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LINKAGES BETWEEN WOMEN'S EMPOWERMENT, CHILDREN'S DIET AND NUTRITION UNDER RAPID URBANIZATION IN BANGLADESH

(FINAL REPORT)

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'Linkages between Women's Empowerment, Children's Diet and Nutrition under Rapid Urbanization in Bangladesh'

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Abbreviations

AIC = Akaike information criterion

ANC= Ante-natal care

BDHS= Bangladesh Demographic and Health Survey

BMI = Body Mass index

BMI= Body Mass Index

CDD = Child Dietary Diversity

CF= Complementary Feeding

CIP= Country Investment Plan

EU= European Union

FANTA = Food And nutrition Technical Assistance

FAO= Food and Agriculture Organization

FGD= Focus Group Discussion

FPMU= Food Planning and Monitoring Unit

GSEM= Generalized Structural Equation Model

HAZ= Height for Age z score

HDD = Household Dietary Diversity

HDD= High Dietary Diversity

HFV= Household Food Variety

ICDDR'B= International Centre for Diarrhoeal Disease Research, Bangladesh

INFS= Institute of Nutrition and Food Science

IYCF= Infant and Young Child Feeding

Kcal= Kilo calorie

LDD= Low Dietary Diversity

MDD= Medium Dietary Diversity

MDD-W = Minimum Dietary Diversity – Women

MICS= Multiple Indicator Cluster Survey

MPI= Multi-dimensional Poverty Index

MUAC= Mid Upper Arm Circumference

NNP= National Nutrition Programme

OPHI= The Oxford Poverty and Human Development Initiative

PCA = Principal Component Analysis

RRR= Relative risk ratio

SEM= Structural equation modeling

SES= Socio-economic status

USAID= United States Agency for International Development

WASH = Water, Sanitation and Hygiene

WAZ= Weight for Age z score

WDD = Women Dietary Diversity

WHO = World Health Organization

WHO= World Health Organization

Executive Summary

With the growing urbanization in Bangladesh, socio-demographic structure is changing similar as many other countries in the world. If the trend continues, Bangladesh would be an urbanized country by 2039 when the majority of people will live in urban areas (NIPORT, 2016). The leading cause of demographic shift from rural towards urban and peri-urban areas is the employment opportunities in these areas due to urban concentration of development initiatives. Female employment in Bangladesh grew to 35%, reaching 18.1 million by 2017 as depicted by the report titled "World Employment and Social Outlook: Trends 2018" of ILO. Evidence shows that urban women are expected to be empowered than their rural counterpart, as well, employed women have more access to economic resources, which may exert influences in household food consumption behaviour and care practices. At the same time, women in Bangladesh are also traditionally responsible for child care and all other reproductive works at the household, their employment may hinge the dynamics of this social structure. To track this reshaping of household dynamics, in addition to socioeconomic indices, child dietary and anthropometric indicators recommended to be effective measures (FAO 2013). It is, therefore, of immense importance to evaluate the linkages between women's empowerment, children's diet and their nutritional status for future policy formulation of women empowerment in the conjecture of child health and nutrition

Research Question:

Is women's status an important determinant of child nutritional status in case of urban households? If so, what are the pathways through which it operates?"

Objectives of the Study:

The specific objectives of this study are:

I. To identify the maternal factors which affect children's nutritional status, diets and diet diversity in urban areas for different socio-economic categories based on previous evidence in Bangladesh and abroad.

II. To study the extent to which women's autonomy (e.g. their ability to control household resources, being in employment) and degree of empowerment translates into better nutrition and diets for children and the pathways through which this operates.

III. To examine the ways women's involvement in reproductive work (i.e. childcare, domestic work, and healthcare, etc.) and productive work outside the household affects maternal and child nutrition in urban areas, across the entire income spectrum.

Methodology:

Study design: In this study, we have defined empowerment in a way that Kabeer (1999) referred to the expansion in people's ability to make strategic life choices where this ability was previously denied to them, which can be thought in terms of three dimensions: resources, agency and achievement. Before that Sen (1985) referred to 'resources and agency' together as capabilities as, "the potential that people have for living the lives they want, of achieving valued ways of `being and doing'". So, in this study empowerment would mean the power/ capability of getting enabling environment of a mother to think about herself, for her children and for the family as a whole, which

includes self-esteem (confidence about herself), decision making power about herself, household resources and domestic issues, relationship with the family members who can favour/against to create environment.

To accomplish the study, primary data was collected from 1978 households, from mothers about mother herself and her the youngest child aged between 6 to 59 months, care giver (if any) and from female adolescents (if any) about themselves from different urban and peri-urban areas of Bangladesh. Nearly 40% of our respondents were from mega city Dhaka, 33% from city areas, and 28% from different towns. In addition, FGDs were conducted with several categories of mothers considering all socioeconomic categories, where 184 mothers and 22 adolescents participated. At the same time, BDHS 2014 was used as the source of secondary data. The survey followed a multi-methods approach to capture issues related to food and nutrition status of children (6-59 months) of the selected women who were supposed to be empowered due to socio-economic upliftment of the country. Given priority of comprehensive baseline study, the methodology was exploratory in nature, participatory in practice; interactive in principles and both quantitative and qualitative in scope.

Study Variables: This study considered maternal factors such as mothers' age, education, time allocation for children, receiving ante-natal care during pregnancy, etc.; household factors such as socio-economic status, household dietary diversity, housing status, household sanitation practice etc. Women empowerment was defined by five dimensions: self-esteem, access to and control over resources, decisions taken in the household matters, attitude and behaviour of husband and other family members, and freedom of movement. Child's nutritional status was measured through three different dimensions such as stunting, wasting and underweight.

Data Collection and Management: Using a thematic approach, interacting influence of the variables from different dimensions were integrated. On the other hand, using both additive and principal component method of data analysis, the dimensions of women empowerment were extracted. By using factor analysis, the empowerment score of individual respondents were estimated, where the cut off value had been estimated as 80% (Alkire, 2012). The child nutrition outcomes were calculated based on anthropometric z-scores for children under five, calculated using the 2006 WHO Child Growth Standards (WHO Multicentre Growth Reference Study Group, 2006). To estimate women dietary diversity and child dietary diversity, we have used 24 hours food recall method and considered 9 and 7 food groups (FAO 2015; and WHO 2014); and accordingly classified. Since the outcome variable i.e., the child's nutritional status, had more than two categories, therefore multinomial logistic regression had been used.

Results:

Overall Situation of the Mothers: The study revealed that most of the mothers were <30 years old with a mean age of 27 years, majority of them had more than secondary level of education (52%). Among the samples, 55% got married before 18 years of age of which 50% of the married mothers were from mega city, Dhaka. More than one-third of the mothers (36%) had their first baby between 20 to 24 years of age. Housewife mothers usually accompany their children for more time than the working mothers across all socioeconomic categories, though quality of providing care to their children is not clear (as we did not measure this). Around 7% mothers did not go for any ante-natal visits to the doctors or health workers during their pregnancy and 59% had visited at least 4 times. It is seen that 49% of our respondents are from middle class category; 10% households are headcount poor and 12% are vulnerable to poor and fall into poverty at any time if their situations degrade. Again, 34% respondents have inadequate sanitation.

Women Empowerment: Overall, 20% of the respondent mothers were found to be achieved empowerment using the cut off value as 80% (Alkire, 2012), and this amount was different for different dimensions of empowerment criteria (self-esteem – 20%, access to and control over resources – 25%, decisions taken in the household matters – 24%, attitude and behaviour of husband – 48%, and freedom of movement – 20%). Various factors were found to influence women's empowerment status, e.g., if the age is increased by 1 year, the probability of being empowered increased by 2.3%. Mothers with tertiary level education were 8.2% more likely to be empowered than mothers with no education. The probability of being empowered was increased by 3.7% when the age at first marriage delayed by 1 year. Women with working opportunity, and women from well off families were more empowered than others. Regarding shift of socio-economic determinants (wealth index) from poor to second class, mothers were 74% less likely of being empowered, holding all other variables as constant. If the status shifts from poor to middle class, poor to 4th class, and poor to rich, the mothers become more likely of being empowered by the margin of 1.6%, 66% and 52%, respectively. Working mothers were nearly 6% more empowered than housewife mothers. When mother is employed, then the probability of being empowered rises 2.42 times in access to & control over resources dimension and 1.94 times in decision related to household dimension

Women and Child' Dietary Diversity: Most of the mothers (76%) had low dietary diversity and no mother was found with high dietary diversity, whereas only 22% children of our sample have high dietary diversity. And mother's high involvement in productive and reproductive work hours could negatively affect women dietary diversity. In cases, mother's time management, nutrition knowledge, higher education, their improved socioeconomic status, and higher empowerment could change the situation of dietary diversity in a positive way. In addition, women dietary diversity has a significant positive association with child dietary diversity.

The maternal factors affecting children's nutritional status: From different multinomial logistic regression, the study found that mothers' socio-economic status, educational qualification, nutritional knowledge, BMI, receiving ante-natal care (ANC), status of empowerment, childcare support, and sanitation status - were the important factors influencing child nutritional status. Children from families of relatively higher access to resources had higher probability of having better nutritional status. ANC visits were found to be significant protective factors against malnutrition in children. Working mothers provided less breast feeding, and faced problems with complementary feeding, as they had to join at work after maternity leave when they just started complementary feeding. Most working mothers depended on female relatives to attend to their children or gave the responsibility to unprofessional domestic workers. Childcare support was found to be a crucial factor in improving child nutritional status. The study found positive correlations with family childcare and reduced likelihood (75%) of child wasting.

Women's involvement in reproductive work and productive work and 'maternal and child nutrition': 'Time' plays a critical role in all mothers' life. Housewife mothers do not only care the children, rather they spent maximum time of a day in many other reproductive activities. They do not reduce their time in cooking and household chores; instead, they cut down their personal time and especially from their children which can be substituted by other members of the family. The working mothers spent most of their time as productive hours. In the families of higher socioeconomic status, mothers buy more food, may not necessarily translate to proper consumption, due to mother's time constraints. Mothers from lower SES spend relatively more time in the management of households as they do perform all of their works manually. Most of the self-employed mothers mix their family life and work life together with prioritizing works; and cannot give enough

time to their children because of distraction by work. So, it seems, all types of mothers face time constraints. In this way, time spent by women outside the home does not affect their food consumption or that of their children, and this further affects both mothers' and child nutritional status. We have found, a significant percentage of mothers from both employed categories who work ≤8 hours can spend quality time with the children. So, it appears that ≤8 hours of maternal productive work may not have a negative effect on child undernutrition, if there is access to quality child care and access to healthy food and if caregivers' have sufficient knowledge on nutrition.

Discussion:

In this study, we have estimated Women Empowerment Index using variables of to 5 different dimensions. But due to multicollinearity among themselves, regression models were formulated only with the 3 dimensions, viz., attitude and behaviour of partner; access to and control over resources; and mobility of the mother (excluding decision at household level and self esteem). It has been found that though working women has achieved access to income, but considering all mothers, they have little control over their family resources, whether those are earned by themselves or their husbands. As a result, even if they earn, sometimes they may not have the freedom to spend their own income. We found that **increasing overall empowerment of women often deteriorates child nutritional status probably due to lesser care time given to their children.** But when the empowerment has been decomposed into three different dimensions which we included in the model, we found a different picture.

There are some issues of empowerment which are related to child nutrition. Mother's better economic freedom may enable her to decide to about buying diverse nutritious foods and health seeking behaviour, but if there is lack of resources at household level, women's increased economic freedom may not translate into improved child nutritional status. Without access to monetary resources, mothers may be unable to purchase appropriate food to meet the special needs of their young children and to provide health care facilities. Again, pregnant and lactating mothers need cooperation and mental support from family members, without which they may feel depressed (and disempowered), which impede them to provide their best level care for their children. When any mother faces conflict at household or workplace, she usually unable to think about diverse diet and concentrate to prepare appropriate food and feed the baby in a 'responsive feeding' manner. Therefore the child is deprived of nutrition which obstructs child's physical, cognitive and mental development. In this way, mothers' physical and mental stress impedes the nutritional status of child.

Why freedom of mothers' mobility may not improve child nutritional status?

The first two to three years of a child is of extremely important for the physical growth and cognitive development and throughout this period, a child demands intensive care which needs quality time and intellectual knowledge. If the urban mothers' frequently visit their relatives' house, may face problem with their child's feeding and sleeping pattern. Most of the cases, they receive improper health information from the relatives, and therefore they wouldn't visit health workers and doctors for regular check up of the child as recommended. Empowered mothers usually visit hospital for their own health problems and health crisis of elderly family members. We also have found mothers, who have convenient access to market places, spend a lot of time to buy products fulfilling their own and

family needs; rarely they buy foods as per child health requirements, rather they bring processed food at home for the child. Finally, child health is rarely discussed in the community events, therefore urban mothers are not actually getting child health related support and guidance from their participation in the events. Therefore, mobility may increase mothers' self-confidence, but this increasing mobility can conflict with concentrating on the child and may cause child malnutrition.

In the case of working mothers, empowerment or disempowerment does not only arise in their household or community; it also happens in the workplace at a great extent. We found many mothers, who made a good score in composite empowerment and in its dimension but while conducting FGD, they were non-cooperated in the workplace, for which they fall in depression. The women also pass there 8 hours or even more time for work. When the women are trying to achieve empowerment (to be able to make their strategic life choices which was denied before) as a mean of employment, they again become disempowered in the workplace, which may mean that the existing women empowerment calculation may not be appropriate for measuring empowerment of working mothers. There may be different dimensions remain untouched, for which those mothers suffer.

The formal sector working mothers in Bangladesh get 6 months maternity leave but actually the leave ended, when it is the time to start to provide complementary foods to the child, with which Bangladeshi working mothers could not still cope with. Most of the mothers call their elderly female relatives to attend their children, which again create burden for the elderly citizen. Some mothers leave the responsibility to unprofessional domestic workers, sometimes even they are adolescents. Child care support is essential for improving child nutritional status. Our study found that if the child gets care from family members when the mother is not home, then the child would be 75% less likely to be wasted.

