household characteristics had shown significant correlation with anemia status of rural women (Bishwajit et al., 2016). It also appears that severe anemia in the Bangladeshi population is less frequent (Ahmed, 2000). However, this study found less percentage of severe anemia among the employed women while non-employed women were with high percentage. This means women who were employed were less likely to be anemic. In fact, besides contributing to economic access to better food, nutrition, and living conditions, employment can promote nutritional knowledge and health status among women.

5.4 Dietary food intake

Dietary food intake was measured following FCS based on dietary diversity, food frequency and relative importance of different food groups in the last 7 days (Hoddinott and Yohannes, 2002; Kennedy et al., 2011). This study recorded that rice dominates over other food items in terms of frequency.The employed and the non-employed women in the three sectors took carbohydrate, protein, vitamin, minerals in their daily diet. FCS analysis revealed that employed women had significantly better status than the non-employed women in general, tribal and shrimp women group.

5.5 Physical activity level

Total physical activity for women includes behaviors within the household, leisure and occupation domains and is referred to as lifestyle physical activity. (Wilbur et al., 1993). Generally, PAL rates are lower for women than men and these rate further decline with ages (Caspersen et al., 2000). In this study physical activity of the non-employed women was lower than the employed women which might be due to limited financial resources, endure social isolation and have fewer community health resources than the employed women. Similar findings reported by Carruth and Logan (2002) who compared between rural and urban women. These factors may contribute to lower PAL of non-employed women compared to employed women in general, tribal and shrimp women group.

5.6 Food security status

Food security, as defined by the United Nations' Committee on World Food Security, means that all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs

for an active and healthy life in World Food Summit in 1996. Women contribution in agricultural production and marketing for income generation, and ensuring their nutritional status are vital for improving food security in the country (MoA, 2013). Explicit recognition of women's role in their families' nutrition is central to nutrition-sensitive agriculture (Ruel and Alderman, 2013). More percentage of underweight indicate increased food insecurity situation among non-employee while maximum percentage of normal weight indicates better food security (Begum *et al.*, 2013). Our study found that employed women have better food security than the non-employed which coincides with the statement. This means non-employed women vulnerable to food access. In fact, the country experiences numerous challenges regarding food insecurity. Food utilization has improved but balanced food intake is still far below the standard. A notable portion of people who are not employed are still severely food insecured and malnourished (Roy *et al.*, 2019) .

CONCLUSION and KEY FINDINGS

CONCLUSION

Women in Bangladesh play very important roles in family and the economy. They take care of the husband and children and engage themselves in employment generation activities, formally or informally. This research is first of its kind in Bangladesh to examine the socio-economic, health, nutrition and lifestyle indicators by using primary survey data of more than 900 respondents. Furthermore, this study compares the results among general agricultural women, shrimp women and tribal women workers. By analyzing data for all the three segments, this study provides important value to the literature.

The findings from the study are as follows:

- Education is a strong driver of employment of women in agriculture. Our results indicate that the Shrimp sector has greater proportion of educated women than the general agriculture.
- Significant diversity of income exists across groups. Among various employment groups, the Shrimp sector women have relatively higher income (Tk. 4103) than the general agricultural women.
- The tribal agricultural women are disadvantaged in terms of employment and education.
- Religion has significant influence on employment of tribal workers, while marital status has significant influence on employment of Shrimp workers.
- Women involved in agriculture have better lifestyle than the non-employed women. However, our study is suggesting immediate initiatives, for example, training, free education, business literacy school (BLS), etc. for enhancing education among the employed and the non-employed women for the betterment of the production efficiency and development of the country. Our study suggests that agricultural work has great potentiality of increasing women and household income and for creating employment.
- Significant diversity exists in terms of housing condition. Among the employed women, 78.0%, 90.4% and 36.7% in agriculture, tribal and shrimp sector are

used to live in own house, while 60.1%, 80.8% and 52.0% non-employed women were found having own house.

- In shrimp cases, our study found that, employed women lead a better life than the non-employed since livelihood levels and standards are influenced by income level, education and social changes. The new knowledge would help to formulate strategies and policies to address the major constraints to improve the lifestyle of the community.
- Employed women have access to better quality of drinking water. About 92% of employed women in agriculture are having access to tube well drinking water as compared to about 82% non-employed women. Tube well water also significantly dominated in source for cooking and utensils washing among the employed and the non-employed in agriculture, tribal and shrimp women. Separate kitchen percentage was higher among agriculture and tribal employed women whereas in shrimp both employed and non-employed women had separate kitchen.
- In prenatal care, more employed women found are found more with health check during pregnancy than the non-employed women. Also, the breast feeding practice was more among the employed women than the non-employed women.
- Tribal employed and non-employed workers are significantly lagging behind in terms of health indicators. Over 90% of Shrimp employed women have completed all courses of vaccination, while the rate is 77% for general employed women and only 61% for the tribal employed women in agriculture.
- There is a significant difference in hygiene and sanitation status between the employed and the non-employed women where the employed women have better hygiene and sanitation status. Tribal women are found to be disadvantaged by this indicator.
- Significant food consumption pattern ($P<0.05^*$) revealed that the employed women had better condition (acceptable high) than the non-employed women.
- Significant disparity exists in terms of physical activity level where the vigorous activity levels are found to be higher for the employed women. The excessive workload may be detrimental to women health and may affect the labour productivity in agriculture in the long run.
- The results indicate better Body Mass Index condition for employed women. We found that the maximum non-employed women are suffering from underweight, overweight and obese. For example, in agriculture area 42.8% women are

underweight and 32.4% are obese. In tribal, 21.2% are overweight and 30.8% are obese and similarly in shrimp 36.0% are overweight and 21.3% are obese.

- Severe anemia conditions prevail among non-employed women, which is a major policy concern. Anemia status among the employed women was moderate to mild anemic. Highest 33.2% employed agriculture women found non-anemic followed by 8.0% shrimp women and 4.8% tribal women.
- Food consumption score and physical activity level indicated that the employed women in agriculture and shrimp industry have better condition than the non-employed women.
- Food security status are found mostly insecured in all the employed and the non-employed women. Among the agricultural women only 31.5% and 17.3% employed and non-employed women, respectively are found food secured. In the tribal women, it was 24.0% and 15.4%, respectively while in the shrimp workers it was 40.0% and 12.0%, respectively. The results were found significant with $P<0.05^*$.

The results from the study show significant disparity in income, health, nutrition and lifestyle conditions of women workers. Education and training underpin the development of women employment, which leads to women empowerment and higher socio-economic status. Shrimp women are having higher personal income, while tribal women are found to be disadvantaged by various indicators.

The study recommends

- Developing appropriate tool to improve socioeconomic status of shrimp sector women certainly offer an improved option and add significant value to the sector
- Almost all the problems faced by the women labor such as discrimination in wages of male and female, discrimination in working hours, harassment should be monitored by government and non-government officials
- Policy makers and agencies would be benefited from being better informed regarding the livelihood and hygiene information of shrimp industry women
- More research and effective actions like training along with credit facilities should be implemented to train the women

KEY FINDINGS

This study is first of its kind of independent studies (using primary data) to examine the employment status of women in agriculture and its impacts on women health, nutrition and lifestyle indicators. Using a random sample of more than 900 women in agriculture and Shrimp sector and covering data for six districts, this study provides a very comprehensive picture and unique value to the literature. Results were comprehensively compared across three different groups, i.e., general agriculture, shrimp sector and tribal women. This study examines, not only the general agricultural women, but also the shrimp sector and tribal women, which has important value in addition to the literature.

Lifestyle and socio-demography of agricultural, tribal and shrimp women

The average household size for the general agricultural women is found to be 4.34 persons for both employed and unemployed women. For the tribal women the average household size is 4.68, which is not significantly different from the non-employed women, which is 4.54. However, a significant difference in the mean household size is found to be in the Shrimp sector. The mean household size of the Shrimp employed women is 3.97 persons compared to the non-employed women 4.47 persons and the difference is statistically significant at the 1% level ($P<0.01$). Age distribution result revealed that maximum women are between 25-34 and 35-44 years old in all three sectors with exception in shrimp control women where 42.7% were above 45 years old. Marital status results found that most women were married. Primary education was phenomenally highest percentage among the employed and the non-employed women in agriculture, tribal and shrimp sector. Average employed respondents income was insignificantly higher than the non-employed women in agriculture and tribal women while in shrimp sector, average employed respondents income was significantly higher than non-employed women. Housing condition results revealed that more employed women live in own house among agriculture and tribal while in shrimp non-employed women mostly live in own house. Employed women in shrimp sector are used to live in rented house in slum since they work in processing plants and came from distant places. Lighting of the house was maximum among the employed tribal women (89.4%) and minimum among the non-employed shrimp women (56.0%). In agriculture and shrimp sector Polli electricity contributed much (above 65%) which was less than 40% in tribal sector. Tube well was the main sources of drinking water. In the three sectors use of

tube well water for cooking and washing utensils were highest than other sources except the non-employed tribal group who use other sources.