Dietary diversity should not be underestimated which is one of the few requirements for children to get all essential nutrients, which would lead child physical as well as mental development. Our traditional eating habits often do not translate into a balanced nutritious diet. A great concern is: urban children seldom drink fresh milk or occasionally eat any kind of seasonal fruits, rather the busy life schedule of family members including mothers stimulate them to get habituated with snacks or fast foods and carb-based diets. The quality of the diet of children during their early years depends mainly on the attitude, behaviour and decisions of the mothers or those who usually care the child. Therefore, nutrition education and awareness programs should be adapted through counselling of pregnant and lactating mothers.

Recommendations:

Bangladesh is in transition of urbanization, where women are increasingly joining to the labour force, and in the near future, urban population will dominate the rural. The problems of urban working women that are emerging include triple burden of responsibilities living in a nuclear structure of

family which need utmost importance to be given for the family and young children as women are also responsible for child care and all other household works in the structural rearrangement of urban and peri-urban settings, in which children's physical and mental growth and development has become a critical concern, which is an overlooked component in Bangladesh. With this background, after sufficient exploration, this study recommends the following way forwards:

1. Introducing Day Care Centers

A day care center may offer a more affordable and reliable option, with trained and certified staff and a social environment for the child. There are many examples that high-quality child care has positive long-term impacts on the children and the economy, also provides important benefits to parents. Public child care makes it possible for low income parents to take advantage of opportunities for advancement.

2. Antenatal care services, its quality and extent

We need to give proper attention to antenatal care services, its quality and extent. ANC services should be made available for all mothers. With the existing services, it should include counselling for parents, physical and mental challenges, postpartum depression, nutrition education, caring for a child, and regular check up. Improvement in the ANC services may reduce the burden of child malnutrition.

3. Attention needs to be given to increase dietary diversity

A short and comprehensive baby-rearing book can be published where all the scientific process of child-rearing will be visually illustrated along with baby food processing and feeding practice, healthy cooking practice, schedule child feeding frequency, healthy food purchasing behaviors and so on. The book may be provided to the mothers as the material of ante-natal services. Interventions favoring food accessibility for disadvantaged households should be strengthened by a social safety net programme. Again, interventions favoring food accessibility for disadvantaged households should be strengthened. Inclusion of low income mothers in the social safety net programme (e. g., food transfer) may provide an opportunity to enable them to increase dietary diversity. Moreover, small serving size foods, mixed cut locally available fresh fruits and mix of different nuts and seeds can be made available in hygienic packets which will ensure the fruit and nuts consumption for all socioeconomic categories especially lower and lower-middle income class people.

4. Workplace environment

In the case of working mothers, empowerment or disempowerment also arises in the workplace. Therefore, like establishing infrastructural facilities (female toilet, child daycare option, breastfeeding room, lactation breaks in the work), consider context-specific flexible working time, introduce gender-sensitive language, ensuring respective attitude towards pregnant and breastfeeding mothers, 15 days of paternity leave etc. It is needed to rethink to adjust mothers' working time after completion of maternity leave, so that they would be able to provide breast milk and start complementary feeding in a more convenient way. The government could incentivise employers to provide creche services and wet-nursing facilities at the workplace.

5. Ensure access to resources for the mothers of lower socioeconomic status

Access to resources is a crucial issue of low income families. Inclusion of low income mothers in the social safety net programme (e. g., cash transfer) may provide an opportunity to make their strategic life choices (education, self-esteem, control over resources, decision-making power, mobility, public speaking, etc.), by decreasing household poverty-related stress, which in turn may increase positive

parenting of children. There is a need to motivate and make competent to use the home and kitchen appliances needed for routine housekeeping tasks to reduce household workloads, and save the time and energy burdens of household work which may provide an opportunity for the mothers to concentrate on their young children.

6. Improved water, sanitation and hygiene

Only a better and healthy food habit cannot alone ensure better child nutritional status unless the water, sanitation and hygiene facilities are improved, and the research found in the urban and peri-urban areas, more than 40% people do not have access to improved sanitation, therefore, the local government need to work on this concern.

7. Nutrition intervention is also needed for the adolescent girls

Adolescent girls are the future mothers. Attention needs to be given on their dietary diversity as they need energy and nutrient-dense foods to grow physically and mentally and to live a healthy life. Some nutritional problems remaining in child life can possibly be improved by consolidating healthy eating and lifestyle behaviors during adolescence. Most of the time, in the lower socioeconomic category, the girls enter pregnancy with micronutrient deficiencies which adversely affect their health and that of the fetus. Improving the nutritional status of adolescent girls might have a positive effect on the future generation and thus promoting nutritional status to future generations.

1. Context of the Study

Bangladesh is expected to become an urbanized country by 2039 when the majority of the country's total population will live and work in towns and cities (NIPORT, 2016). Urban populations are growing most rapidly and the major cities are expanding through establishing economic activities – which are recently termed as "peri-urban". Peri-urban areas are characterized by urban–rural interface, co-existence of agricultural and non-agricultural activities, spatial location (normally 20 km distance from urban centers), land use change (agriculture to non-agricultural uses), set up of heavy and light industries (John et al, 2019), occupational transitions, fluid population (home of migrant population from rural areas and resettled urban poor (shift from more expensive to less expensive areas) in search of jobs, sometimes urban rich who want to avoid urban crowding (Sen, 2014). Most of the manufacturing industries in Bangladesh are located in these urban and peri-urban areas which create huge pressure on resources, growth of slums, insufficient water and sanitation services, and degradation of farmland.

Child ill-health is a common factor among the urban poor (Ahsan et al. 2017). Multiple studies have looked into various determinants of child health in Bangladesh, albeit few in specifically urban settings. Black et al. (2013) mentioned that half of the under-5 children in slums were stunted and 43% were underweight. UNICEF (2013) reported the under-5 mortality rate to be almost 50% higher in the urban areas than rural areas. Rahman et al. (2014) found high rate of overweight (23.6%) and obesity (17.9%) amongst affluent urban children and adolescents due to urban lifestyle.

So, it seems, on the one hand, a relatively small share of urban children consume more food (with/without maintaining diversity) than they need with insufficient physical activity; and on the other hand, a significant share of urban children consume less food than they needed. Though Bangladesh is producing enough food, too few urban children are being fed adequate diverse nutritious diets to ensure their optimal physical growth and cognitive development. It is also an issue of how children are fed, the care these children receive (such as breastfeeding, complementary feeding, food preparation etc.), and the environments in which they live. The ability of caretakers (typically the mothers), to provide care to children ultimately rests upon the quality of the care they themselves receive (Smith et al, 2003).

Women's participation in the labour force has increased manifolds over time in all sectors (BBS, 2013), specially in the urban areas; while at the same time the burden of domestic chores also mostly remain on their shoulders. However, women's increasing access to economic and financial resources due to entering the paid employment sector-may result in an improvement in women's empowerment. The intra-household bargaining model also shows that paid employment can have direct autonomy-enhancing effects via increasing women's bargaining power, which can also be thought of as "enabling conditions," include the extent of social protections provided by states, organizations and communities. Women's empowerment is a multidimensional concept and its definition and measurement changes when the context changes. Kabeer (1999) mentioned the ability to exercise choice, encompasses three dimensions: resources, agency, and achievements. Kabeer argued that empowerment is actually a 'process' where women gain ability to make and choose on their 'strategic life choices' (like marriage, child bearing, education, etc.) which was denied to them before. She emphasized the concept of 'agency', which is the capacity of a person to make independent choices in her life even facing oppositions. 'Agency' also implies that women themselves have to play significantly active role in bringing the changes in their lives, not merely receiving the benefits without participating in the process (Sen 1993; Mehra 1997). Sen (1999) has given importance on the mother's "agency" in well-being of her child. When a woman is exercising her 'agency', she is free to pursue her goals or values she regards as important (Sen 1999). Therefore, expansion of agency is essential for empowerment (Malhotra et al., 2002). Mahmud, Shah, and Becker (2012) mentioned about the process of enabling women to have the power to navigate life's

challenges. On the other hand, in rural context, the Women Empowerment in Agriculture Index (WEAI) captures the roles and extent of women's engagement in the agricultural sector in five domains (Alkire et al., 2013). Sraboni et al. (2014) and Malapit et al. (2015) suggested that the domains of empowerment that are significant for women and children's diet and nutrition outcomes may not always overlap. Different aspects of empowerment may be important for different nutrition outcomes, consistent with other findings in the empowerment literature (Kabeer, 1999; Sraboni et al., 2014).

There are mixed findings about employment-empowerment relation. Employment may mean greater recognition and remuneration of women's work, and typically improve bargaining power, thereby leading to empowerment (Braunstein, 2008). Alternatively, paid employment may lead to double burden of work unless other social policies and institutions emerge to deal with the work traditionally assigned to (unpaid) women (Alkire et al., 2013). Na et al. (2015) and Pratley (2016) found that mothers' earnings can have a positive effect on infant nutrition. Previously, Hoddinott and Haddad (1995) and; Duflo and Udry (2004) found that increasing women's share of cash income significantly increases the share of household budget allocated to food. Ndaimani (2018) mentioned that unless mothers have the power to decide on the utilization of their earnings, it would not benefit themselves or their children. Some mentioned that mothers being employed have been linked to lower nutrition among children under-five in Bangladesh due to their inability to devote adequate time for feeding and care. Mothers' employment compromises infant feeding and care' and 'caregivers' inability to substitute mothers' care (Fakir and Khan 2015). Raju and Rao (2019) mentioned that though in principle, women's (agricultural) work could have both positive and negative effects on nutrition, but they found clear evidence of the negative implications of women's seasonally high work burdens in agriculture, on nutritional outcomes, both of their children, through time trade-offs, and their own health, due to energy stress. Cooksey et al. (2009) found negative effects of mothers' employment on child health which can be minimized by adequate maternity leaves and part-time employment for mothers of young children. But Risica et. al., (2016) mentioned that childcare facility can play very important role to improve nutrition and activity for children. However, still the employment authorities are not always mother-friendly. Many mothers have to return to work immediately after giving birth because of the policy and nature of the job. As a result, more and more children in Bangladesh are taken care-off by adult relatives (the paternal grandmother/paid non-relatives/ unprofessional maids (Hoque and Kamruzzaman, 2016). Fenske et al. (2013) reported that the growth and development of children under-5 is greatly affected by various factors. The proper understanding of the role of women in providing adequate nutrition is necessary. The causes of malnutrition to children were inadequate feeding practices, early life infections, child care practices, hygiene practices etc. - all of which connected to women, especially to mother/ caregiver.

The concept of child diet consists of three ideas: meal frequency, dietary diversity and minimum acceptable diet. UNICEF (2013) has given importance on the first 1,000 days covering the period of pregnancy up to the child's second birthday, while the child needs sufficient nutrition for rapid growth and development. Attention has been directed towards responsive feeding which considers how mother cares for the child and whether the mother interacts with the child to encourage eating during the meal because good care can tackle problems when food and health services are limited. Sibhatu et al. (2015) mentioned that agricultural production at household level leads to increase in dietary diversity and child nutritional status, but market access is also important. Malapit et al. (2015) found a weaker and limited influence of women's empowerment on child diets and nutritional status in comparison to production diversity. Kadiyala, et al (2014) indicated about 6 pathways of which three relates to the nutritional impacts, those are farm production, farm incomes, and food prices. They also mentioned that agriculture influence diets even when controlling for income and, relative food prices could partly explain observed dietary changes. The evidence on agriculture–

gender linkages to nutrition is relatively weak. The root causes of these gaps include an interdisciplinary disconnect between nutrition and economics/agriculture, inadequate survey data, and limited policy-driven experimentation. Closing these gaps is essential to strengthen the agriculture sector's contribution to reducing malnutrition.

Inadequate childcare practices are fundamental to addressing malnutrition among children. Poor maternal education (formal and informal) has been identified as a major constraint to good childcare practices. Caregiving behaviours provide favorable environment within which children are raised, are central to nutritional outcomes of children. Even in households with similar levels of income and resource, there is a wide variation in nutritional outcomes of children, which tends to suggest that factors other than resources are responsible for nutritional status of children. UNICEF Model (1990) showed that to provide care adequately, caregivers require education (both formal and informal), time, and support (e.g. control of resources). One would expect that mothers' knowledge of child nutrition and childcare practices would have a significant effect on their children's nutritional status. While some studies have reported that maternal nutritional knowledge is positively associated with the child nutritional status (Mueller and Krawinkel 2005), others have shown that adequate knowledge is not always translated into appropriate actions (Black, et al., 2008).

Hackett et al., (2015) found that improved infant and young child feeding (IYCF) practices have the potential to improve child health and development outcomes in poorly resourced communities in Bangladesh. The study found that mothers' IYCF knowledge was limited and suggested that female adolescence is a window of opportunity for improving unborn health outcomes among future children. It needs to be mentioned here that despite remarkable progress in human development and substantial decrease in total fertility rate in Bangladesh, adolescent motherhood is still highly prevalent. In Bangladesh, approximately 60% of rural girls become mothers before the age of 18 (Islam, et. al, 2017). The average age of girls' marriage in Bangladesh is 16.1 years (BDHS, 2014). Vereecken and Maes (2010) showed a lower dietary adequacy in children of mothers with low and medium level of education, medium-ranked occupation, and lower levels of both nutritional knowledge and food-related health attitude. Saaka (2014) found that increase in maternal childcare knowledge significantly contributes to child's nutritional status if there is concurrent improvement in socioeconomic circumstances of women living in deprived communities. Al-Shookri (2011) showed mothers with low educational levels, high-ranked occupation, and lower levels of both nutritional knowledge and food related health while the highest food intake and healthy eating attitude scores were found in children of mothers with high education level and mother without a job. Campbell et al (2013) discovered that maternal nutrition knowledge (understanding of what foods to buy, prepare and serve) and home food availability (HFA) are directly and independently associated with children's food intakes. Hoddinott (2017) found that mothers whose neighbour participated in a nutrition Behaviour Change Communication (BCC) intervention scored higher on a measure of IYCN knowledge - were more likely to feed their children legumes and nuts, vitamin A rich fruits and vegetables, and eggs. Understanding the factors that determine the translation of adequate child health and nutritional knowledge into appropriate action in impoverished environment might help design more effective interventions against malnutrition, whereas the pathways remains unclear and complex and essential to be explored.

There are studies which also show women and men reveal different preferences while allocating food and non-food resources in the households (Alderman et al. 1995; Hoddinott and Haddad 1995; Quisumbing 2003), which may affect child nutrition. As women are the primary caregivers, the intra-household gender relations play crucial role in determining the resource allocation. So, the wellbeing of household, especially nutrition of the children is found to be impacted by the women's status in the family.

Under the situation of urbanization, child health becomes a matter of concern in Bangladesh. Mothers biologically carry the children, who are then culturally responsible for caring them, at the same time who are also joining in the labour force as their new role. It may have several impacts. They may achieve economic empowerment which may also result of buying a more diverse and nutritious diet for families, especially for themselves and their children. Only capability is not enough to translate into nutrition but child care also plays a significant role for which mothers need to provide their time. So this research is an attempt to explore how time and capability work in the mothers' busy life to reduce child malnutrition.

Planned objectives and outputs:

Based on the situation mentioned in the previous section, in this study, our research questions are: is the level of women empowerment an important factor of child nutrition in the case of urban households? If so, what are the pathways through which it operates? Thus, studies are required to analyse the trade-off between mothers' employment and child care to gain a true understanding and identify the required policy interventions for the benefits and problems related to women empowerment and child nutrition. The contribution of this study will be to trace the pathway of linking women's role and impact on child nutrition in the urban/peri-urban context. Based on the above-mentioned situation, the study will address the following objectives to achieve the mentioned outputs:

Objective 1 To identify the maternal factors which affect children's nutritional status, diets and diet diversity in urban areas for different socio-economic categories based on previous evidence in Bangladesh and abroad.

Output 1.1: Knowledge about the level of children's nutritional status, diets and diet diversity in urban areas for different socio-economic categories will be generated.

Output 1.2: Information on maternal factors related to children's nutrition and dietary status for urban and peri-urban areas for different socio-economic categories.

Output 1.3: Information on the present condition and awareness of adolescent girls on nutrition-related issues that can influence family food consumption

Objective 2: To study the extent to which women's autonomy (e.g. their ability to control household resources, being in employment) and degree of empowerment translates into better nutrition and diets for children and the pathways through which this operates.

Output 2.1: Better understanding about the current status of women's empowerment in the urban and peri-urban areas of Bangladesh will be gained.

Output 2.2: Association between children's diet and nutrition with mother's empowerment will be determined.

Objective 3: To examine the ways women's involvement in reproductive work (i.e. childcare, domestic work, and healthcare, etc.) and productive work outside the household affects maternal and child nutrition in urban areas, across the entire income spectrum.

Output 3.1: Knowledge of the level and ways of time allocation of mothers in relation to productive, reproductive and community responsibilities and its effect/ influence on children's nutritional status.

2. Conceptual Framework of this study

Women's empowerment has been recognized as one of the underlying determinant of child nutrition. But women's empowerment itself is a complex construct and there is no universally accepted definition of the term or agreement regarding which domains comprises one's empowerment. The literature on women's empowerment, however, usually refers to notions of power, agency, control and decision making (Kabeer 1999; Malhotra et al. 2002; and many others). Kabeer (1999) defines empowerment as a process, namely, 'the expansion in people's ability to make strategic life choices in a context where this ability was previously denied to them'. However, despite significant associations observed between women's empowerment and child nutrition, the pathways of influence and domains of women's empowerment most relevant for child nutrition remain due in large part to the heterogeneity in describing, defining, and operationalizing women's empowerment (Pratley, 2016). Nonetheless, studies assessing associations between women's empowerment and child nutrition have operationalized this construct using numerous direct and indirect measures of empowerment. The key point is: researchers agree that women's empowerment is a process that operates in context-specific ways (Yount, Peterman, & Cheong, 2018), as heterogeneity exists in context specific masculine family structure and the societal conditions that subordinate women. Therefore, in this section, we will search how women empowerment might be contextualized in urban context of Bangladesh that affect child nutritional status.

2.1 Conceptualizing empowerment

There are indirect and direct measures and indicators of empowerment which are widely used in development literature. As empowerment is not tangible, very often, proxy variables are used to measure this unobservable element. Frequently used indicators are couple's educational difference (Smith et al., 2003; Thomas, 1994), female school enrolment, female labour force participation, labour laws, childcare options wage differentials between married couples, women's income, age difference between spouses, legal frameworks (such as, property rights law, marriage and family law, labour laws, inheritance law), kinship (for example, age difference between spouses, family structure, number of children, rates of female versus male migration), land ownership, social norms, Marriage, kin, and social support (e.g., social status of family of origin, assets brought to marriage, traditional support networks, educational differences between husband and wife, relative age at first marriage (Smith and Haddad 2000) etc. Although in a true sense, these measures cannot define women's empowerment, per se. In a traditional and patriarchy dominated country like Bangladesh, whether the women are better educated or earning a lot may not have enough decision making power regarding whom to marry, spending her earning, where to go or to seek medical care and every time they have to seek permission from their parents specially from father. These proxy variables can be termed as 'enabling factor' or 'sources of empowerment' (Kishor; 2000).

On the contrary, direct measures can capture the empowerment of women in household. In this method questions are asked, for example, on women's decision making power regarding domestic issues such as cooking, clothing, purchasing foods, freedom of movement, control over financial resources, attitude towards domestic violence (Kishor 2000; Malhotra, Schuler, and Boender 2002). Direct measures are considered to be better method as they are closer to capture the element 'agency' of empowerment (Hashemi et al. 1996; Mason 1998, Mason and Smith 2000; Malhotra and Mather 1997). Chatterjee and Dubey (2018) employed direct measure to capture women's autonomy by capturing woman's real capacity to control regular domestic activities, physical movement (mobility), financial resources and exposure to domestic violence. In a similar study, Smith et al, (2003) defined women's empowerment as "women's power relative to men''. Women with lower status tend to have weaker control over household resources, tighter time constraints, less access to information and health services, poorer mental health, and lower self-esteem. All these factors are

thought to be closely tied to women's own nutritional status and the attention/ support by their family members, and, in turn, to children's birth weight and the quality of care.

In our present study, we indicate 'agency' as empowerment which would mean the power/ capability of getting enabling environment of a mother to think about herself, for her children and for the family as a whole. It includes self-esteem (confidence about herself), decision making power about herself, household resources and domestic issues, relationship with the family members who can favour/against to create environment.

BDHS (2014) found that only 32% of currently married women who earn cash reported that they themselves mainly decide how their cash earnings are used. Anderson and Eswaran (2009) reported that women who earned an income of their own, had some say in household decisions than those who worked as unpaid labour on the family farm or the economically inactive; and the role of education did not have significant influence on decision-making. Conversely, Engle, Castle and Mennon (1996) argue that women of rich households do not ensure that they have proper access to resources. Castle (1995) found that some of the most malnourished children are of mothers with the lower autonomy among rich families. While measuring women's empowerment in rural Bangladesh, Mahmud, et al., (2012) found that women in the high wealth quintiles have significant negative coefficients indicating that they have less decision-making power in the household compared to the poorest women; and married women's role in household decision-making was relatively greater in health and family planning decisions, and lower in decisions related to household expenditures and personal autonomy. While analysing BRAC's TUP program in Bangladesh which provided livestock and training to poor rural women, Roy et al, (2015) found that in Bangladesh, though women preserve ownership of transferred livestock, but men own new investments; and women's relative resource control, mobility, and control over income are reduced. Heath (2014) documented a positive correlation between paid work and domestic violence in the urban context in case waged workers, majority of them worked garment industry, less educated and married at an early age as they have low bargaining power, while Sraboni, et. al (2014) found empowerment gaps for women in rural Bangladesh are found to be greatest in terms of leadership in the community and control and access to resources. Thus, this research explores the (employment-) empowerment-children's nutrition relationship in the case of urban and peri-urban areas of Bangladesh. So, it seems, there is no straight answer to who is being empowered and how to achieve empowerment in a patriarchal structure like Bangladesh.

Several researchers have defined and measured empowerment/ autonomy by using different indicators. Some of those definitions and indicators have been presented in Table 2.1.

Table 2.1 Measuring indicators of empowerment in the literature

	Literature	Definition/Measurement of empowerment
1.	Desai and Alva (1998)	Education as a proxy for empowerment
2.	Jejeebhoy (1997); Bloom et al., (2001), Bhagwalia et al. (2012)	mainly four elements (1) decision-making power of women; (2) mobility outside the house or physical autonomy; (3) attitude towards domestic violence; and (4) economic independence

	Literature	Definition/Measurement of empowerment
3.	as Basu (1992), Dyson and Moore (1983), Bloom et al. (2001) and Jejeebhoy (2000)	Women's ability to influence decisions about themselves or close household members, their ability to control economic resources and information, and their ability to move freely.
4.	Hashemi, Schuler, and Riley (1996)	Eight dimensions: ability to make small purchases, ability to make large purchases, involvement in major household decisions, mobility, economic security, relative freedom from domination within the family, involvement in protests and political campaigning, and political and legal awareness
5.	Engle et al. (1996)	Resources needed by the caregiver and specific care practices, including education, autonomy and control of resources, knowledge and beliefs, physical health, nutritional status, mental health, self-confidence, reasonable workload and availability of time, and family and community/ social support
6.	Bouis et al. (1998)	Analysed women's time allocation, marriage assets, transfers at marriage, inheritance, women's mobility (going alone to another village to visit relatives or friends; attending NGO training (alone or with company); attending an NGO training alone); never having been verbally abused by husband; never having been physically abused by husband
7.	Engle, Menon, and Haddad (1999)	women's status is measured by control of time and income, time constraints and social support, female-specific health service availability, knowledge and beliefs, mental health, confidence, and self-esteem
8.	Mason and Smith (1999)	Woman's control over and involvement in a number of decisions such as purchases and work outside of the home as well as how many children to have and women's freedom of movement
9.	Yount (1999) and Kabeer (1999)	Knowledge and access to or control of resources (education, employment, media exposure, earnings, and asset ownership
10.	Quisumbing and Maluccio (2003); Thomas, Frankenberg, and Sikoki (1999); Agarwal (1997)	household decision making regarding marriage, resources of the families of the spouses, inherited assets, and welfare receipts
11.	Sen and Batliwala (2000)	• A person's control over resources, including economic, human, and social resources, enhances her or his ability to exercise choice. Examples of economic resources are income, time, productive inputs, financial assets, and food. Examples of human resources are education, skills, and knowledge. Membership in

	Literature	Definition/Measurement of empowerment
		groups and access to kin and other social networks are examples of social resources. • Customs and norms based in deeply held beliefs, values, and attitudes often dictate differential roles, acceptable behaviors, rights, privileges, and life options for women and men. Norms and customs governing social behavior mean that some alternatives are not even considered in the domain of choice for women. • Because of extra-household differences in women's and men's power, regardless of their power relative to their husbands, women may face more obstacles to attaining their goals and aspirations than men. Not taking into account the broader institutional context in which women and men operate may lead one to overlook important pathways through which women's status influences outcomes • Women with low status may face difficulty in even perceiving the need for their own health care, much less garnering the confidence to act on that need • With respect to the availability of reproductive health services for women, including services for fertility regulation, ongoing gynecological care, and prenatal and birthing care, in communities where women's status is low, these services may not be available at all. Sen and Batliwala write "The control of women's and girls' sexuality and reproduction is at the core of unequal gender relations and is central to the denial of equality and self-determination of women" (2000, 24).
12.	Kishor (2000)	3 types of indicators: (1) those that give direct evidence of such power; (2) those that are sources of power; and (3) those that characterize the setting of power. Direct evidence indicators are: decision making in households, including control over resources, women's autonomy, and women's and men's attitudes on gender roles and acceptable behaviors. Source indicators are knowledge and access to or control of resources. Examples of setting indicators are customs and norms regarding marriage (for example, dowry, levirate, co-residence with in laws), the literacy and education of spouses' parents, age differences between spouses, education differences between spouses, and the degree of spousal communication.
13.	Adato et al. (2000)	Bargaining power measured by four determinants: (1) control over resources, (2) factors used to influence bargaining process, (3) mobilization of interpersonal networks, (4) basic attitudinal attributes. Six dimensions (or indicators) of empowerment: household decision making, other types of choice, women's rights in marriage, participation in public domain, economic security, and cognitive processes

	Literature	Definition/Measurement of empowerment
14.	Kabeer (2001)	female mobility and social status, self-worth and perceived economic contribution, voice in decision making, assets and education
15.	Malhotra, Schuler and Boender (2002)	explained the various dimensions along which women can be empowered (economic, sociocultural, familial and interpersonal, legal, political, and psychological) and also the different levels at which empowerment can occur: the household, community, national, regional, and global. In this conceptualization, individual- and household-level indicators are more related to direct measures and national and regional-level indicators are more related to indirect measures. Direct measures include appreciation in the household, sense of self-worth in addition to other indicators.
16.	Smith et al, (2003)	Defined women's status as women's power relative to men's in household and communities (degree of equality between females and males in communities) - "societal gender equality."
17.	Adato and Roopnaraine (2004)	Focuses on reports of women's self-esteem, men's attitudes toward women's role as beneficiaries, and women's control over resources; also looks at reports of conflict and domestic violence in the household
18.	Pitt, Khandker, and Cartwright (2006)	Economic access and power, household decisions, mobility and networks, activism, household attitudes, husband's behaviour
19.	Handa et al. (2009)	Examines decision making through five questions on (1) decisions on taking children to a doctor, (2) decisions on spending women's extra income, (3) decisions on house repairs, (4) decisions on child clothing and shoe expenditures, and (5) who tells children to go to school Decision making index presented in three variations: full index (summing all five questions), a woman's income indicator, and the full index without the women's income question
20.	Shroff et al., (2009)	Financial autonomy is measured by 'freedom to use discretionary money' and physical mobility reflected by 'freedom to go to the market'
21.	Iannotti, Cunningham, and Ruel (2009)	women's decision making power in the household, which includes decisions on household land use, group meeting participation, making small household purchases, making large household purchases, daily workload
2.	Hidrobo et al. (2012)	Women's empowerment indicators are based on decision making power in relation to a number of domains: (1) whether a woman works for pay, (2) children's education, (3) children's health, (4) women's own health, (5) small daily food purchases, (6) large food purchases, (7) large asset purchases, and (8) whether or not to use contraceptives.