Health status of agricultural, tribal and shrimp women

Prenatal care result showed that trends of health check during pregnancy was higher among the employed women in agriculture, tribal and shrimp sector than the non-employed women although the difference was not varied largely. Similar trends found in Tetanus toxoid full and incomplete dose completion which was significant in shrimp women ($P<0.05^*$). Significantly higher delivery process observed among the employed women in the sectors than the non-employed women. The study found that in agriculture, tribal and shrimp 91.0%, 82.7% and 92.7% employed women, respectively practiced breast feeding. Among the non-employed the percentage was little lower. Completion of vaccine courses was significantly higher among the employed women than the non-employed women. Hygiene and sanitation parameters like latrine, hand washing after toilet, hand washing before and after eating and garbage disposal status found better in employed women in agricultural, tribal and shrimp sector than the non-employed employed women. Among five common diseases (Skin diseases, Dermatitis, Influenza, Asthma and Back pain) skin problem and back pain were more severe in agricultural and tribal women. In shrimp women, significant highest percentage had influenza among the employed women (52.6%) while asthma was highest (42.9%) among the non-employed women ($p<0.05^*$). Dermatitis secured lowest percentage among the women except the non-employed shrimp women where back pain was absent.

Nutritional status of agricultural, tribal and shrimp women

Significant food consumption pattern ($P<0.05^*$) revealed that the employed women had better condition (acceptable high) than non-employed women. Significant physical activity level observed among the respondents ($P<0.05^*$). Among the agricultural women, 44.8% in employed women found with vigorous activity while 67.6% non-employed women found with active or moderate level. In the tribal area,40.4% employed women were found with vigorous activity whereas highest 57.7% women found with sedentary or light activity. On the other hand, in shrimp sector active or moderate PAL found highest (43.3%) among the employed and low activity level found most (53.3%)

among the non-employed women. Estimation of basal metabolic rate (BMR) by age was as 14.814 Kcal/day, 8.126 Kcal/day and 9.082 Kcal/day for 18-30 yrs, 30-60 yrs and >60 yrs old women, respectively. The research found that maximum non-employed women are suffering from underweight, overweight and obese which were lower among the employed women. Severe anemia was found among the non-employed women while it was moderate to mild anemic in case of employed women. Ferritin level of the employed and the non-employed women from agriculture and shrimp, zinc level of the employed and the non-employed women in agriculture and iron level of the employed agriculture women found significant with association of anemia status ($p<0.05$). Another key findings in this study is that among the employed agriculture, tribal and shrimp women serum ferritin level <15 µg/L was 83.3%, 91.7% and 98.0%, respectively. Zinc level in the employed women from all the three sector has higher percentage <10.1 µmol/L than the non-employed women. In agriculture women, serum ferritin and zinc status of the employed and the non-employed women were significant ($p<0.05$).However, serum ferritin, zinc and iron level among the employed and the non-employed tribal and shrimp sector was significant ($p<0.05$).

Food security status

Food security status was found mostly insecured in the all employed and the non-employed women. Among agricultural women only 31.5% and 17.3% employed and non-employed women, respectively were found food secured. In tribal, it was 24.0% and 15.4%, respectively while in shrimp it was 40.0% and 12.0%, respectively. The results were found significant with $P<0.05^*$.

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Appendix

Appendix

Appendix 1]: Questionnaire for data collection

Institute of Nutrition and Food Science
University of Dhaka
Life Style, Health, Nutritional Status and Food Security of Female Workers in Agriculture and Shrimp Sectors
(এই উত্তর পত্রের তথ্য গুলি শুধু মাত্র গবেষণার কাজে ব্যবহৃত হবে)

ক্রমিক নং	সাক্ষাৎকার গ্রহণের তারিখ		
1.	উত্তর দাত্রীর নাম		পরিবারের ধরণ কোড: 1.একক পরিবার 2. যৌথ পরিবার 3.বস্তিবাসী জনগোষ্ঠীর ধরণ কোড: 1. বাঙালী 2. উপজাতি 3. বিহারী 4. অন্যান্য এলাকার ধরণ কোড: 1. গ্রামীণ 2. শহরে/ পৌর
2.	PSU No		
3.	পরিবার প্রধানের নাম		
4.	এলাকার নাম/ ঠিকানা		
5.	এলাকার ধরণ		
6.	জেলা		
7.	উপজেলা		
8.	ডাকঘর		
9.	ডাকঘর কোড		
10.	পরিবারের ধরণ (কোড)		
11.	জনগোষ্ঠীর ধরণ (কোড)		

Section-A
পরিবার পরিচিতি
ত, গঠন ও আর্থসামাজিক তথ্য

1. আপনি কোন ধর্মাবলম্বি? (কোড: 1. মুসলিম, 2.হিন্দু, 3. বৌদ্ধ, 4. খ্রিষ্টান 5. ..... অন্যান্য)
3. জনগোষ্ঠীর ধরণ (জনগোষ্ঠী কোড: 1.বাঙ্গালী, 2. চাকমা, 3.মারমা, 4. সাওতাল, 5. মণিপুরী, 6. ত্রিপুরা, 7.খাসিয়া, 8. গারু, 9.অন্যান্য)

2. পরিবারের মোট সদস্য সংখ্যা

A. পরিবারের সদস্যদের পরিচিতি

MID	পরিবারের সদস্যের নাম	লিঙ্গ কোড	পরিবার প্রধানের সাথে সম্পর্ক কোড	বয়স		বৈবাহিক অবস্থা কোড	পাশকৃত শ্রেণী / শিক্ষা কোড কোড	পেশা কোড-৫	
				বছর	মাস			প্রধান	গৌণ
1.									
2.									
3.									
4.									
5.									

কোড-১ঃ লিঙ্গ
1. পুরুষ
2. মহিলা
3. গর্ভবতী
4.স্তন্যদাত্রী
5. গর্ভবতী ও স্তন্যদাত্রী

কোড -২ ঃ পরিবার প্রধানের সাথে সম্পর্ক
1. পরিবার প্রধান
2. স্ত্রী/স্বামী
3. পিতা/মাতা
4.ভাই/বোন
5. পুত্র/কন্যা
6. স্নেহের বৌ
7. উত্তর পাত্রী নিজে

কোড -৩ ঃ বৈবাহিক অবস্থা
1. বিবাহিত
2. অবিবাহিত
3. বিবাহ/বিপত্নীক
4. পরিত্যক্তা/বিচ্ছিন্ন
5. তালাক প্রাপ্ত

কোড -৪ ঃ শিক্ষা কোড
1. নিরক্ষর
2. প্রাথমিক
3. অষ্টম শ্রেণী পাশ
4. এস.এস.সি পাশ
5. লিখ করতে পারে
6. পড়তে পারে
7. পড়তে ও লিখতে পারে

কোড -৫ ঃ পেশা কোড
1. কোম্পানী
2. শিল্প
3. মাঠে
4. বৃদ্ধ/বৃদ্ধা
5. শারীরিক অক্ষম
6. অতিথি, পরিশ্রম
7. শিশু
8. ছাত্র/ছাত্রী
9. বেকার
10. ব্যবসা
11. অন্যান্য

4. আপনি কত টাকা আয় করেন? .....টাকা।

প্রশ্ন নং	প্রশ্ন	কোড	উত্তর
5.	আপনি কি ধরনের কাজ করেন?	(কোড প্রথম পৃষ্ঠা থেকে পেশা কোড ব্যবহার করুন)	
6.	আপনি কি বৎসরের সকল সময়ই কাজ করেন?	(কোডঃ 1= সারা বৎসরই কাজ করি, 2= নিষ্কলাল কাজ করি (যান.....দিন.....) 3= মাঝে মধ্যে করি (যান...../দিন.....)	
7.	আপনাকে পারিশ্রমিক কিভাবে প্রদান করে?	(কোডঃ 1= দলগত/ঠেক, 2=দলগত ও ব্যক্তিগতের মাধ্যমে, 3= ব্যক্তিগতের মাধ্যমে, 4= কোন কিছুই পাই না।)	
8.	আপনার রোজগারের টাকা কিভাবে খরচ হবে সিদ্ধান্ত কে নেয়?	(কোডঃ 1=নিজেই, 2=আমরা যুগলেই, 3=স্বামী একা, 4=অন্য কেউ, 5=উপার্জনকারী ও অন্য কেউ, 6=.....অন্যান্য।)	
9.	ফাউন্ডারী/ মিল ছাড়া পর সারাদিন উপার্জনক্ষম/ অন্য কোন কাজ করেছেন কি?	(কোডঃ 1= হ্যাঁ, 2=না)	
10	যদি হ্যাঁ হয় তাহলে কোথায়?	.....।	
11.	কোন টাকা পান কি ?	(কোডঃ 1= হ্যাঁ, 2=না)	
12.	যদি হ্যাঁ হয় তাহলে কত টাকা?	.....।	
13.	আপনার স্বাস্থ্য পরিচর্যার বিষয়ে সাধারণত কে সিদ্ধান্ত নেয়?	(কোডঃ 1=নিজেই, 2=আমরা যুগলেই, 3=স্বামী একা, 4=অন্য কেউ, 5=উপার্জনকারী ও অন্য কেউ, 6=.....অন্যান্য।)	

C. পরিবারের আয়-ব্যয় সংক্রান্ত তথ্য

14.	পরিবারের কতজন আয় করেন?	.....জন

15. কে কত টাকা আয় করেন?