	Literature	Definition/Measurement of empowerment
		Responses can be (1) female only, (2) spouse only, (3) woman and spouse together, (4) someone else in the household, (5) woman and someone else, (6) decision not applicable
23.	Bhagowalia et al. (2012)	women's involvement in household decision making, women's access to or control over resources, women's mobility, power relations between husband and wife, women's and men's attitudes toward abuse and intimate partner violence, and attitudes toward gender roles, sources of power such as media exposure, education, or paid employment, settings of power such as social hierarchies
24.	Mahmud, Shah and Becker, 2012	Self-esteem, control over resources, decision making ability, mobility
25.	UNICEF (2013)	composite index of mobility, decision making and access to financial resources
26.	Imai et al. (2013)	bargaining power which is calculated as ratio of mother's schooling years to father's schooling years
27.	IFPRI Discussion Paper (2013)	Mara van den Bold, Agnes R. Quisumbing and Stuart Gillespie: Agricultural interventions—(e.g. home gardening and dairy projects) show mixed impacts on women's empowerment measures such as time, workload, and control over income; but they demonstrate very little impact on nutrition.
28.	Chatterjee, P. and Dubey, A. (2018)	The autonomy index is created using four dimensions- women's decision making, freedom of movement, financial autonomy and attitude towards domestic violence.
29.		6 domains (leadership, decision making, mobility, economic security, male involvement in housework, and nonfamily groups),

Based on the previous literature, we have fixed the domains/ dimensions relevant to empowerment of urban and peri-urban mothers. As women's empowerment is highly context specific, it is important that any determinants/ dimensions used are measured that represent a balance between universal indicators of empowerment that correspond with internationally agreed-upon indicators on gender equality and rights, and context-specific locally defined indicators that are in line with respective sociocultural interpretations of empowerment.

In this research, Women Empowerment will be measured following 'dimensions of a married woman's empowerment' used by Mahmud et al. (2012), in which the dimensions are self-esteem, control over resources, decision making ability and mobility. We would like to include an additional dimension 'attitude, behaviour/support/recognition of other family members towards the respondent', due to the cultural existence of strong hierarchy/patriarchal relationship among family members. The dimension has been mentioned in different literature with different background like relative freedom from domination within the family [Hashemi, Schuler, and Riley (1996)], family support [Engle et al. (1996)], abused by husband [Bouis et al. (1998)], men's attitudes on gender

roles and acceptable behaviors; and the degree of spousal communication [Kishor (2000)], men's attitudes toward women which may cause or negotiate conflict and domestic violence in the household [Adato and Roopnaraine (2004)], household attitudes, husband's behaviour [Pitt, Khandker, and Cartwright (2006)]. Mahmud et al. (2012) also mentioned about wife-beating, which we think that it may come under Attitude, behaviour and support/recognition from husband, as the word 'EMPOWER' means to give legal authority or power to anyone, which may also mean creating enabling environment to enjoy power in the family. It could be mentioned here the views of Agarwala & Lynch (2006) who examined the relatedness of autonomy dimensions using survey data from India and Pakistan and found that while most commonly measured dimensions of autonomy were moderately correlated, perceived legitimacy of domestic violence did not correlate well with other dimensions of autonomy. For this reason, they argued that women's opinion of the legitimacy of domestic violence should not be included in autonomy measurements as it may reflect education, or some social factor other than autonomy (Agarwala & Lynch 2006). The dimensions have been shortly described in the following:

Self-esteem is an individual's subjective evaluation and belief of their own worth. Smith and Mackie (2007) defined as "The self-concept is what we think about the self; self-esteem, is the positive or negative evaluations of the self, as in how we feel about it". Experiences in a person's life are a major source of how self-esteem develops mainly at family, at society and at schools. In the early years of a child's life, parents have a significant influence on self-esteem and can be considered the main source of positive and negative experiences a child will have. Unconditional love, caring, supportive parenting styles helps a child develop a stable sense of being cared for and respected. These feelings translate into later effects on self-esteem as the child grows older. Experiences that contribute to low self-esteem include being harshly criticized, being physically, sexually or emotionally abused, being ignored, ridiculed or teased or being expected to be "perfect" all the time. In patriarchal societies, women generally have lower level of self-esteem. Access to and control over resources refers as right, opportunity and power over the income and productive resources.

Attitude and behaviour of husband and other family members include, care, financial and mental support provided to the mother, helping her in household works, expressing her opinion when she is disagree with them, behaviour shown to her when there is an unwilling mistake happen etc.

Decisions taken in the household includes who decides what to buy from the market how much money to be spent on food items, items for personal use, expensive things for the household, capital/ investment items like land, jewelry, selling or buying items for family, health expenditures to make, where to invest surplus money, how many children the family have or are planning to have etc.

Women in many parts of the world find their mobility restricted by social or cultural norms, or by their communities' toleration of threatening or even violent behaviour towards them. A woman's mobility may be curtailed from childhood, and this disempowerment follows her throughout her life. This kind of social norms may inhibit girls' participation in education, and further development. If they do go out in public, the threat of social harassment and violence may underpin their isolation. In the light of social restriction, women also continue to face their restricted mobility at household, though it may be different for the women living in urban areas of Bangladesh who sometimes migrate to city areas to search for employment.

Questions were framed for all indicators/dimensions and asked about all the domains formatted in both qualitative and quantitative answers. Each indicator was given a highest score by adding the value achieved in all questions. Qualitative/ open ended answers were coded according to the literature, if not available, the answers were coded based on the opinions of the research team members.

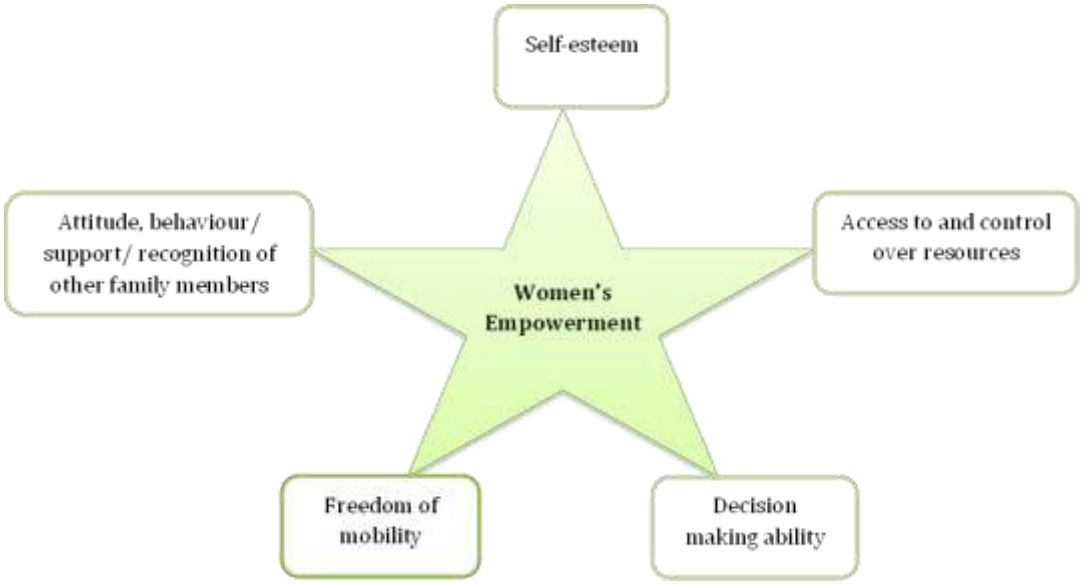


Figure 2.1 Dimensions of Married Women's Empowerment [Adapted from Mahmud et al. (2012)]

Mason (1998) and Mason and Smith (2000), for example, treat empowerment, autonomy, and gender stratification interchangeably. Similarly, Jejeebhoy (2000) considers autonomy and empowerment as more or less equal terms, and defines both in terms of women "gaining control of their own lives vis-a-vis family, community, society, markets." In contrast, other authors have explicitly argued that autonomy is not equivalent to empowerment, stressing that autonomy implies independence whereas empowerment may well be achieved through interdependence (Malhotra and Mather 1997; Govindasamy and Malhotra 1996; Kabeer 1998).

2.2 Women empowerment and child nutrition

Several studies suggested that women's empowerment plays important role in shaping children's health and cognitive development [(Bhagowalia et al. (2012); Smith et al. (2003a); Smith et al. (2011); Guha-Khasnobis and Hazarika (2006); Shroff et al. (2011), Chatterjee and Dubey (2018)]. Engle et al. (1999) and UNICEF (2007) mentioned that as women are the primary caregivers of the children, women's status; significantly impact the children's health outcome. Allendorf (2007) mentioned that women with more decision making power can have control over daily diet, buying expensive items, decision about emergency care are important for child's health outcome. Quisumbing (2003) reported positive correlation between mothers' control over resources and child nutrition. Malapit et al., (2015) found that higher women's empowerment helped mitigate the negative effects of low production diversity on maternal and child dietary diversity. Rahman et al. (2015) also found increasing maternal decision-making autonomy may reduce the prevalence of malnourished children. Njuki et al. (2011) mentioned that despite these opportunities for economic autonomy, persistent gender differentials in the value of what is controlled reflect gendered differences in intra-household power and influence household cooperation strategies.

Smith et al. (2003) found that higher women's status has a significant, positive effect on children's nutritional status in which they studied 36 countries of South Asia (Bangladesh, India, Nepal and Pakistan), Sub-Saharan Africa (23 countries), and Latin America and the Caribbean regions (9 countries). They found that women's status influences child nutrition because women with superior status have better nutritional status themselves, are better cared for, and deliver higher quality care to their children. But the pathways through which women's status influences child nutrition differ significantly across regions. It is surprising that South Asia's high child malnutrition rate even

exceeds Sub-Saharan Africa, despite many of the determinants of child nutritional status like national income, democracy, food supplies, health services, and education are better. The study mentioned it as "Asian Enigma" and identified three broad socioeconomic factors to explain this: women's status, sanitation, and urbanization, where women's status is by far the greatest contributor to this regional gap in children's nutritional status. It plays this role not because it is lower in South Asia but mainly because its positive impact is stronger in South Asia, making its costs in terms of child malnutrition far higher in that region. The human costs of women's lower status in South Asia are high. The study estimated that if women and men had equal status, the region could have13.4 million fewer malnourished under-three children, whereas it would be a reduction of 1.7 million in Sub-Saharan Africa. Hence, understanding the linkages between child nutrition and women's empowerment is of great concern.

The process for women to become empowered and the domains most relevant for child nutrition may differ across contexts. Understanding the contextually relevant domains through which empowerment influences child nutrition is important for designing and implementing contextually appropriate policies and programs. Identifying those empowerment elements that are relevant for child nutrition may provide useful insights for monitoring empowerment and progress towards achieving multiple Sustainable Development Goals related to both nutrition and gender.

2.3 Conceptual framework of the study

Women's low social status was one of the key factors identified early on as a potential key contributor to malnutrition in the South Asian region (Ramalingaswami et al. 1996). The 1990 UNICEF framework lists care as one of the major determinants of malnutrition that includes feeding practices, hygiene practices and stimulation of children – which are critically important for optimal child nutrition and development, Later, Engle et al. (1997) included maternal resources for care as determinants of child nutritional well-being. Maternal care resources are characteristics that may affect how mothers are able to care for their children and include: women's education and knowledge; physical health and mental health; autonomy and control of household resources; workload and time availability; and social support networks. Engle et al. (1997) to focus on three domains of empowerment identified as determinants of nutritional well-being: control of resources, workload and time, and social support. Bhagwalia et al. (2012) extended the model as: to ensure adequate care for their children, women need access to a variety of resources such as social support, social status and empowerment, mental and physical health, and knowledge and education. All models focused specifically on the social status and empowerment domain of resources, assuming that children of more autonomous women have better health and nutrition outcomes. The social context of the household, such as culture, norms, occupation, socioeconomic status, determines the relative status of women – which in turn, can determine nutritional status and dietary intake of children in different ways. For example, female participation in household decisions regarding their own health and the health of their children is essential for improving child nutrition specially in providing a proper diet and medical care by child-oriented allocation of resources. A woman's control over monetary resources could effectively change the composition of household purchases, specially choosing healthy diet option. Shroff et al. (2009) suggested that women's control over assets is particularly important for household food security and for child outcomes because women invest substantially in nutrition, education, and healthcare.

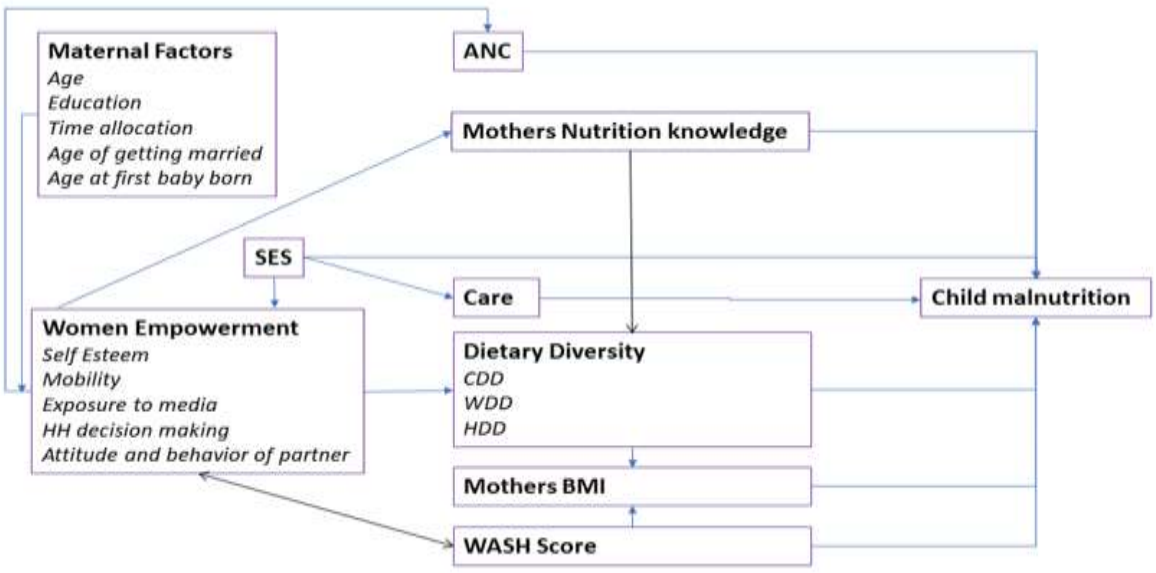


Figure 2.2 Conceptual framework of the study

The conceptual framework of this study is presented in Figure 2.2. Since we have different types of independent variables like maternal factors (age, education, time allocation, age at first marriage, age at first baby born, ante-natal care received during pregnancy, mother nutritional knowledge as well as mothers health status which is calculated with the help of body mass index), different dimensions of women empowerment (self-esteem, mobility, exposure to media, household decision-making capabilities, attitude and behaviour of a partner, access to and control over resources). In this research, we also explore what affects empowerment of urban mothers, therefore it would also be the dependent variable as well as the independent one. Household socio-economic status or wealth index, availability of child caregiver along with household WASH index are also considered as independent variables.

All these independent variables might have an impact on child nutritional status as well as other dependent variables like women empowerment and dietary diversity. Household socio-economic status is mainly a composite score which represents the economic as well as the social condition of that household in five categories such as poor to rich. This is also a very important factor that can affect the outcome variables.

3. Implementation of activities:

The research was conducted in three stages. At first, exploring the BDHS 2014 data, which is a nationally representative survey, is being used to present a general picture of household socioeconomic characteristics, different aspects of health and nutrition of women and children, food consumption, etc. After that we conducted a field survey keeping in mind the objectives of the current study and then, an in depth qualitative research through mainly FGDs to realize the association elaborately with everyday life example in different socioeconomic context.

3.1 Secondary data: Bangladesh Demographic and Health Survey (BDHS, 2014)

The Bangladesh Demographic and Health Survey (BDHS) 2014 generated data on basic national indicators like maternal and child health, childhood mortality, nutritional status of mothers and children, etc. The survey included 17,300 households. Since this research is about urban women and dietary outcome of children, we identified and separated those urban households which have at least one child under five from this dataset. Children under-five years of age have been given much attention in nutrition literature specially by WHO and UNICEF. Like the infant mortality rate, the mortality rate of children under 5 is a baseline indicator of how a country is progressing towards assuring children's rights, in particular their rights to life, health-care services, nutrition, water, social security and protection. Article 24 of the United Nations Convention on the Rights of the Child specifically obliges all States to take appropriate measures to reduce the child death rate. But infants under 6 months are exclusively breastfed. Exclusive breastfeeding is an unequalled way of providing the ideal food for the healthy growth and development of infants (UNICEF, 2010). Therefore in our research, we have taken mothers of children under-five (6-59 months) as our respondents.The number of such households is 2428, out of which 2,200 were male headed and 228 female headed households. Next we derived different descriptive data from such households like the divisional distribution, sources of drinking water, frequency distribution of the number of children, education of female household head and wife, ownership of assets, height and weight measurement of mother and child, etc.

Table 3.1 Categorization of data according to divisions in BDHS (2014)

Division	Number of Households	Percent
Barisal	257	10.58
Chittagong	471	19.40
Dhaka	566	23.31
Khulna	295	12.15
Rajshahi	292	12.03
Rangpur	245	10.09
Sylhet	302	12.44
Total	2,428	100.00

In this study, we tried to find linkages between women's empowerment and child diet and nutrition. The BDHS provides sufficient data on maternal and child health and nutrition but measuring women empowerment was not the objective. In explaining women's empowerment, BDHS (2014) used some indicators: women's control over their own income, freedom of movement, participation in household decisions, and women's acceptance of wife beating. But empowerment, diet, and nutrition

are context specific concepts and dynamic in nature. In a broad sense, "Power" is a key concept for an understanding of processes of empowerment, which resides with those who make the decisions. Relationships of power depend on one's culture, location and time (Sadan, 2004). Empowerment is the process that involves at least two parties that are dynamic and multidimensional, where the activities are sharing power, and create mutual relationship, making it possible for people to increase their sense of control and can help optimize their independence (Febriana, 2011). Again, diet refers to the food and drink a person consumes, which changes over the time and is shaped by economic reform, industrialization, market system, agricultural production system, infrastructural location (rural or urban) and many other factors. For example, as Lang (2004) mentioned that the twentieth century witnessed a revolution of modern food supply chain in terms of production, distribution, consumption, and by high levels of concentration of market share. Though diet is only a part of nutrition, consuming a healthy diet (eating a variety of fruit and vegetables in meals, reducing saturated fats and trans-fats, limiting the consumption of foods and drinks containing salt, high-sodium condiment and high amounts of sugars etc.) throughout the life-course helps to prevent malnutrition. It is again a question, how much would it be possible to consume healthy diet under the ever-changed food system. Therefore, we intended to conduct field survey.

3.2 Primary data collection

Definition of Urban and peri-urban areas in Bangladesh

Bangladesh has 532 urban areas classified into eleven City Corporations and 318 Pourashavas (Municipalities) run by elected Pourashava councils. BBS 2015 defined as:

Urban Area: It corresponds with area developed around a central place having 5000 population with such amenities as paved roads, improved communication, electricity, gas, water supply, sewerage, sanitation and also having comparatively higher density of population with majority population in non-agriculture occupations. City, Town, Paurasahva and Cantonment are the examples of urban area.

i) Mega City: It is metropolitan area having population 5 million or more.; **ii) City Corporation:** It includes city corporations/incorporated and administered by the Ministry of local government under City Corporation Act, 2009; **iii) Paurashava /Municipality Area (PSA):** It includes paurashavas incorporated and administered by local government under Paurashava Act, 2009; **iv) City:** It is an urban area having population 1,00,000 and above, **v) Other Urban Area (OUA):** It includes those Upazila headquarters which are not paurashavas. The only exception relates to 17 unions adjacent to Dhaka City Corporation under Dhaka Metropolitan Area. These unions are treated as other urban areas on the basis of their urban characteristics; and **vi) Town:** It is an urban area having population less than 1,00,000.

In the same document, urban population have been distributed by size classes as: i) Towns (T) - Population less than - 100,000; ii) Cities (C) - Population - 100,000 - 49,99,999; and iii) Mega City (M) - Population - 5000,000 and above]

Peri-urban areas were also included in this research. Also, we have selected the peri-urban areas, which are included as towns and cities according to the Urban Area Report of BBS (2015).

Peri-urban areas

Peri-urban areas—are neither urban nor rural—are a distinct geographic space (Mortoja and Yigitcanlar, 2020) characterized by a mix of rural and urban characteristics, occupy the region immediately outside and around urban areas or an extension of urban areas, which is in developing stage of urbanization. In terms of demographics, peri-urban areas tend to attract newcomers/ in-migrants, belong to diverse ethnic backgrounds. These are zones of social and economic change and spatial restructuring due to industrialization. It is not just a fringe in-between urban and rural, a zone of transition, rather it is a new kind of multi-functional territory (Ravetz, et al., 2012). Urban area can be defined at an area of 2 Km from the town/ city center and then peri-urban starts and it ends at the demarcation of rural and urban (Miah, et al., 2003). Peri-urban areas are those which are characterized by a mix of rural and urban characteristics. The quality of community facilities (schools, hospitals, etc.) is commonly inferior, and even absent with institutional vacuum. Roads and other infrastructure services are deficient in terms of service level and standard. Economic activities are agricultural, as well as, industrial. Government gives less attention to the infrastructure development due to administrative transition. Environmental health conditions are worse due to higher population and housing densities, generate considerably more wastes – which may result higher cases of diseases such as malaria, diarrhea, worm infections, and respiratory track infections. In this study, city peri-urban areas are characterized by industrial areas where most of the migrant female are visible for working here in the different industries, and in the peri-urban towns, most of the houses are newly developed on the previous agricultural land, nearby the towns and mostly rural affluents leave their village as well as their agriculture profession and start to live either for educating children or any other social or economic reason or to get a flavour of staying in the city.

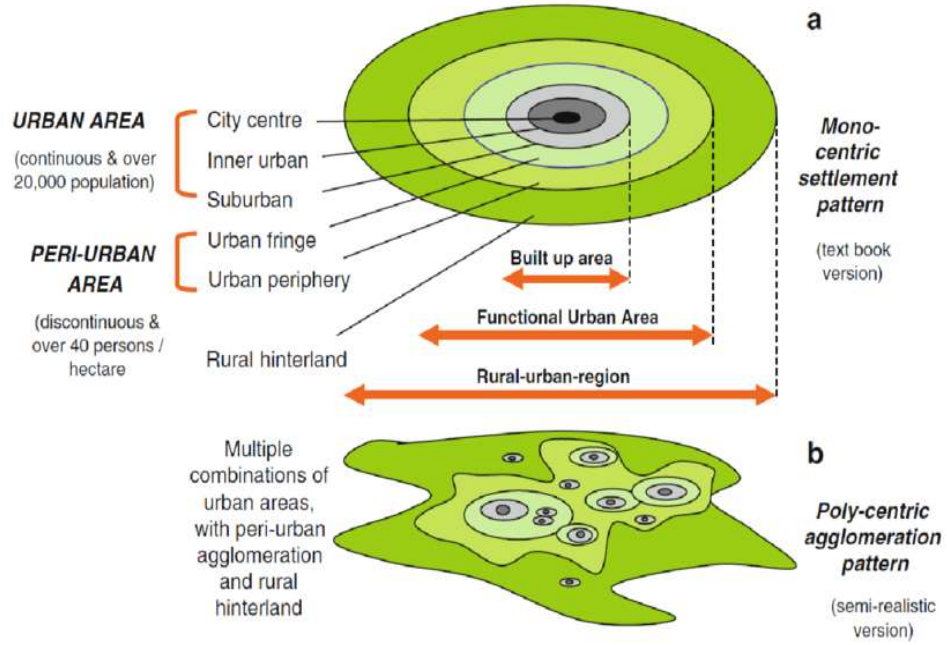


Figure 3.1: Concept of different urban areas (Ravetz, et al. 2012**)**

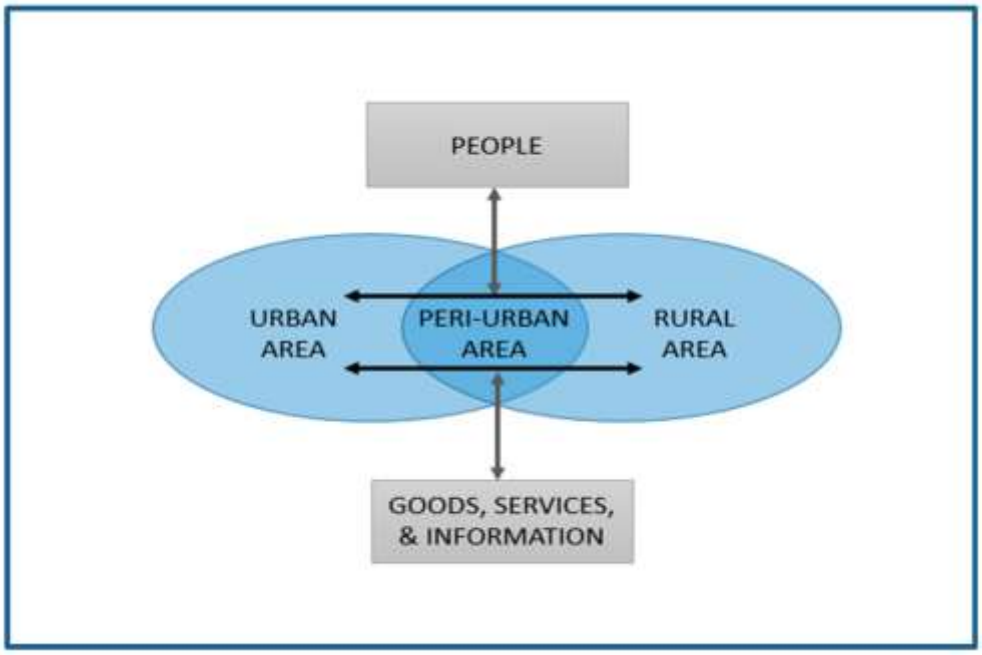


Figure 3.2: Concept of peri-urban area (Samat et al, 2020)

3.2.1 Selection of area and Sample size

In collecting primary data, study participants were mothers having at least one living child <5 years of age, elderly or young women as well as relative adolescent girls (if available in those households) who were supposed to take care of children in their households,living in urban and peri-urban areas of Bangladesh.

Sample size calculation

We have modelled sample size calculations for the proposed cross-sectional study based on "percentage of children under 5 years of age who are stunted (height for age)" and using the following formula:

$$Sample\ Size, n = \frac{Z^2\ P(1-P)}{d^2}$$

Where, P is the expected proportion in population

d is the precision and

Z is the normal variate corresponding to desire level of confidence

The prevalence of stunted children under-5 had been collected from MICS 2019 survey data. We calculated sample size with % of stunted children from different angles such as national, male/female, urban/rural and divisional level and at different precision. For prevalence of stunted children under 5 years at national (overall), male, female, urban, rural and different divisional area and using the different precision (d= 0.05, 0.03, 0.02 and 0.01) and standard normal variate at 5% Type I error (which is z=1.96), the minimum sample required is summarized in Table 3.2. With precision of 0.02, we selected the maximum (n=2253) among minimum sample sizes estimated; which was convenient logistically, and duration of data collection financially with current fund awarded for this study. Then this total number of sample was distributed in the selected areas according to proportion of female population in those areas and approximate minimum numbers of samples for randomly selected areas are summarized in the Table 3.2.