সদস্য নং	সদস্যের নাম	আয়ের উৎস (মাসিক)		
		চাকুরী	কৃষি	ব্যবসা
পরিবারের সদস্যদের মাসিক মোট আয়=				

16.	কোন জায়গা থেকে ঋণ গ্রহণ করেছেন কি?	(কোডঃ 1= হ্যাঁ, 2=না)	

17. ঋণ গ্রহণ করে থাকলে নিচের ছক পূরণ করুন

ক্রমিক নং	সংস্থার নাম	টাকার পরিমাণ	ঋণ গ্রহণের কারণ (কোড)	ঋণ পরিশোধ নিয়মিত করতে পারছেন কি?	ক্রমিক নং	সংস্থার নাম	টাকার পরিমাণ	ঋণ গ্রহণের কারণ (কোড)	ঋণ পরিশোধ নিয়মিত করতে পারছেন কি?

সংস্থা ঃ 1=ব্র্যাক, 2=প্রভাতী ব্যাংক, 3=সোনালী ব্যাংক, 4=অগ্রণী ব্যাংক, 5=জনতা ব্যাংক, 6=রূপালী ব্যাংক, 7=এ্যাবীন ব্যাংক, 8=আশা, 9=উদীপন, 10=প্রশিকা, 11=ব্যক্তি থেকে, 12=মহাজন, 13=.....অন্যান্য।

কারণ: 1=পারিবারিক প্রয়োজন, 2=কৃষিভিত্তিক কাজের জন্য, 3=বাড়ী তৈরী/মেরামত, 4=শিক্ষা ব্যয়, 5=চিকিৎসা ব্যয়, 6=মেয়ের বিয়ে, 7=গৌতুক, 8=অন্যান্য।

18. পরিবারের মাসিক ব্যয় (নিম্নের খাত ওয়ারী)

ক্রোড	1	2	3	4	5	6	7	8	9
আয়ের খাত	খাওয়া (নিজের থেকের চাল ডাল আর মূল্য হিসাব নিতে হবে)	শিক্ষা	ঔষধ চিকিৎসা	যাতায়াত	কাপড় (ভাড়া+বিদ্যুৎ+মেয়া কর)	প্রসাধন পরিচ্ছদ	কৃষি কাজ	কৃষ্য	অন্যান্য
টাকার পরিমাণ									
মোট ব্যয়									

প্রশ্ন নং	প্রশ্ন	কোড	উত্তর
19.	পরিবারের বড় ধরনের কেনাকাটার বিষয় সাধারণত কে সিদ্ধান্ত নেয়?	(কোডঃ 1= নিজেই নেই, 2= আমরা যুগলেই, 3=স্বামী, 4= অন্য কেউ, 5= উপার্জনকারী ও অন্য কেউ, 6= বাবা এবং মা ,7 = বাবা, 8= মা, 9 = ...অন্যান্য।)	
20.	পরিবারের রাতিদিনের কেনাকাটার বিষয় সাধারণত কে সিদ্ধান্ত নেয়?	(কোডঃ 1= নিজেই নেই, 2= আমরা যুগলেই, 3=স্বামী, 4= অন্য কেউ, 5= উপার্জনকারী ও অন্য কেউ, 6= বাবা এবং মা ,7 = বাবা, 8= মা, 9 = ...অন্যান্য।)	

21. উত্তরদাতার পুষ্টিগত অবস্থা

শারীরিক মাপজোক			জৈব রাসায়নিক মাপ		
ওজন (কেজি)	উচ্চতা (সেমি)	বাহুর মাপ (মি মি)	রক্তে Hb এর মাত্রা (mmol/L)	রক্তের সেরাম Hb সম্পৃক্ত হয়েছে	Blood Pressure
				১=হাঁ, ২= না	

Section B: Lifestyle and Demographic Information
জীবনযাপন পদ্ধতি

A. বাসস্থানের ধরন

প্রশ্ন নং	প্রশ্ন	কোড	উত্তর
22.	বাসগৃহের মালিকানা কার?	(কোড: 1= নিজস্ব, 2=ভাড়াবাসা, 3=..............অন্যান্য)	
23.	বাড়িতে ঘরের সংখ্যা কয়টি ?	..................টি।	
24.	বাসগৃহে শোবার রুমের সংখ্যা কয়টি?	..................টি	
25.	বাসগৃহের ছাদের প্রধান উপকরণ কি?	(কোড: 1=বেড়া/তালপাতা/বাঁশ/গোল পাতা, 2=টিন,3=রড, ইট, সিমেন্ট ও বালি,4= টালি, 5=.................................অন্যান্য)	
26.	বাসগৃহের দেয়ালের প্রধান উপকরণ কি?	(কোড:1=বেড়া/তালপাতা/বাঁশ গোল পাতা,2=টিন, 3= ইট,সিমেন্ট ও বালি,4= মাটির দেয়াল, 5= কাঠ, 6=.................................অন্যান্য)	
27.	বাসগৃহের ঘরের মেঝের প্রধান উপকরণ কি?	(কোড:1= কাঠ, 2= বাঁশ, 3=ইট,সিমেন্ট ও বালি, 4=সিরামিক টাইলস, 5=মাটির, 6=..........................অন্যান্য ।)	
28.	আলাদা রান্নাঘর আছে কি?	(কোড: 1=হাঁ, 2=না)	
29.	না, হলে কোথায় রান্না করেন?	(কোড: 1=খোলা জায়গায়, 2=বারান্দার পাশে,3=থাকার ঘরে, 4=প্রযোজ্য নয়,5=.........................অন্যান্য)	
30.	রান্নার জ্বালানী হিসেবে কি ব্যবহার করেন?	(কোড:1=এল,পি,জি, 2=প্রাকৃতিক গ্যাস, 3=কেরোসিন, 4=কাঠ/লাকড়ি,খড়কুটা, 5=.......................অন্যান্য)	
31.	পরিবারে কি ধরনের রান্নার চুলা ব্যবহৃত হয়?	(কোড: 1=প্রাকৃতিক গ্যাসের চুলা,2= কেরোসিন চুলা, 3=কাঠ/লাকড়ির চুলা, 4= এল,পি,জি, 5=উন্নত চুলা, 6= বৈদ্যুতিক চুলা, 7=..........................অন্যান্য)	
32.	আপনার বাড়িতে কি পৃথক গোসল খানা আছে?	(কোড: 1=হাঁ, 2=না)	
33.	বাড়িতে ময়লা আবর্জনা কোথায় ফেলা হয়?	(কোড: 1=নির্দিষ্ট গর্তে/জায়গায়, 2=বাড়ির আশেপাশে খোলা জায়গায়, 3= যেখানে সেখানে, 4=.....................অন্যান্য)	

B. বাড়িতে আলোর উৎস সম্পর্কে তথ্য

প্রশ্ন নং	প্রশ্ন	কোড	উত্তর
34.	বাড়িতে পর্যাপ্ত আলো বাতাসের ব্যবস্থা আছে কি?	(কোড: 1=হাঁ, 2=না)	
35.	আপনার বাড়িতে বর্তমানে আলোর জন্য কি ধরনের উৎস ব্যবহার করা হয়?	(কোড:1=কুপি, 2=হারিকেন, 3=মোমবাতি, 4=সৌরবিদ্যুৎ চালিত বাতি, 5=জেনারেটর চালিত বাতি, 6=বায়োগ্যাস চালিত বাতি, 7=পল্লী বিদ্যুৎ চালিত বাতি, 8=.........অন্যান্য)	
36.	প্রতিদিন সাধারণভাবে গড়ে কতক্ষণ আপনার বাতির প্রয়োজন হয়?	(কোড: 1=২ ঘন্টা, 2=৪ঘন্টা, 3=৬ঘন্টা, 4=৬ঘন্টার বেশি)	