Table 3.2 Estimation of sample size with level of confidence at 0.05 (Z=1.96)

	*Proportion of stunted under-5 children (%)	Sample Size			
		At precision 0.05	At precision 0.03	At precision 0.02	At precision 0.01
National	28.0	310	861	1936	7745
Sex					
Male	28.0	310	861	1936	7745
Female	27.9	309	859	1932	7728
Residence					
Urban	26.3	298	827	1862	7446
Rural	28.4	312	868	1953	7812
Region/Division					
Barisal	30.6	326	906	2040	8158
Chottogram	27.0	303	841	1893	7572
Dhaka	28.0	310	861	1936	7745
Khulna	20.6	251	698	1571	6283
Mymensingh	33.3	341	948	2133	8533
Rajshahi	26.3	298	827	1862	7446
Rangpur	26.6	300	833	1875	7500
Sylhet	37.6	361	1001	2253	9013

*Source: Multiple Indicator Cluster Survey (MICS), 2019 (Progotir Pathey Bangladesh)

The area from where samples were recruited was selected from mega city, city and town (Urban Area Report, BBS, 2014). So all the areas were grouped into 3 clusters and study areas were selected from each cluster to have the participants from different profession and across almost all over the country, both from urban and peri-urban areas. A list of the area for each cluster was prepared and then the areas were selected from each cluster by lottery except cluster 1: Mega city Dhaka (the only mega city in Bangladesh), from where we purposively selected city due to its nature of very rapid urbanization. Finally, data were collected from a total of 1978 women bearing at least one <5 child living from the 5 urban and peri-urban areas (mega city, urban city, peri-urban city, urban town, and Peri-urban town).

Table 3.3: Sample selection

Clusters	Urban		Peri- urban	
	Districts	Number of data	Districts	Number of data
Cluster 1: Mega city	Dhaka	625 (31.60%)	-	-
Custer 2: City	Mymensingh, Khulna, Barisal, Rangpur,	487 (24.62%)	Gazipur, Tongi, Narsingdi, Savar	326 (16.48%)
Cluster 3: Town	Gaibandha, Habiganj, Dinajpur	227 (11.48%)	Sirajganj, Sherpur, Bandarban	313 (15.82%)

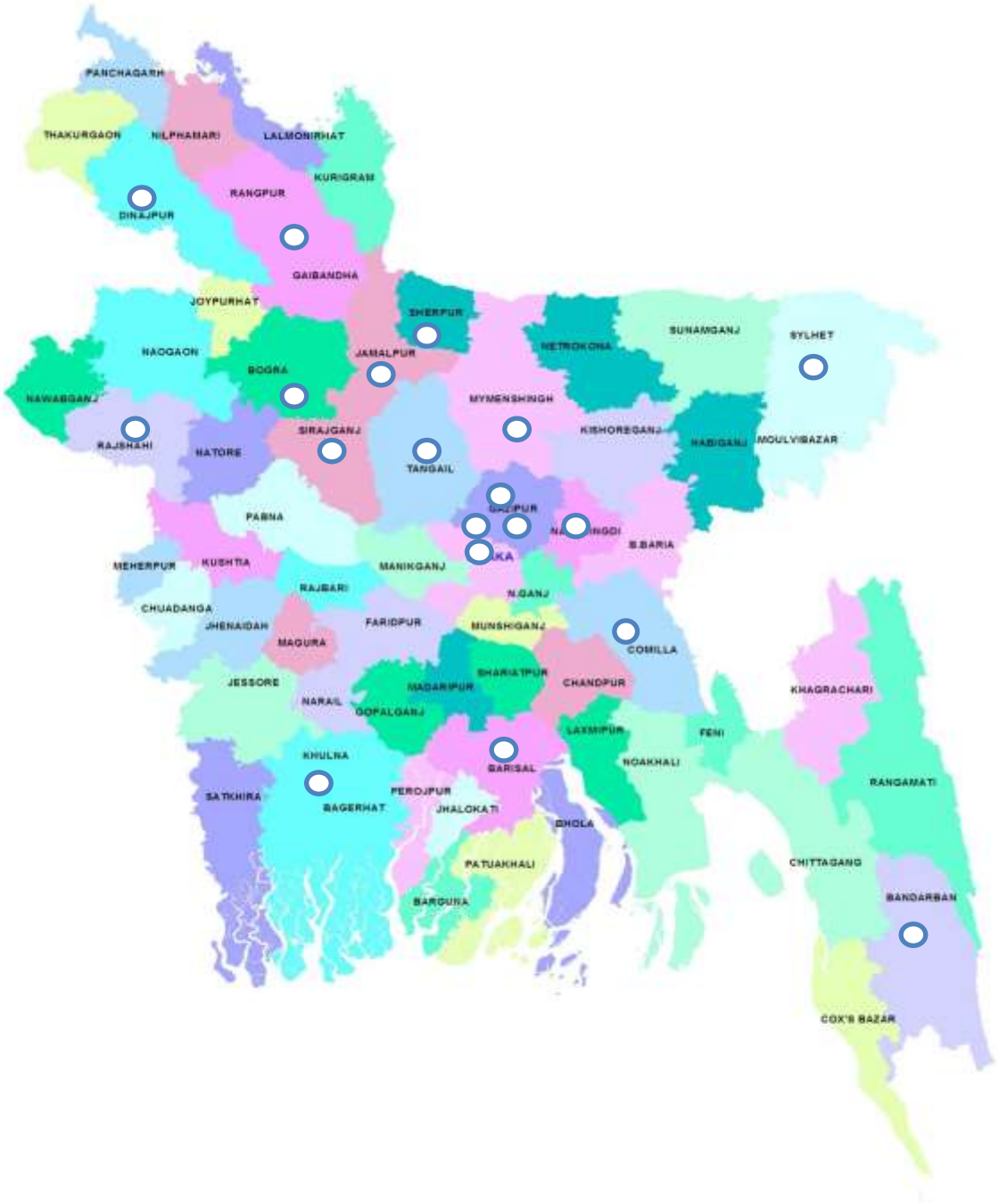


Figure 3.1: Study areas in Bangladesh

3.2.2 Formulation of Questionnaire

For the primary data collection, an interview schedule/questionnaire was developed. Data were gathered on General Household Characteristics (family assets, WASH, income, expenditure), Maternal Health during Pregnancy, Child Health Status, Empowerment (Self- esteem, intra-

Household Relationship, behaviour of family members, Mobility, decision making at household level, leadership,), difficulties of working mother, care, Food Consumption by children and mother, Knowledge of mother/ caregiver about Child Care, etc. The outcome variables are children's diet, nutrition status, care etc. The questionnaire schedule, as per the variables listed in Table 3.4, were pretested in a pilot study to check its validity.

3.2.3 Selection of enumerators and training

The study paid special attention to assemble and carefully train a strong team of enumerators, who were dedicated and courageous, given the exceptionally difficult circumstances posed by COVID 19 that occurred during the intended survey phase. As the COVID 19 situation continued also in June-2020, therefore we made an advertisement to select enumerators from the cities, pourashavas and municipalities, where we selected our sites. Almost all of the enumerators were the students from reputed BAU, who are from 'science' background, had acceptable level of knowledge on nutrition, anthropometry and social research.

Earlier the formal training, since 1st July 2020, meetings were arranged each night for approximately 2 hours (mostly from 9-00 – 11.00 pm) by the principal investigator, where enumerators gathered knowledge about the objectives of the project, questionnaire, project proposal and; some literatures were provided to the enumerators before the training program. To make the communications easier, a messenger group was created with the enumerators and team members, which is very popular to the young generation and useful platform to share information quickly.

A 4-day long training – with a fifth day of reflections – was arranged by the Interdisciplinary Institute of Food Security (IIFS), Bangladesh Agricultural University, Mymensingh on 13th July to 16th July on **"Linkages between Women's Empowerment, Children's Diet and Nutrition under Rapid Urbanization in Bangladesh"** and there had been a group discussion on 17th July. Before that, a well-structured questionnaire was prepared. Due to COVID 19 pandemic, it was not possible to arrange a training program on a face to face interaction. For this reason, the training was conducted via zoom app. It could be mentioned here that this is one of the earliest formal virtual training programme in Bangladesh in the pandemic time. This training aimed to provide enumerators as much guidance as possible for quality data collection and to implement the goals of the project. About 40 potential enumerators participated in this training. The trainers also gave them a proper guideline about how to collect data from the respondents and how to keep themselves safe from Covid 19 during collecting data(Figure 3.10).

They also said, they accumulated much new knowledge from that training, some new topic and got better guidelines for collecting data. They also mentioned some limitations, as the training provided virtually due to Covid-19 situation; sometimes it was difficult for them when the network was weak. They also said that if the training could be conducted by face to face, the interaction would be easier. After the end of the training, we also opened a close group Facebook page, to use it as a notice board.

3.1.4Training enumerators on Anthropometric measurements

As we conducted training in online, so it was not possible practically to show them anthropometric measurements. Therefore, we communicated with the doctors and nurses of the nearby hospitals or health complexes, where the enumerators reside. We make them understand about the purpose of the survey and everyone agreed to train them. The enumerators meet them 3 times in that learning week and judged themselves whether they became perfect in measuring. Actually, our strength was that the enumerators were magnificent students, field oriented with a good critical analytical ability who got bored to be at home all the time due to pandemic. At the same time, the research team were also visiting, supervising and inspiring the enumerators. The enumerators were trying their bests to draw the actual situation from the field.

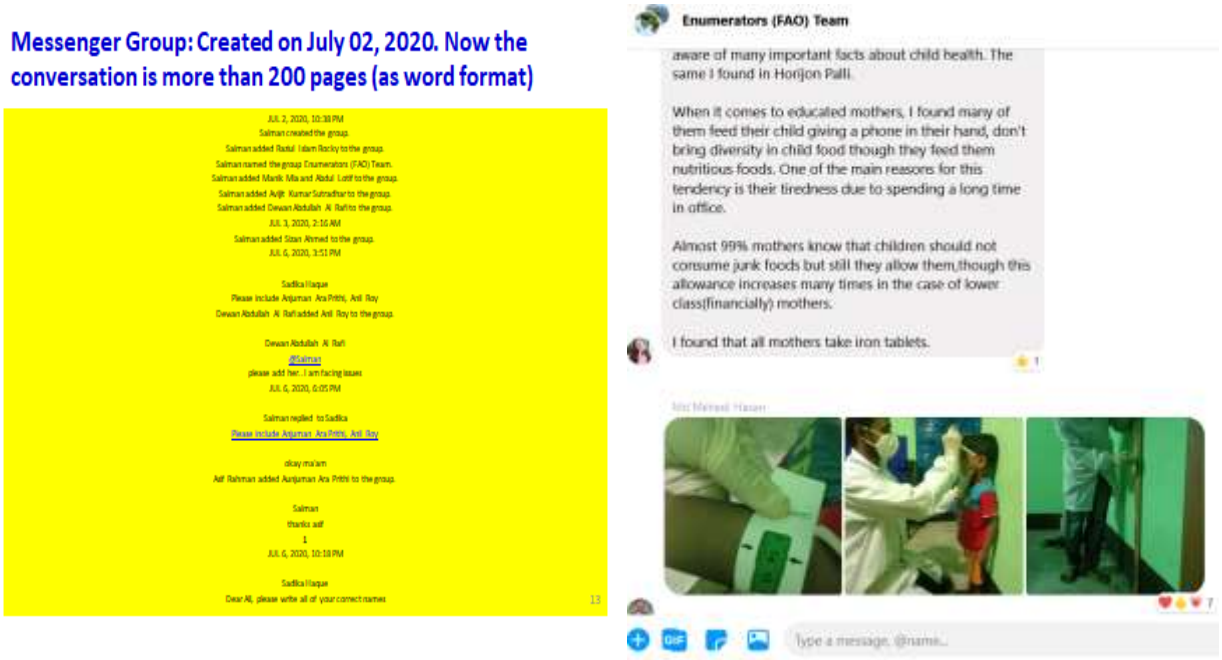


Figure 3.2 Messenger Group[Enumerator (FAO) Team]: The tool to monitor the enumerators and share all the experiences from the field

Figure 3.3: Picture of opening ceremony of the training program

Figure 3.4: Picture of Training session

Figure 3.5: Facebook group for monitoring and updating activities

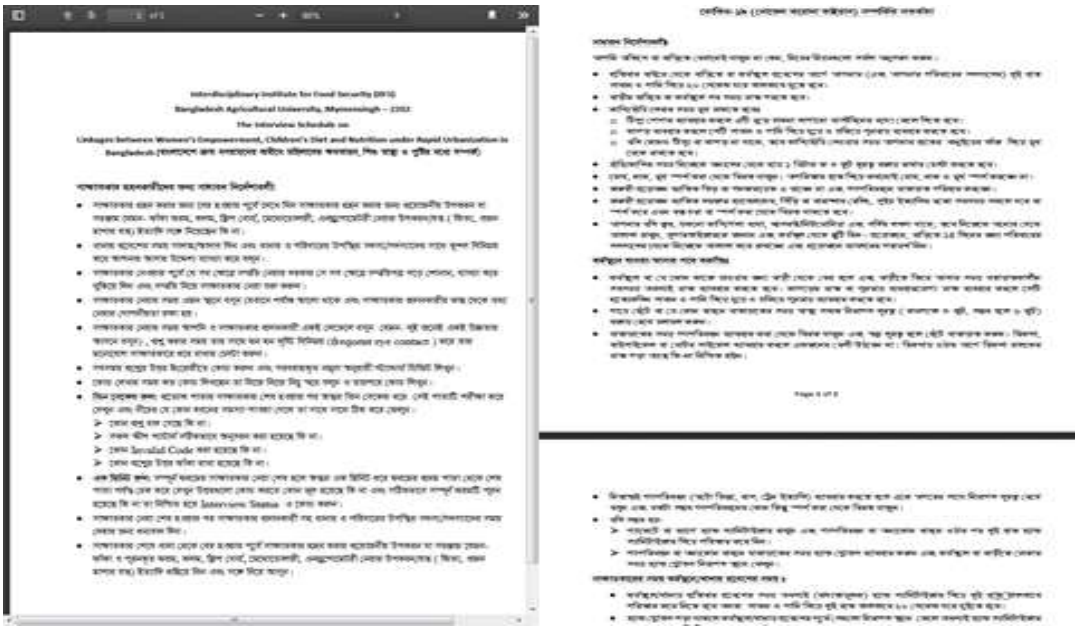


Figure 3.6: Guidelines to be followed while collecting data

3.2.5 Pre-testing of the questionnaire

The questionnaires were field tested in three urban locations (outside study locations) to determine the appropriate order/sequence for females by primary investigators. Pre-testing also identified some problems with the questionnaire, which were addressed later.