C. পরিষ্কার পরিচ্ছন্নতা

প্রশ্ন নং	প্রশ্ন	কোড	উত্তর
37.	বাসস্থানের আভ্যন্তরীন পরিষ্কার পরিচ্ছন্নতা কি ধরনের?	(কোড:1=পরিষ্কার পরিচ্ছন্ন,2=অপরিষ্কার, 3=স্যাঁতস্যাঁতে ও অপরিষ্কার, 4= পরিষ্কার কিন্তু স্যাঁতস্যাঁতে)	
38.	বাড়ির আঙ্গিনার পরিষ্কার পরিচ্ছন্নতার কি রূপ/কি ধরনের ?	(কোড:1=পরিষ্কার পরিচ্ছন্ন,2=অপরিষ্কার, 3=স্যাঁতস্যাঁতে ও অপরিষ্কার, 4= পরিষ্কার কিন্তু স্যাঁতস্যাঁতে)	
39.	পরিবারের সকলে সব সময় জুতা / স্যান্ডেল ব্যবহার করে কি ?	(কোড: 1=হাঁ, 2=না)	
40.	পায়খানা বা খোলা জায়গায় যাওয়ার সময় পরিবারের সবাই জুতা/স্যান্ডেল ব্যবহার করে কি ?	(কোড: 1=হাঁ, 2=না)	
41.	পায়খানার মালিকানা ?	(কোড:1=ব্যক্তিগত/নিজস্ব, 2=সরকারী/এনজিও, 3=অন্যের সাথে শেয়ার করে, 4= খোলা জায়গায়, 5=..................অন্যান্য)	
42.	পায়খানার কয়টি পরিবার ব্যবহার করে?	(কোড:1=১ টি পরিবার, 2=২টি পরিবার, 3=২ এর অধিক)	
43.	পরিবারের সদস্যগণ কি ধরনের পায়খানা ব্যবহার করেন ?	(কোড 1=ট্যাংকি থেকে পাইপে চালিত ব্যবস্থা, 2= ফ্লাশ বা পানি ঢালা ব্যবস্থা,3=পাকা গর্ত থেকে পানি তোলা ব্যবস্থা/পানি তুলে ফেলে রাখা ব্যবস্থা , 4=বায়োগ্যাস তৈরী কূপ ব্যবস্থা, 5= পয়ঃ আলোবাতাস যুক্ত ব্যবস্থা,6=..................অন্যান্য)	
44.	পরিবারের পাঁচ বছর বয়সী শিশুরা কোথায় মলত্যাগ করে ?	(কোড: 1=পায়খানায়,2=খোলা/ঝুলন্ত পায়খানায়, 3=নির্দিষ্টগর্ত/জুয়া/ঝাড়ি,	

		4=স্বাস্থ্যসম্মত(স্যানিটারী/স্ল্যাব) পায়খানায়, 5= খোলা জায়গায়, 6=ড্রেনের ধারে, 7=প্রযোজ্য নয়, 8=......................অন্যান্য)	
45.	উচ্ছৌচের পানির উৎস কোথায় ?	(কোডঃ 1=ট্যাপের পানি , 2= কিতরের জল, 3=বৃষ্টির, 4 =কলের জল 5=......................অন্যান্য)	
46.	খোলা জায়গায় মলত্যাগ করলে কি করেন ?	(কোডঃ 1=মল পরিষ্কার করে ফেলি, 2=যেখানে করে সেখানেই থাকে কুকুর পরিষ্কার করে, 3=প্রযোজ্য নয়, 4=......................অন্যান্য)	
47.	পরিবারের কিশোরী/মহিলা কোথায় গোসল করেন?	(কোডঃ1=পুকুর, 2=খাল/নদী, 3=গোসলখানা/নলকূপ, 4=ডোবা)	
48.	পরিবারের বাকি সদস্যরা কোথায় গোসল করেন?	(কোডঃ1=পুকুর, 2=খাল/নদী, 3=গোসলখানা/নলকূপ, 4=ডোবা)	

D. ব্যক্তিগত পরিষ্কার পরিচ্ছন্নতা (তথ্য সংগ্রহকারী পর্যবেক্ষণ করে লিখুন)

বস্তু নং	বস্তু	কোড	উত্তর
49.	নখ পরিষ্কার আছে কি ?	(কোডঃ 1=হ্যাঁ, 2=না)	
50.	পায়ের পাতা পরিষ্কার আছে কি ?	(কোডঃ 1=হ্যাঁ, 2=না)	
51.	দাঁত পরিষ্কার আছে কি ?	(কোডঃ 1=হ্যাঁ, 2=না)	
52.	কখন হাত পরিষ্কার করতে হয় আপনি জানেন কি?	(কোডঃ 1=খাওয়ার আগে, 2=খাওয়ার পরে, 3=টয়লেট থেকে আসার পরে, 4=খাবার ধরার সময়, 5=বাচ্চার মলমূত্র পরিষ্কার করার পর, 6=কাঁচা মাছ-মাংস ধরার পর)	
53.	আপনি কখন হাত পরিষ্কার করেন?	(কোডঃ 1=খাওয়ার আগে, 2=খাওয়ার পরে, 3=টয়লেট থেকে আসার পরে, 4=খাবার ধরার সময়, 5=বাচ্চার মলমূত্র পরিষ্কার করার পর, 6=কাঁচা মাছ-মাংস ধরার পর)	
54.	কিভাবে হাত পরিষ্কার করেন?	(কোডঃ 1=সাবান দিয়ে, 2=মাটি/ছাই দিয়ে, 3= শুধু পানি দিয়ে)	

দৈনিক কার্যক্রম (গত ২৪ ঘণ্টা)
(উত্তরদাতার ক্ষেত্রে দিতে হবে)

55. বিগত ২৪ ঘণ্টার শারীরিক কার্যাবলীর বিবরণ

বিভিন্ন সময়	কার্যাবলীর ধরন	কার্য শুরুর সময়	কার্য শেষের সময়	কার্যাবলীর কোড	মোট সময় (মিনিট)
ফজরের আযানের সময়..................					
ঘুম থেকে ওঠা.........					
জোহরের আযানের সময়...........					
আসরের আযানের সময়..........					
মাগরিবের আযানের সময়..........					
এশার আযানের সময়........					
রাতের খাবারের সময় ও পরে					

কোডঃ 1=প্রার্থনা, 2=গৃহস্থালীর কাজ, 3=ব্যক্তিগত কর্মকাণ্ড, 4= সন্তান পালন, 5= আহার, 6= কুটির শিল্প, 7= অন্যান্য

Section – C: Nutrition and Health
পুষ্টিজ্ঞান ও তার অনুশীলন

A. পুষ্টি জ্ঞান সম্পর্কিত তথ্য

প্রশ্ন নং.	প্রশ্ন	কোড	উত্তর
56.	সন্তান জন্মের পর তাকে কি মুখের মুখ খাওয়ানো উচিত?	(কোডঃ 1=হ্যাঁ, 2=না, 3=জানিনা, 4=প্রযোজ্য নয়)	
57.	সন্তান জন্মের পর প্রথম কখন মুখের মুখ দেয়া প্রয়োজন?	(কোডঃ 1=মুখের মুখ দেয়া ঠিক নয়, 2=এক ঘন্টার কম সময়ের মধ্যে, 3=জন্মের পরপরই,4=জানি না, 5=.....অন্যান্য 6=প্রযোজ্য নয়)	
58.	সন্তান জন্মের পরপরই কি নবজাতককে পাল মুখ খাওয়ানো উচিত?	(কোডঃ 1=হ্যাঁ, 2=না, 3= .....অন্যান্য, 4=প্রযোজ্য নয়)	
59.	সন্তান কে জন্মের প্রথম তিনদিন পরই কি মুখের দুধের পাশাপাশি অন্য তরল খাদ্য দেয়া উচিত?	(কোডঃ 1=হ্যাঁ, 2=না, 3= মাসের মধ্যে, 4=.....অন্যান্য, 5=প্রযোজ্য নয়)	
60.	কত মাস বয়স পর্যন্ত সন্তানকে মুখের মুখ খাওয়ানো প্রয়োজন?	(কোডঃ 1=....মাস, 2=মুখের মুখ খাওয়ানো ঠিক নয়, 3=.....অন্যান্য)	
61.	পুষ্টিকর খাবার সম্পর্কে কি কোন ধারণা আছে?	(কোডঃ 1=হ্যাঁ, 2=না, 3= অল্প অল্প)	
62.	বর্তমানে আপনার এলাকায় কোনমুখ পুষ্টি কার্যক্রম চালু আছে কি?	(কোডঃ 1=হ্যাঁ, 2=না, 3=জানিনা)	
63.	যা হলে কি কার্যক্রম চালু আছে?	সংস্থার নাম	
64.	সুষম খাদ্য কি?	(কোডঃ 1=ভাত/রুটি, 2=মাছ/মাংস/ডিম, 3=শাক/সব্জি, 4=ফলমূল, 5=জানিনা, 6= সবগুলি, 7=.....অন্যান্য)	
65.	প্রতিটি লোকের সুষম খাদ্য খাওয়ার প্রয়োজন আছে কি?	(কোডঃ 1=হ্যাঁ, 2=না, 3=জানিনা)	
66.	সুষম খাদ্য না খেলে শরীরের কোন অসুবিধা হবে কি?	(কোডঃ 1=হ্যাঁ, 2=না, 3=জানিনা)	
67.	শরীরের জন্য শক্তিদায়ক খাদ্য কি?	(কোডঃ 1=ভাত/রুটি, 2=মাছ/মাংস/ডিম, 3=শাক/সব্জি, 4=ফলমূল, 5=জানিনা, 6= সবগুলি, 7=.....অন্যান্য)	
68.	শরীরের গঠনকারী খাদ্য কি?	(কোডঃ 1=ভাত/রুটি, 2=মাছ/মাংস/ডিম, 3=শাক/সব্জি, 4=ফলমূল, 5=জানিনা, 6= সবগুলি, 7=.....অন্যান্য)	
69.	শরীরের রোগ প্রতিরোধক খাদ্য কি?	(কোডঃ 1=ভাত/রুটি, 2=মাছ/মাংস/ডিম, 3=শাক/সব্জি, 4=ফলমূল, 5=জানিনা, 6= সবগুলি, 7=.....অন্যান্য)	
70.	একজন মানুষের প্রতিদিন পর্যাপ্ত পরিমান শাকসবজি খাওয়ার প্রয়োজন আছে কি?	(কোডঃ 1=হ্যাঁ,2=না,3=জানিনা, 4=.....অন্যান্য)	
71.	একজন মানুষের ঠিক জাতীয় খাদ্য খাওয়ার প্রয়োজন আছে কি?	(কোডঃ 1=হ্যাঁ,2=না,3=জানিনা, 4=.....অন্যান্য)	
72.	আমলকী/সেদু/কমলা, আপেল ও আম/আঁটাল, এই খাবারগুলির মধ্যে কোনটি ভিটামিন 'সি' সমৃদ্ধ?	(কোডঃ 1=আমলকী/সেদু/কমলা, 2=আপেল, 3=আম/আঁটাল, 4=জানিনা, 5= সবগুলি, 6=.....অন্যান্য)	
73.	প্রতিদিন নিয়মিত কি কি খাদ্য খেলে শরীরে কখনও রক্তের পরিমান কম হবে না?	(কোডঃ 1=দেশী লাল খাবার, 2=শাক-সব্জি/ফলমূল, 3=মাছ/ডিম/দুধ,4=সুষম খাদ্য, 5=জানিনা, 6= সবগুলি, 7=.....অন্যান্য)	
74.	আপনি কি ভিটামিন "এ" ক্যাপসুলের নাম শুনেছেন?	(কোডঃ 1=হ্যাঁ, 2=না)	

75.	প্রতিদিন নিয়মিত কি কি খাদ্য খেলে শরীরে কখনও ভিটামিন "এ" এর অভাব হবে না?	(কোডঃ 1=ভাত/আলু, 2=মাছ/মাংস/শাকসব্জি, 3=ডাল, 4=আমলকী/সেদু/কমলা, 5=জানিনা, 6= সবগুলি, 7=.....অন্যান্য)
76.	প্রতিদিন নিয়মিত কি কি খাদ্য খেলে শরীরে কখনও আয়োডিনের অভাব হবে না?	(কোডঃ 1=আয়োডিন লবণ/সামুদ্রিক মাছ, , 2=মাছ/মাংস/শাকসব্জি, 3=ডাল, 4=আমলকী/সেদু/কমলা, 5=জানিনা, 6= সবগুলি, 7=.....অন্যান্য)
77.	আলু, মাছ/মাংস/ডিম, ডাল ও শাকসব্জি এই খাদ্য গুলোর মধ্যে কোনটি আয়রন সমৃদ্ধ?	(কোডঃ 1=আলু, 2=মাছ/মাংস, 3=ডাল, 4=শাক- সব্জি, 5=জানিনা)
78.	গর্ভবতী ও প্রসূতি মায়ের ক্ষেত্রে দৈনিক অন্যান্য খাদ্যের পাশাপাশি দেশী দেশী শাক-সবজি, ফল-মূল খাওয়ার প্রয়োজন আছে কি?	(কোডঃ 1=হ্যাঁ, 2=না, 3=জানিনা)
79.	আয়োডিনের উৎস কি?	(কোডঃ টিউবওয়েল/পাইপ লাগানো পানি,2= বিভিন্নখাদ্য,3=ঔষধ, 4=জানিনা, 5= .....অন্যান্য)
80.	আয়োডিনের ঘাটতে কি হয়?	(কোডঃ 1=ক্যান্সার/গলা/শরীরে ফুল হয়, 2=চুঁচিয়ে রক্ত ঝরে হয়, 3=জানিনা, 4=.....অন্যান্য)
81.	টিউবওয়েলের পানি পান করলে সে পানি আয়োডিনে যুক্ত কি ?	(কোডঃ 1=হ্যাঁ, 2=না, 3=এধরনো নির্ণয়ন করা হয়নি, 4=প্রযোজ্য নয়)
82.	আপনি কি আয়োডিন লবণ ব্যবহার করেন?	(কোডঃ 1=হ্যাঁ, 2=না)
83.	উত্তর না হলে কেন করেন না?	(কোডঃ 1=দাম বেশী, 2= এক কেজির নিচে কিনতে পাওয়া যায় না, 3=ভাল লাগে না, 4=.....অন্যান্য)

B. পুষ্টিজ্ঞানের অনুশীলন

প্রশ্ন নং.	প্রশ্ন	কোড	উত্তর
84.	আপনি আপনার সর্বশেষ সন্তানকে জন্মের পর মুখের দুধ খাইয়েছেন/খাইয়েছিলেন কি?	(কোডঃ 1=হ্যাঁ, 2=না, 3=প্রযোজ্য নয়)	
85.	আপনি আপনার সর্বশেষ সন্তানকে জন্মের পর প্রথম কখন মুখের দুধ দিয়েছেন/ দিয়েছিলেন কি?	(কোডঃ 1=প্রযোজ্য নয়, 2=এক ঘন্টার কম সময়ের মধ্যে, 3=জন্মের পরপরই, 4=.....অন্যান্য)	
86.	জন্মের পরপরই আপনার সর্বশেষ সন্তানকে কি পাল দুধ খাইয়েছেন/খাইয়েছিলেন?	(কোডঃ 1=হ্যাঁ, 2=না, 3=প্রযোজ্য নয়)	
87.	আপনার সর্বশেষ সন্তানকে জন্মের প্রথম তিনদিন পর মুখের দুধ ছাড়া অন্য কোন তরল খাদ্য দিয়েছেন/দিয়েছিলেন কি?	(কোডঃ 1=হ্যাঁ, 2=না,3=মাঝে মধ্যে,4=প্রযোজ্য নয়, 5=.....অন্যান্য)	
88.	আপনি সুষম খাদ্য খান কি?	(কোডঃ 1=হ্যাঁ, 2=না,3=জানি না)	
89.	আপনি শক্তিদায়ক খাদ্য খান কি?	(কোডঃ 1=হ্যাঁ, 2=না,3=জানি না)	
90.	আপনি শরীর গঠনকারী খাদ্য খান কি?	(কোডঃ 1=হ্যাঁ, 2=না,3=জানি না)	
91.	আপনি শরীরের রোগ প্রতিরোধক খাদ্য খান কি?	(কোডঃ 1=ফল/ফলের রস, 2=মাছ/মাংস/ডিম, 3=শাক/সব্জি, 4=জানিনা, 6= সবগুলি, 7=.....অন্যান্য)	
92.	আপনি কি টক জাতীয় খাবার খান?	(কোডঃ 1=হ্যাঁ, 2=না, 3= খুবই কম)	
93.	শরীরে কখনও রক্তের পরিমাণ না কমার জন্য প্রতিদিন নিয়মিত আপনি কি কি খাবার খান?	(কোডঃ 1=দেশী লাল খাবার, 2=শাক-সব্জি/ফলমূল, 3=গোস্ত/মাছ/ডিম/দুধ, 4=কোন কিছুই খাই না, 5=জানিনা, 6= সবগুলি, 7=.....অন্যান্য)	
94.	আপনি ভিটামিন "এ" সমৃদ্ধ খাবার হিসেবে কি খান/খেয়েছেন?	(কোডঃ 1=লাল শাকসব্জি,2= আমলকী/লেবু/কমলা, 3= ফলমূল, 4=.....অন্যান্য)	
95.	আপনি আয়োডিনের অভাব না হবার জন্য কি খান/খেয়েছেন?	(কোডঃ 1=আয়োডিন লবণ/লবণাক্ত মাছ, , 2=মাছ/মাংস/শাকসব্জি, 3=গোস্ত,4=আমলকী/লেবু/কমলা, 5=জানিনা, 6=.....অন্যান্য)	
96.	আপনি কি পর্যাপ্ত পরিমাণ শাক-সবজি খান?	(কোডঃ 1=হ্যাঁ, 2=না, 3= মাঝে-মধ্যে, 4= .....অন্যান্য)	
97.	আলু, মাছ/মাংস/ডিম, ডাল ও শাকসব্জি এই খাদ্য গুলোর মধ্যে আপনি আয়রন সমৃদ্ধ খাবার হিসেবে কোনটি খান/খেয়েছেন?	(কোডঃ 1=আলু, 2=মাছ/মাংস, 3=গোস্ত, 4=শাক- সব্জি, 5=জানিনা)	
98.	আপনি যখন গর্ভবতী ছিলেন তখন নৈমিত্তিক অন্যান্য খাদ্যের পাশাপাশি বেশী বেশী শাক-সবজি, ফল-মূল খেয়েছেন/খেয়েছিলেন?	(কোডঃ 1=হ্যাঁ, 2=না, 3= মাঝে-মধ্যে খেয়েছি, 4=প্রযোজ্য নয়, 5= .....অন্যান্য)	