Figure 3.7: Things provided to the enumerators for field survey

3.2.6 Data collection procedure

The goal of our project is to find out the factors which affect on children's nutritional status, the degree of women empowerment and its association with children's diet and nutrition. For achieving the goal, data is being collected from urban mothers who have children between the ages of 6 to 59 months. A number of 32 enumerators were collecting data from different urban areas of Bangladesh. The selected enumerators started to pretest from 20 July 2020 by administering previously validated structured questionnaire. The data survey team consisted with mostly female enumerators. They interviewed the mothers, female household members (generally the wives of the household heads). The interviews were conducted one-by-one and face-to-face with the respondents. Anthropometric measurements of the child, mother and adolescent girls (if any) were recorded simultaneously by enumerators. We provided tools and equipment like Questionnaire, Weight measurement machine, Height measurement wooden scale, steel tape, MUAC tape, Apron, One time face masks, Hand gloves, Hand washing Soap, Hand sanitizer, Liquid disinfectants, paper, pen, pencil, scale and more. In addition to fill up each questionnaire through interview, the enumerators were taking note separately for each respondent immediately after collecting data. The enumerators and research team had daily conversation regarding the problems and findings in the field and gave the updates daily about their amount of data collection. We maintained some criteria while collecting data which were as follows:

- Only the mothers (and adolescent girls, if any)) were interviewed.
- Biological child, not foster child.
- Single tone outcome child, clinically mothers may face different situation for twin children.
- The women who did not allow measuring their height, weight and MUAC, we escaped them.
- For the male enumerators, not to visit the very religious mothers who do not like to come in front of the men.
- Child aged between 6-59 months.
- Did not consider the families who lost their jobs during COVID-19 and affected directly, as this year would be an abnormal year in their life.
- Did not consider currently pregnant women.
- The enumerators did not collect data after Eid for 7 days as there were special types of dietary diversity at HH level.

The meeting between field enumerators and research team members had been continuing everyday. A 4-members team were regularly monitoring the data entry in Google doc form and they immediately noticed the mistake of entry to the respective enumerators and solved the mistakes. Enumerators were trying to input data regularly in the same day, they had collected. At everyday'

meeting at night, they were asked about the ways how they had measured the height, weight and MUAC; and how were they maintaining their health safety measurement during COVID-19 pandemic, just to remember that those are very important part of their work. Each enumerator was asked to take picture daily and post in the messenger group, so that the monitoring team can check, whether their measurement is acceptable. Accordingly, they used to paste photos taken in the field in the messenger group

Issue of Homeless

After collecting information from the ward office for sampling, we found some of the targeted respondents in mega city Dhaka have been displaced from their long time living place (specially from Mirpur, Bijoy Soroni, Baulbagh etc.) which were destroyed due to "construction of metro rail" project and some were living in the government owned land in an illegal way. But they were the citizens of Dhaka by their national identity card. They are working as maids, street hawkers and some have become beggars due to unsettledness. So, while collecting data from them, they were recognized as homeless respondents. Now they are living in *mazar* areas or over/under the foot over bridge/ under the fly over areas etc. In this way, we found 18 unsettled households as our respondents.

3.2.7 Some problems and field insights shared by enumerators

- At first, it was a big problem on collecting data about amount of meal consumption. It was difficult to get the exact amount of meal by asking them questions. The respondents did not know the amount (gm, ml) of meal. For clearing this confusion, we conducted a training session on dietary diversity and the appropriate amount of food consumption. Then it was advised to use measurement cups and spoons to get the nearly accurate amount.
- It was difficult to calculate the mothers' working hours. "How much time they used on what purpose?" It was the most common problem faced by the enumerators. Most of the respondents started their work in the early morning. And they used to do more than one task at a time. For this reason, it was difficult for them to say the exact amount of working hours per task.
- The respondents, who did their delivery at home in normal process, did not know the exact birth weight of child, because they did not measure the weight of the child after giving birth.
- Some mother did not know the exact date of birth of the child.
- Some of the respondent got married at early age and did not have enough knowledge about child health and nutrition.
- One of the enumerators found a respondent, who was beaten by her husband just before she met her. Though she is well educated, she did not have the permission to go out for doing job. Her husband was very dominating.
- The respondents, who worked in bank, usually they did not cook food. The family members helped them in household work.
- Some of them knew the negative affect of fast food. But for the child's insistence, they had to give them fast food.
- Some of the working mothers, specially the RMG workers gave some money to the children before going to the work place. But they had no idea about what they ate, on which purpose they used the money. Most of them used to eat fast food or street food.
- In many cases, the enumerators had to take permission from the husbands of the respondents. If the husband did not allow them to do it, they could not talk to the women.

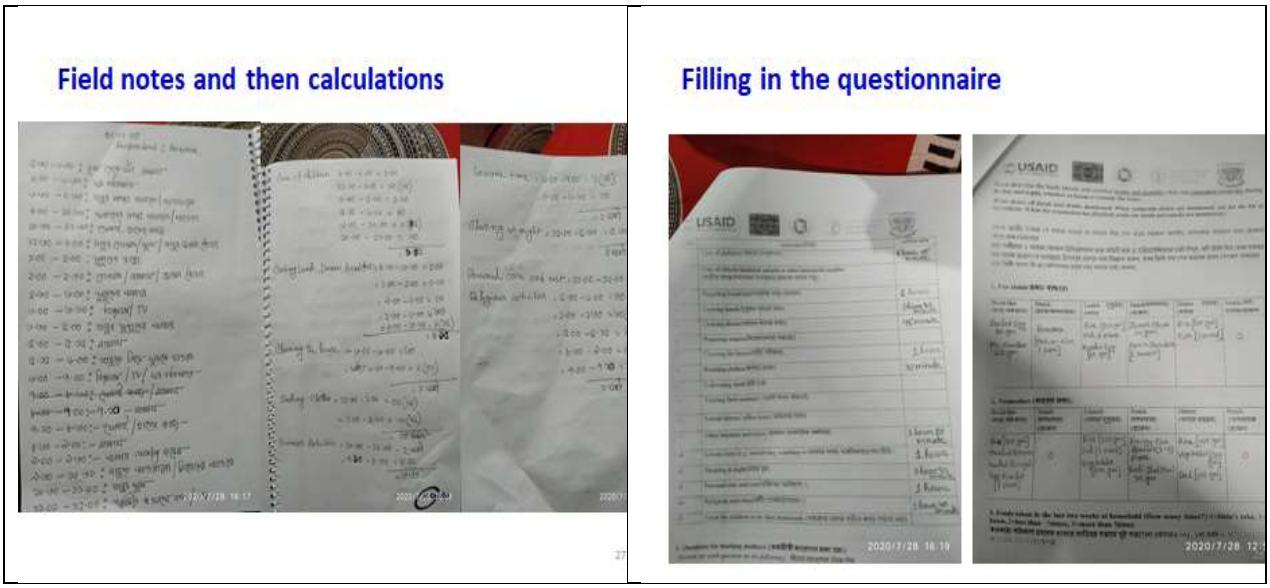


Figure 3.8: The enumerators were taking note separately for each respondent immediately after collecting data

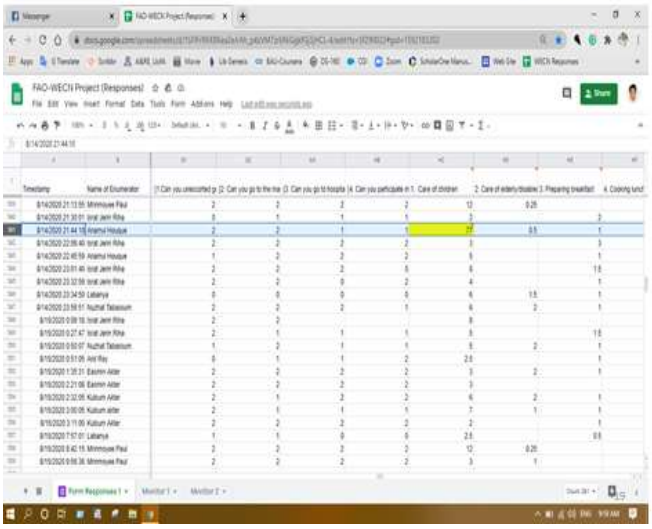
3.2.8 Data entry by using the online Google form

We had developed an online data entry form based on the Google platform, **Google Forms**. This form is created as our questionnaire was, so that all the enumerators found the data entry process very easy. Before starting the data entry, we had an interactive session where our ICT facilitator Dr. Md. Nazmul Hoque had demonstrated how to fill in the Google form as we want. All of our enumerators joined the session and made their confusion clear. After coming from data collection, the enumerators checked the filled in forms, and afterwards, entered their collected and properly calculated data in the Google form which were automatically stored in another Google based platform, **Google Sheets**. Google sheets were automatically generated excel sheets that had a link with the Google form. Only the 4 administrators had access to that Google sheet so that they could easily check the data whenever they needed. Administrators were monitoring every single entry so that further data cleaning process could be very easy. To make this task easier, we added data validation on the main Google sheet and all the mistakes were identified within a second of entry. Once a problem was identified, the responsible administrator then contacted with the respective enumerator with the questionnaire code. The questionnaire code was a combination of the name of the enumerator and a unique integer number that is asked at the beginning of the Google form. This code was very useful to track a specific questionnaire. Our administrators make the necessary Corrections by gathering all the required data which was missing during entry or entered improperly.

Figure 3.9: Pictures were taken for anthropometric measurements; so that the enumerators suggest them whether their measurement is satisfactory

Google Form: Enumerators themselves enter their collected data in google form

How is google form look like after entering data?



3.2.9 Quality control

To ensure the quality of the household survey data, the research team had made several visits to the enumerators, working in the study area. To ensure the quality of data, the team arranged a virtual meeting in every night for 1-1.5 hours. The meeting was very much interactive, though the enumerators were tired after coming back from the field, but it seems, they didn't. In those meetings, enumerators shared the problems they faced, their experience and their vision what they found during collecting data. We discussed about the probable solutions of their problems. Both the enumerators and research teams were working simultaneously through mobile communications. The 4 supervisors were almost whole day busy to solve the problems raised in the field (mostly by phone call or showing pictures or videos in messenger). The supervisors were responsible for respective group of enumerator teams made random checks of about 10% of the completed questionnaires by revisiting the sample households. The enumerators also made random checks of 10% respondents for the 2nd time to validate anthropometric data. In addition, survey supervisors routinely oversee interviews and if any inconsistencies found in completing questionnaires, the enumerators were asked to visit the related respondents to find out the reasons and correct the responses as needed.

3.2.10 How did the enumerators influence the mothers to provide information?

In the meeting, we asked the enumerators, how were the field situation for them and how did they approach the respondents to get information. They mentioned that at the end of July, while speaking with the respondents over phone, some of the higher-income families refused to speak with them due to COVID-19 pandemic. But in August they did not face problem. All of our enumerators were asked to explain the reason why the mothers were convinced about themselves to provide data. In the following, answers of three enumerators are mentioned:

Table 3.4: Technique of convincing respondents by the enumerator

Enumerator 1	1. We go to collect data with proper health measures. This convinces them to speak with us in this situation. Besides, when we tell them about the health issues of their children then they also become convinced.
Enumerator 2	I am allowed to respondents because I have taken proper safety measures. I explain very clearly about project's purpose and goals. If they provide us the real data then government can provide necessary guidelines to solve the existing problem. I have also told them in future their children will be benefited by this research. Then respondents were convinced and provide information.
Enumerator 3	1. Successfully explain them the objectives of data collection; 2. Ensuring safety issues; 3. Some of them convinced by seeing our ID card, attitude and as we are university student; 4. Measurement tools, weight and height measuring scale, MUAC tape etc. are another reason for give information.

However, field survey had started in July 2020 and it ended in October 15, 2020.

3.2.11Qualitative field study and Data analysis

After ending primary data collection, we checked our data and the nature of the respondents. Besides, quantitative data gathering, we had also conducted a number of 25 Focus Group Discussions with homogeneous groups like looking into different income spectrum, socioeconomic category, migrated women who keep strong ties with their origin, adolescent girls considering them potential future mothers. Accordingly, we had made a list to conduct FGDs and the 25 interviews were conducted with the following groups: Housewives, Teachers, Bankers, Class I officers, Lower class workers (Housemaids, sweepers), Garment Workers, Wives of RMG workers, Student mothers, Self employed, Class-3 employees, Landlord, Adolescent girls, Homeless. The researchers and facilitators observed the reality of intra-household and socio-cultural relationship with the mothers/caregivers, the untold stories happened at intra-household level that affects child nutrition. We had also explored, what kinds of people, social relations, events and process comprise children's diet and nutritional status. Collected ethnographic data and FGD summaries had been documented in English. Individuals involved in the analysis development process developed codebooks based on a priori codes which were complimented by emerging codes arising from the data collected. Based on this, data were categorized into themes to develop relevant recommendation.

3.2.12 Data safety and confidentially

We did not anticipate any risk to human subjects from deriving from these procedures. To safeguard participants' rights, the research enumerators had been trained on the research protocol and the ethical principles of human subjects' research. All research study members had experience with research data collection where the individuals participate as subjects have been conducted in private settings with their verbal and written consent. Confidentiality of information had been strictly maintained. All participants had been given unique identifying numbers. The enumerators were asked to store data in locked filing cabinets and on password-protected computers. The research team and the supervisors have also followed the same procedure.