C. রান্না সম্পর্কিত জ্ঞান

প্রশ্ন নং.	প্রশ্ন	কোড	উত্তর
99.	রান্নার পূর্বে হাত ভাল করে পরিষ্কার-পরিচ্ছন্ন করারপ্রয়োজন কি ?	(কোডঃ 1=হ্যাঁ, 2=না,3=কখনও কখনও,4=.....অন্যান্য)	
100.	রান্নার পাত্র ভাল করে পরিষ্কার-পরিচ্ছন্ন করার প্রয়োজন আছে কি?	(কোডঃ 1=হ্যাঁ, 2=না, 3=কখনও কখনও, 4=.....অন্যান্য)	
101.	জাক রান্নার সময় মাছ কেটে ধোওয়া উচিত কি ?	(কোডঃ 1=হ্যাঁ, 2=না, 3= জানিনা/বুঝিনা)	
102.	রান্নার পূর্বে শাক সবজি কিভাবে পরিষ্কার করা প্রয়োজন?	(কোডঃ 1=ছোট টুকরা করে পানিতে ধুঁয়া, 2=আস্ত ধুয়ে কাটি, 3= 1 ও 2 উভয় পদ্ধতি অনুসরন করা, 4= .....অন্যান্য)	
103.	শাক সবজি সিদ্ধ করার পর পানি ফেলে দেওয়া সঠিক কি ?	(কোডঃ1=হ্যাঁ, 2=না, 3=জানিনা/বুঝিনা)	
104.	শাক সবজি রান্নার সময় ঢেকে রান্না করা সঠিক কি ?	(কোডঃ1=হ্যাঁ, 2=না, 3=জানিনা/বুঝিনা)	
105.	শাক রান্নার সময় তেল দিয়ে রান্না করার দরকার আছে কি ?	(কোডঃ1=হ্যাঁ, 2=না, 3=কখনও কখনও, 4=জানিনা, 5= .....অন্যান্য)	
106.	রান্নার পর খাবার কোথায় রাখা সঠিক বলে মনে করেন?	(কোডঃ1= রান্না ঘরে, 2=বারান্দায়, 3= খোলা জায়গায়, 4=.....অন্যান্য)	
107.	রান্নার পর খাবার কি ঢেকে রাখার প্রয়োজন আছে কি?	(কোডঃ1=হ্যাঁ, 2=না, 3=কখনও কখনও, 4 =প্রয়োজন নেই)	
108.	খাবার পূর্বে কি হাত ধুয়ে নেওয়ার প্রয়োজন আছে কি?	(কোডঃ1= সব সময়, 2=পরিষ্কার না থাকলে, 3=কখনও কখনও, 4 =কখনও না, 5=প্রয়োজন নেই)	
109.	রান্নার পর কোথায় বসে খাবার গ্রহণ করেন?	(কোডঃ1= রান্না ঘরে, 2=বারিন্দার মাদুরে, 3= চেয়ার/টেবিল/টেবিল/খেকে বসে, 4= নিজের ঘরে)	

D. রান্না সম্পর্কিত জ্ঞানের অনুশীলন

প্রশ্ন নং.	প্রশ্ন	কোড	উত্তর
110.	আপনি রান্নার পূর্বে হাত পরিষ্কার করে নেন কি?	(কোডঃ 1=হ্যাঁ, 2=না, 3=কখনও কখনও, 4=.....অন্যান্য)	
111.	রান্নার পূর্বে রান্নার পাত্র পরিষ্কার করে নেন কি?	(কোডঃ 1=হ্যাঁ, 2=না, 3=কখনও কখনও, 4=.....অন্যান্য)	
112.	জাক রান্নার সময় মাছ কেটে নেন কি ?	(কোডঃ 1=হ্যাঁ, 2=না, 3=মাঝে-মধ্যে, 4=.....অন্যান্য)	
113.	রান্নার পূর্বে আপনি কিভাবে শাক-সবজি পরিষ্কার করেন?	(কোডঃ 1=ছোট টুকরা করে পানিতে ধুই, 2=আস্ত ধুয়ে কাটি, 3= 1 ও 2 উভয় পদ্ধতি অনুসরন করি, 4= .....অন্যান্য)	
114.	শাক সবজি সিদ্ধ করার পর পানি ফেলে দেন কি ?	(কোডঃ 1=হ্যাঁ, 2=না, 3=মাঝে-মধ্যে)	
115.	শাক সবজি রান্নার সময় ঢেকে রান্না করেন কি?	(কোডঃ 1=হ্যাঁ, 2=না, 3=কখনও কখনও)	

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116.	শাক রান্নার সময় আপনি কি তৈল ব্যবহার করেন ?	(কোডঃ 1=হ্যাঁ, 2=না, 3=কখনও কখনও)	
117.	রান্নার সময় আপনি কি ধরনের লবণ ব্যবহার করেন?	(কোডঃ 1= প্যাকেট/আয়োডিনযুক্ত লবণ, 2= খোলা লবণ)	
118.	লবণ কিভাবে সংরক্ষণ করেন ?	(কোডঃ 1=খোলা,2=ঢাকনাসহ পাত্রে, 3=ঢাকনা ছাড়া পাত্রে, 4=যে প্যাকেট লবণ পাওয়া যায় তাতেই)	
119.	আপনারা খোলা ও বাসি খাবার খান কি?	(কোডঃ1=হ্যাঁ, 2=না, 3=কখনও কখনও, 4= ....অন্যান্য)	
120.	রান্নার পর খাবার কোথায় রাখেন?	(কোডঃ1= রান্না ঘরে, 2=বারান্দায়, 3= খোলা জায়গায়, 4=.......................অন্যান্য)	
121.	রান্নার পর খাবার কি ঢেকে রাখেন কি?	(কোডঃ 1=হ্যাঁ, 2=না, 3=কখনও কখনও, 4=...................................অন্যান্য)	
122.	খাবার পূর্বে হাত ধুয়ে নেন কি?	(কোডঃ 1 = সবসময় সবাই হাত ধুয়ে খাই, 2 = হাত পরিষ্কার থাকলে হাত ধুই না, 3 =ছোটরা মাঝে-মধ্যে হাত ধোয় না, 4= বড়রা মাঝে-মধ্যে হাত ধোয় না, 5 =...................... অন্যান্য)	
123.	রান্নার পর খাবার কোথায় খান?	(কোডঃ1= রান্না ঘরে, 2=বারান্দায় মাদুরে, 3= চৌকি/চেয়ার/টেবিল/বেঞ্চে বসে, 4= নিজের ঘরে)	

E. পানি উৎস ও পানি বিশুদ্ধকরণ

প্রশ্ন নং	প্রশ্ন	কোড	উত্তর
124.	আপনাদের খাবার পানির প্রধান উৎস কি?	(কোডঃ1=নলকূপ, 2=ট্যাপ, 3=কুয়া, 4=পুকুর/ডোবা, 5=নদী/খাল, 6=বর্ষার পানি, 7=বোতলের পানি, 8=পুকুর/নদীর পানি ফুটিয়ে, 9=.................অন্যান্য)	
125.	টিউবওয়েলের পানি পান করলে সে পানি আর্সেনিক মুক্ত কি ?	(কোডঃ 1=হ্যাঁ, 2=না, 3=এখনো নির্ধারণ করা হয়নি, 4=প্রযোজ্য নয়)	
126.	খাবার পানির প্রধান উৎসের মালিক কে	(কোডঃ1= ব্যক্তিগত/নিজস্ব, 2=সরকারী/এনজিও, 3=অন্যের মালিকানা)	
127.	রান্নাঘর থেকে খাবার পানির উৎসের দূরত্ব কত ?	.... ফুট।	
128.	রান্না ও ধোয়া (থালা , বাসন, হাড়ি, পাতিল) পানির উৎস কি ?	(কোডঃ1=নলকূপ, 2=ট্যাপ, 3=কুয়া, 4=পুকুর/ডোবা, 5=নদী/খাল, 6=বর্ষার পানি, 7=বোতলের পানি, 8=পুকুর/নদীর পানি ফুটিয়ে, 9=.................অন্যান্য)	
129.	রান্না ও ধোয়া (থালা , বাসন, হাড়ি, পাতিল) পানির উৎসের মালিক কে ?	(কোডঃ1= ব্যক্তিগত/নিজস্ব, 2=সরকারী/এনজিও, 3=অন্যের মালিকানা)	
130.	রান্না ঘর থেকে রান্না ও ধোয়া (থালা , বাসন, হাড়ি, পাতিল) পানির উৎসের দূরত্ব কত ?	.... ফুট।	
131.	পানি পান করার পূর্বে পানি কিভাবে বিশুদ্ধ করেন ?	(কোডঃ 1=কতক্ষণ ফুটান ....মিনিট, 2=পানি বিশুদ্ধ করন ট্যাবলেট দিয়ে, 3=ফিটকারী দিয়ে, 4=ফিল্টার, 5=বিশুদ্ধ করা হয় না, 6=টিউবওয়েলের পানি তাই বিশুদ্ধ করা হয় না)	

খাদ্যাভ্যাস সম্পর্কিত তথ্য

A. পারিবারিক খাদ্যাভ্যাস ও খাদ্য গ্রহণ

132. বিগত সাত দিন নিম্নলিখিত খাদ্যগুলো সকাল ,দুপুর, ও রাত্রে কতদিন খেয়েছেন ? (না খেলে (-) চিহ্ন দিন)

খাদ্যের গ্রুপ	শক্তিদান কারী খাদ্য				শরীর গঠন ও বৃদ্ধিসাধন কারী খাদ্য				রোগ প্রতিরোধক খাদ্য			
বেলা	ভাত	মুড়ি	রুটি	তেল	মাছ	মাংস	ডিম	দুধ	দুধ জাতীয় খাদ্য	শাক	সবজি	ফল
সকাল												
দুপুর												
রাত্রি												

F. কর্মক্ষেত্রে শারীরিক সমস্যা সংক্রান্ত তথ্য

প্রশ্ন নং	প্রশ্ন	কোড	উত্তর
133.	কাজ করার ফলে কোন শারীরিক সমস্যা হয় কি?	(কোডঃ 1=হ্যাঁ, 2=না)	
134.	কি ধরনের সমস্যা ?	(কোডঃ 1= হাত,পা, নখ ক্ষয়ে যাওয়া, 2=হাতপায়ে ক্ষয়ে যাওয়া, 3= জ্বর/সর্দি/কাশি, 4=খালকষ্ট, 5= ....অন্যান্য, 6=প্রযোজ্য নয়)	
135.	কাজ করতে গিয়ে কোন অসহায়ী/ক্ষতি হয়েছে কি না?	(কোডঃ 1= হানি হয়েছে, 2=ক্ষতি হয়েছে, 3=কোনটিই হয়নি	

G. প্রাথমিক স্বাস্থ্য রক্ষণাবেক্ষণ সম্পর্কিত তথ্য

প্রশ্ন নং	প্রশ্ন	কোড	উত্তর
136.	আপনি জানেন কি ডায়রিয়া কি কারনে হয়?	(কোডঃ 1=জানিনা, 2=সঠিক উত্তর দিয়েছে, 3=উত্তর আংশিক সঠিক, 4=উত্তর সঠিক না)	
137.	ডায়রিয়া থেকে আরোগ্য লাভের জন্য কি ব্যবস্থা নেওয়া উচিত?	(কোডঃ 1=ঘরের তৈরী স্যালাইন, 2=স্যালাইন প্যাকেট, 3=ডাবের পানি, 4=ঔষধ, 5=ঔষধ ও খাবার স্যালাইন, 6=.....................অন্যান্য)	
138.	কোন উপসর্গটি ভিটামিন এ-এর অভাবে হয়?	(কোডঃ 1=রাতকানা, 2= অন্ধত্ব, 3=অপসরে ত্বক, 4=....................অন্যান্য)	
139.	কোন উপসর্গটি ভিটামিন সি এর অভাবে হয়?	(কোডঃ 1=দাঁতের মাড়ি থেকে রক্ত পড়া, 2= ....অন্যান্য)	
140.	কোন রোগটি আপনার হয়েছে যা আয়রনের অভাবে?	(কোডঃ 1=ক্ষুধামন্দা, 2=বমিভাব, 3=জিহ্বা,ঠোঁট,নখ বর্ণহীন, 4=জিহ্বা ও ঠোঁটে ঘা, 5=অস্থির বোধ, 6=মাথাব্যথা, 7=দুর্বলতা)	

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প্রশ্ন নং	প্রশ্ন	কোড	উত্তর
141.	আপনি মোট কতবার গর্ভধারণ করেছেন?	...............বার	
142.	গর্ভাবস্থায় মোট কতবার ডাক্তারি পরীক্ষা করার প্রয়োজন আছে বলে মনে করেন?	...............বার	
143.	গর্ভাবস্থায় কি ডাক্তারী পরীক্ষা করিয়েছেন?	(কোডঃ 1=হাঁ, 2=না) (হাঁ হলে কতবার ১/২/৩/৪+)	
144.	পরীক্ষা না করিয়ে থাকলে না করানোর কারন কি?	....	
145.	গর্ভাবস্থায় কি ধরনের খাবার গ্রহন করা উচিত বলে আপনি মনে করেন?	....	
146.	গর্ভাবস্থায় কতবার টি টি টিকা নিয়েছেন?	(কোডঃ 1=সময়মত সব ডোজ দেওয়া হয়েছে, 2= অসম্পূর্ণ ডোজ, 3=টিকা দেই নাই, 4=.......................অন্যান্য)	
147.	গর্ভাবস্থায় আয়রন ট্যাবলেট খেয়েছেন কি?	(কোডঃ 1=হাঁ, 2=না)	
148.	খেয়ে থাকলে কতটি আয়রন ট্যাবলেট ট্যাবলেট খেয়েছেন?	(কোডঃ 1=১৫০টি,2=১৫০টির কম, 3=১৫০টির বেশি,4=মনে নেই,5=প্রযোজ্য নয়)	
149.	গর্ভাবস্থায় ফলিক এসিড ট্যাবলেট খেয়েছেন কি?	(কোডঃ 1=হাঁ, 2=না)	
150.	খেয়ে থাকলে কতটি ফলিক এসিড ট্যাবলেট খেয়েছেন?	(কোডঃ 1=১৫০টি,2=১৫০টির কম, 3=১৫০টির বেশি,4=মনে নেই,5=প্রযোজ্য নয়)	
151.	গর্ভাবস্থায় স্বাভাবিকের চেয়ে বেশী খাবার খেতে হয় কি?	(কোডঃ 1=হাঁ, 2=না)	
152.	আপনার সর্বশেষ সন্তান জন্মের সময় ডেলিভারী পদ্ধতি কি ছিল ?	(কোডঃ 1=স্বাভাবিক,2=সিজারিয়ান, 3=ফরসেপ, 4=প্রযোজ্য নয়)	
153.	আপনার সর্বশেষ বাচ্চা জন্মের সময় কে সহায়তা করেছেন ?	(কোডঃ 1=স্বাস্থ্যসেবা দানকারী কর্মী, 2=ডিগ্রীধারী ডাক্তার, 3=নার্স/মিড ওয়াইফ/ প্যারামেডিক্স, 4=প্রশিক্ষণ প্রাপ্ত দাই, 5=স্বাস্থ্য সেবা সহকারী, 6=FWD, 7=গ্রাম্য ডাক্তার, 8=আত্মীয়, 9=প্রতিবেশী, 10=স্বামী, 11=.............অন্যান্য)	
154.	আপনার সর্বশেষ বাচ্চার ডেলিভারীর পর আপনি ডেলিভারী স্থানে কত সময় অবস্থান করেছেন?	(কোডঃ..................ঘন্টা, 33=১ দিন, 44=২ দিন, 55=৩ দিন, 66= ৩ দিনের অধিক, 77=বাড়ীতে ডেলিভারী হয়েছে)	
155.	সর্বশেষ শিশুটি কত মাসে জন্ম নিয়েছে (কত মাস গর্ভধারণের পর জন্ম নিয়েছে)	..........................মাস	
156.	জন্মকালীন সময়ে আপনার বাচ্চার কোন সমস্যা হয়েছিল কি?	(কোডঃ 1=হাঁ, 2=না)	
157.	সমস্যা হয়ে থাকলে কি ধরনের সমস্যা হয়েছিল ?	....	

H. গর্ভকালীন সম্পর্কিত তথ্যাবলী

রোগের নাম	রোগের কোড	পূর্বের চিকিৎসা কোড

রোগের কোডঃ 1=নিউমোনিয়া, 2=জন্ডিস, 3=রক্তস্বল্পতা, 4=অপুষ্টি, 5=কম ওজন, 6=অন্যান্য

(পূর্বের চিকিৎসা কোডঃ 1=ডিগ্রীধারী অ্যালোপ্যাথিক ডাক্তার, 2=হাতুড়ে ডাক্তার, 3=হোমিও প্যাথি, 4=কবিরাজ, 5=দাই, 6=নার্স, মেডিক্যাল অ্যাসিস্ট্যান্ট/প্যারামেডিক্স, 7= পীর ফকির, 8= কেউ না, 9=অন্যান্য)

I. প্রাথমিক স্বাস্থ্য পরিচর্যা

প্রশ্ন নং	প্রশ্ন	কোড	উত্তর
158.	আপনার শিশু বছরের নীচের নির্দিষ্টিকে গত ছয় মাসে ভিটামিন "এ" ক্যাপসুল খাইয়েছেন কি?	(কোডঃ 1=হাঁ, 2=না, 3= প্রযোজ্য নয়)	
159.	শিশু জন্মের ২৪ঘন্টার মধ্যে ভিটামিন "এ" ক্যাপসুল খাইয়েছেন কি?	(কোডঃ 1=হাঁ, 2=না, 3=প্রযোজ্য নয়)	
160.	আপনার সর্বশেষ সন্তানকে সবগুলো টিকা দিয়েছেন/দিয়েছিলেন কি?	(কোডঃ 1=হাঁ, 2=না, 3=মনে নেই/জানিনা, 4=প্রযোজ্য নয়)	
161.	টিকার সবগুলো কোর্স কি পূর্ণ করেছেন বা করাবেন?	(কোডঃ 1=হাঁ, 2=না)	

162.	টিকা দেওয়া থাকলে কোন টিকাগুলো দিয়েছে(কার্ড চেক করুন ও নিচের ঘর পূরণ করুন)										
টিকার নাম	বিসিজি	পোলিও	ডিপিটি	হাম	পঙ্গু	যক্ষ্মা	টিটেনাস	নিউমোনিয়া	হেপাটাইটিস-১	হেপাটাইটিস-২	হেপাটাইটিস-৩
দিয়েছে কি? (কোডঃ ১=হাঁ, ২=না,)											
টিকার কোর্স পূর্ণ করা হয়েছে কি? (কোডঃ ১=হাঁ, ২=না)											

Section D: Food Security Information

A. খাদ্য নিরাপত্তা

প্রশ্ন নং	প্রশ্ন	কোড	উত্তর
163.	বিগত বার মাসে আপনার পরিবারের জন্য যে পরিমাণ খাদ্য দরকার তা খেতে পেয়েছে কি?	(কোডঃ 1=যতটুকু দরকার তার চেয়ে বেশী, 2= চাহিদা অনুযায়ী পেয়েছে, 3= কখনও কখনও পরিমাণ অনুযায়ী পায় নি, 4= কখনও পায় নি, 5= উত্তর দেয় নি)	
164.	কি কি কারণগুলোর জন্য পরিমাণমত খাবার পান নি?	(কোডঃ 1=খাদ্যের জন্য পর্যাপ্ত টাকার অভাব, 2=কেনা/বাজার সময়ের অভাব, 3=হাতের নাগালে বাজার পাওয়া কষ্টকর, 4=খাদ্যাভাস নিয়ন্ত্রন, 5=রান্না করার জন্য প্রয়োজনীয় চুলা নাই, 6=শারীরিক অসুস্থতার জন্য রান্না করতে অপারগতা)	
165.	চাহিদা অনুযায়ী ভিন্ন ভিন্ন খাদ্য পান কি?	(কোডঃ 1= প্রয়োজনীয় টাকা নাই, 2=ভিন্ন ভিন্ন খাদ্য সহজে পাওয়া যায় না, 3=বাজার করার সময় নাই, 4=খাদ্যাভাস নিয়ন্ত্রন, 5=রান্নাকরার জন্য প্রয়োজনীয় চুলা নাই, 6=শারীরিক অসুস্থতার জন্য রান্না করতে অপারগতা)	

166.	বিগত বার মাসে পর্যাপ্ত টাকা থাকা সত্ত্বেও আপনি চাহিদা অনুযায়ী খাদ্য ক্রয় করতে পেরেছেন কি?	(কোডঃ 1= পেরেছি, 2= কখনও কখনও পেরেছি ,3= কখনই না, 4= উত্তর দেয় নি, 5=.....অন্যান্য)	
167.	বিগত বার মাসে খাদ্য পর্যাপ্ত থাকা সত্ত্বেও টাকার অভাবে খাদ্য ক্রয় করতে পেরেছেন কি?	(কোডঃ 1= পেরেছি, 2= কখনও কখনও পেরেছি ,3= কখনই না, 4= উত্তর দেয় নি, 5=.....অন্যান্য)	
168.	বিগত বার মাসে পর্যাপ্ত খাদ্য ক্রয় করার জন্য আপনার সামর্থ্য ছিল কি?	(কোডঃ 1= পেরেছি, 2= কখনও কখনও পেরেছি ,3= কখনই না, 4= উত্তর দেয় নি, 5=.....অন্যান্য)	
169.	টাকার অভাবে সস্তা জাতীয় খাবার গ্রহণ করতে পেরেছেন কি?	(কোডঃ 1= পেরেছি, 2= কখনও কখনও পেরেছি ,3= কখনই না, 4= উত্তর দেয় নি, 5=.....অন্যান্য)	
170.	সামর্থ্য না থাকার কারণে চাহিদা অনুযায়ী প্রয়োজনীয় খাদ্য ক্রয় করতে পেরেছেন কি?	(কোডঃ 1= পেরেছি, 2= কখনও কখনও পেরেছি ,3= কখনই না, 4= উত্তর দেয় নি, 5=.....অন্যান্য)	
171.	টাকার অভাবে খাদ্য তালিকা থেকে কিছু খাদ্য বাদ দিতে হয়েছে কি?	(কোডঃ 1=হ্যাঁ, 2= না, 3= উত্তর দেয় নি, 4= .....অন্যান্য)	

172.	যদি হ্যাঁ হয় তা হলে সবসময় কি একরম হয়?	(কোডঃ 1=মোটামুটি সবসময়েই, 2=কিছু কিছু মাসে, 3=দুই-এক মাসে, 4=সবসময়েই না, 5=উত্তর দেয়নি, 6=.....অন্যান্য)	
173.	বিগত বার মাসে পর্যাপ্ত টাকার অভাবে চাহিদা অনুযায়ী খাদ্য গ্রহণ করতে পেরেছেন কি?	(কোডঃ 1=হ্যাঁ, 2= না, 3= উত্তর দেয় নি, 4= .....অন্যান্য)	
174.	বিগত বার মাসে টাকার অভাবে খাদ্য ক্রয় করতে না পারার কারণে ঋণগ্রস্ত থাকতে হয়েছে কি?	(কোডঃ 1=হ্যাঁ, 2= না, 3= উত্তর দেয় নি, 4= .....অন্যান্য)	
175.	বিগত বার মাসে টাকার অভাবে খাদ্য গ্রহণ করতে না পারার কারণে ওজন কমেছে কি?	(কোডঃ 1=হ্যাঁ, 2= না, 3= উত্তর দেয় নি, 4= .....অন্যান্য)	
176.	বিগত বার মাসে টাকার অভাবে খাদ্য ক্রয় করতে না পারার কারণে কখনও কখনও সারাদিন না খেয়ে থাকতে হয়েছে কি?	(কোডঃ 1=হ্যাঁ, 2= না, 3= উত্তর দেয় নি, 4= .....অন্যান্য)	
177.	পরবর্তী বেলায় আপনারা কি খাবেন তা নিয়ে চিন্তিত থাকেন কি ?	(কোডঃ 1= প্রায়ই / সবসময়, 2= মাঝে মাঝে , 3= কখনই না, 4= প্রযোজ্য নয়, 5=.....অন্যান্য)	
178.	খাবারের অভাব বসন্তের কোন সিরিয়াস সময়ে হয় কি ?	(কোডঃ 1=হ্যাঁ, 2=না)	
179.	পরিবারের সব সদস্য সুষম খাবার পাচ্ছে না , এমন হয় কি ?	(কোডঃ 1= প্রায়ই / সবসময়, 2= মাঝে মাঝে , 3= কখনই না, 4=.....অন্যান্য)	
180.	সারা বছর বসতবাড়ীতে অল্প জমিতে যৌসুম ভিত্তিক পুষ্টিকর শাকসবজির চাষের ব্যাপারে ধারণা আছে কি ?	(কোডঃ 1=হ্যাঁ, 2=না , 3= মনে নেই/ জানি না, 4= প্রযোজ্য নয়)	
181.	আপনার পরিবার জীবনযাত্রার মৌলিক চাহিদা গুলো (অন্ন, বস্ত্র, বাসস্থান, শিক্ষা ও স্বাস্থ্যসেবা ইত্যাদি) পূরণে সক্ষম কি ?	(কোডঃ 1=হ্যাঁ, 2=না)	

182.	জীবন যাপনে কোন মাস গুলি সবচেয়ে কঠিন (টিক চিহ্ন দিন)।	

বৈশাখ 14 April – 14 May	জৈষ্ঠ্য 14 May – 14 June	আষাঢ় 14 June- 14July	শ্রাবণ 16 July- 15Aug	ভাদ্র 16 Aug – 15 Sept	আশ্বিন 16 Sept – 15 Oct	কার্তিক 16 Oct- 15 Nov.	অগ্রহায়ণ 15 Nov- 14 Dec	পৌষ 15 Dec– 13 Jan	মাঘ 14 Jan- 12 Feb	ফাল্গুন 13Feb – 14 March	চৈত্র 15March– 13 April

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