After completing the data collection process, we started our data cleaning, though, while data collection and entry, we were making all the missing information correct. This cleaning process was slightly longer as the rest of the analysis parts mostly depend on the cleaned and adequately processed data. Most of the mistakes were made because of network issues, typing mistakes,

information gaps, and incorrect formatting. We have corrected all the data one by one. Afterward, we stored all the data in a separate EXCEL file and made some copies so that those can be our backup. All the data were kept in password-protected computers, which ensure the data's strong security.

We used several ways like phone calls, Facebook messenger, zoom meetings, etc. considering the COVID-19 pandemic situation to correct data. The supervisors used to call our respective enumerators to join the discussion on zoom. Then we told them the errors of specific questionnaires using the questionnaire code, which is a combination of a number and an enumerator's name. For example, one of our enumerators was Manik Mia. So, the questionnaire code will be like *Manik 53*. When we told them the mistakes in that questionnaire, they gave us the correct information, and we made those accurate in the excel file, which was generated by the Google survey form. Besides this, we also have done cross-checking of the data that were filled by the enumerators. Fortunately, we found very few numbers of mistakes while cross-checking, maybe because of our background works.

After successfully entering all the data, we moved to our next step: data cleaning. At the very beginning, we removed duplicate data from our dataset. We dropped those observations which contain very less information or incomplete/ partially completed. Then we checked each variable whether it contains right data or not. If there were any extreme value or abnormal data found, we made it normal by checking whether it is typing mistake (wrong entry) or something else. In this way, we checked all the variables. Once we cleaning our full data set, we moved forward to the processing, started different analysis types to gain our expected result according to our objectives that eventually led us to the conclusion.

3.2.13 Focus Group Discussion (FGD)

To undertake Focus Group Discussion (FGD), a group was formed with some selected members who trained for primary data collection, based on their willingness to conduct FGD. Before conducting FGD, formal training was held with selected enumerators to make them clear about how to conduct it, their role as a facilitator, recording notes, manage the environment, and other procedures related to it. Information about the respondents had been collected by the enumerators who helped to make categorization among respondents to maintain the homogeneity in group forming. Though virtual method has been preferred instead of direct discussion due to COVID-19 pandemic situation, but for some participants, it was not possible to join in the virtual sessions due to their different technical capabilities. In those cases, face to face discussions were conducted. Only we have done virtually for those who were capable and had regularly participated in virtual meetings or gatherings. But a number of 14 FGDs could be conducted by direct discussion maintaining the social distancing and other cautions to prevent the spread out of COVID-19. A favourable condition was created to obtain accurate information from the respondents. Information provided by the respondents were taken notes by the facilitator's and the full session recorded by digital devices with the permission from the respondents. In the case of online FGDs, 7-8 homogeneous respondents were chosen across the country through the networking of enumerators and grouped them into different categories according to their social class and occupation. Zoom app was used to reach the respondents. Though they were participating in FGDs, but they were asked to be alone in a room for one and half hours where she could speak freely and never interrupted, otherwise she might not share some opinion in front of husbands or mother-in-laws or other family members. To maintain the discussion environment, enumerators met separately with every respondent they selected and showed them how to handle an online meeting. It was also ensured that the respondents were got suitable timing to continue the discussion without any obstacles from their child and other family members that was helped to maintain the accuracy of data. Finally we have conducted 25 FGDs with different categories of the respondents based on their socioeconomic and demographic category that we found in our primary data samples. It could be mentioned here that all the facilitators were female.

Fig 3.11 A virtual FGD with the school teachers

Fig 3.12 A face to face FGD with lower class maids

Figure 3.13 A virtual FGD with the adolescent girls

3.14 A face to face FGD with the RMG workers

3.3 Analytical Techniques

3.3.1 Descriptive Analysis

In the next step, our data were coded for further analysis. All of the coding had done by following the references of BDHS 2017-18 report, FAO and CDC guideline. We then calculated the summary statistics (mean, SD, minimum and maximum) for all the continuous variables, and checked the collinearity among the variables. To check the distribution of our data, we used graphical method (histogram, normal density plot and kernel density plot).

For starting the description of the analytical techniques, we need to explain the process of creating the composite variables as well as the categorization process of the exposure variables that are used in the model. First of all, most of the exposure variables were categorized according to BDHS or BBS report which are widely accepted. The variables which are not available in the aforementioned reports such as sanitation practice, ante-natal care received during pregnancy etc. were categorized in such a way that was acceptable by different researchers and organizations. The categorization of the dependent variables such as child nutritional status and dietary diversity was done by following FAO, WHO, or CDC guidelines. For example, respondents' education was categorized into four major classes such as no institutional education, up to the secondary level of education, Secondary to the higher secondary level of education, and higher education. The distribution of this category has been explained in the descriptive section of this report. Before selecting a variable for

the regression model several diagnostic tests were done including correlation and the distribution of data. During these tests', respondents' education and nutritional knowledge were found correlated with each other as well as women empowerment and household socio-economic status for wealth index. To avoid further statistical complications,the correlated variables were omitted by turns and regression model was run separately with the other variable.

3.3.2 Factor Analysis

This study used many indexes to summarize several variables. To create these indexes, STATA Version 16.0 (Stata Corporation, College Station, TX) has been used. After choosing the appropriate variables and their necessary transformation, exploratory factor analysis was done by '*factor var1 va2 var3 …*' command. After retaining the principal factor, we estimated the index by '*predict*' command. Data were then summarized at different categories with their cut-off value based on previous literature.

3.3.3 Wealth index

There are different ways to measure wealth index but income, expenditure, and consumption are the three main components in every way. Several variables were included in each component and these variables may vary in different socio-economic contexts. To calculate the wealth index for this study, we have considered the following variables:

Table 3.5: Variables chosen for wealth index

Productive	Non- Productive	Household utilities and other
Sewing machine	Radio TV	Water supply
Auto rickshaw	Refrigerator/ Fridge	Flooring
	Bicycle	Toilet
	Motorbike	Roof materials
	Car/ Motor Vehicle	Wall's materials
	Bed	Light source/ electricity
	Almira/ Showcase/ Wardrobe	Persons sleeping per room
	dressing table	
	Dining Table	

After choosing these variables, a binary transformation was made to all of them. Improve or good quality household utility got value 1, otherwise 0. Having productive and non-productive assets also assigned a value with 1 and otherwise 0. Descriptive analysis was conducted to retain the appropriate variables. Some variables were dropped as their frequency distribution falls into greater than 95% or less than 5% of the sample. Then Principal Component Analysis has been used to make this index. STATA Version 16.0 (Stata Corporation, College Station, TX) has been used to estimate the index. We have used the first principal component to create the index by '*predict var name'* command because it explains the largest proportion of total variance. After getting the index value, we made a quartile distribution to summarize our data into five groups: 1(Lowest), 2(Second), 3(Middle), 4(Fourth), 5(Highest).

3.3.4 Multidimensional Poverty Index (MPI)

To measure the acute global poverty, the global MPI is used that is developed by the Oxford Poverty and Human Development Initiative (OPHI) with the UNDP's Human Development Report Office. The AF method developed by Sabina Alkire and James Foster is used to calculate the index (Alkire *et al.*,

2020). The same dimensions, indicators, and deprivation cut-offs that were used in MPI 2011, also used in MPI 2020. It consists of ten indicators which are belonging in three main dimensions is a reflection of Human Development Index (HDI). Two for health, two for education and six for living standards all are composed the ten indicators of MPI. In 2010, all these indicators were selected by the experts (Akman *et al.*, 2011). All the ten indicators are connected to the SDG indicators.

Table3.6: Global MPI 2020 – Dimensions, Indicators, Deprivation Cut-offs, and Weights

Dimensions of poverty	**Indicator**	**Deprived if...**	**SDG area**	**Weight**
Health	Nutrition	Any person under 70 years of age for whom there is nutritional information is undernourished.	SDG 2	1/6
	Child mortality	A child under 18 has died in the household in the five-year period preceding the survey.	SDG 3	1/6
Education	Years of schooling	No eligible household member has completed six years of schooling.	SDG 4	1/6
	School attendance	Any school-aged child is not attending school up to the age at which he/she would complete class 8.	SDG 4	1/6
Living Standards	Cooking fuel	A household cooks using solid fuel, such as dung, agricultural crop, shrubs, wood, charcoal or coal.	SDG 7	1/18
	Sanitation	The household has unimproved or no sanitation facility or it is improved but shared with other households.	SDG 6	1/18
	Drinking water	The household's source of drinking water is not safe or safe drinking water is a 30-minute or longer walk from home, round trip.	SDG 6	1/18
	Electricity	The household has no electricity.	SDG 7	1/18
	Housing	The household has inadequate housing materials in any of the three components: floor, roof, or walls.	SDG 11	1/18
	Assets	The household does not own more than one of these assets: radio, TV, telephone, computer, animal cart, bicycle, motorbike, or refrigerator, and does not own a car or truck.	SDG 1	1/18

(Alkire, Kanagaratnam, and Suppa, 2020).

Equal weight was given to all the three dimensions and each indicator received a 1/3 weight in MPI calculation. The 10 indicators that were belonging in the three dimensions were also weighted equally. Hence, each indicator of health and education dimension received a 1/6 weight {(1/3)/2} and each indicator of standards of living dimension received a 1/18 weight {(1/3)/6} *(Akman et al., 2011)*.

The poverty cut-off (identification of the MPI poor)

Deprivation score is assigned to each person according to his or her deprivations in the component indicators. The weighted sum of the deprivation experienced by an individual, is used to estimate the score so that it lies between 0 to 1. As the deprivation of a person increases, the score increases from 0 to 1 and, if the score is 1, he or she is depriving in all the ten indicators. Those who is not deprived in any indicators receives a score 0.

$$C_i = W_1I_1 + W_2I_2 + \ldots + W_dI_d$$

Where, C_i = Weighted sum of deprivation score, I_i = 1 if the household is deprived in indicator i and I_i = 0 otherwise, and W_i is the weight attached to indicator i with $\sum_{i=1}^{d} W_i = 1$

To identify the multidimensional poor people, a second cut-off or threshold usually used to know as the poverty cut-off in the Alkire- Foster methodology. This is usually denoted by k, where k is defined as the number of deprivations someone must experience in order to be considered poor. An individual is considered as a poor if his or her deprivation score is just equal or greater than the cut-off point that means C_i >=k. If a person's deprivation score is equal or greater than one third (k = 33%) of weighted considered indicators, he or she will identify as a poor in MPI method. The individual whose deprivation score lies below the cut-off point k, but this is non-zero, their score is replaced by 0 and the existing deprivations are not considered in the 'censored headcounts'. This is usually denoted by C_i (k) to differentiate from original deprivation score. That means, when C_i>= k, then C_i (k) = C_i, but if Ci < k then C_i (k) = 0. Here, C_i (k) is considered as the deprivation score of poor (Akman et al., 2011).

Since 2011, two additional categories of multidimensional poverty have been reported in the HDR Tables. These are 'population vulnerable to poverty' and the 'population in severe poverty'. The population vulnerable to poverty is defined as the percentage of the population at risk of suffering multiple deprivations, that is, deprivation score lies between 20 to 33% (20% < C_i<33%). The population in severe poverty, meanwhile, measures the percentage of the population in severe multidimensional poverty, that is those with a deprivation score is 50 percent or more (C_i> 50%) are called severely poor (OPHI, 2017)

Computing the MPI (aggregation)

The following two key structures were used to calculate MPI:

1. the proportion or incidence of people (within a given population) whose share of weighted deprivations is k or more and
2. the intensity of their deprivation: the average proportion of (weighted) deprivations they experienced

The first component is called the multidimensional headcount ratio (H) which was measured as follow:

$$H = q/n$$

Here q is the number of people who are multidimensionally poor and n is the total population.

The second component is called the intensity (or breadth) of poverty (A) and, it is the average deprivation score of multidimensionally poor people which can be expressed as:

$$A = \frac{\sum_{i=1}^{n} C_i(k)}{q}$$

Where C_i (k) is the censored deprivation score of individual i and q is the number of people who are multidimensionally poor. Finally, the MPI is the product of above two components.

$$MPI = H*A$$

Those people, who have a deprivation score lies between 20 to 33 percent ($20\% < C_i < 33\%$) are known as Vulnerable to poverty. Peoples whose deprivation score is 50 percent or more ($C_i > 50\%$) are called severely poor (Akman *et al.*, 2011)

3.3.5 Scoring ante-natal care

The score for ante-natal care is calculated from several key points. In this case we have considered two broad categories of ante-natal care. One is clinical care another is care by providing important information or basic counselling. In the clinical care section, the respondents were asked whether they had ante-natal care such as sufficient ANC visit, ultrasonography, blood test, urine test or other tests during pregnancy. For information service we have asked the mothers whether they had sessions with doctors or health workers regarding child nutrition counselling or breast feeding, iron pill consumption during pregnancy etc. After collecting all the information in these two broad sections, we applied the principal component analysis method to factor some important variables. Using the quartile distribution method, we then categorized the PCA value into three major parts; Low, Medium, High. We also asked how many visits they usually made and calculated how many services, did they receive by additive method.

3.3.6 Women Empowerment Index:

In this study, six domains have been proposed through which women empowerment could be measured at individual level. The domains were classified as, Indicator for self-esteem, Access to and control over resources, Attitude and behavior of partner/ husband, Decision related to households, Exposure to media, and Information about mobility. A few factors under each domain were also attached to measure the impact of each domain. All the factors were quantifiable which was used to measure the empowerment at individual level.

The autonomy/empowerment index were calculated in two different ways; One is to calculate the simple average of values of all indicators (Jensen and Oster (2009) and another one is calculating first principal component (Chakraborty and De [2011]). Different studies have found that each dimension of autonomy has different and independent effects on child health (Malhotra et al. 2002; Shroff et al., 2009; Bhagowalia et al., 2012). So we created both individual index for each dimension (additive index) and again a composite index for all dimensions together. Autonomy/ empowerment score were generated for each respondent by adding up their responses for each question. Then composite index, we calculated by Principal component analysis. We combined all the dimensions for one

composite index and consider the first principal component to build the autonomy/ empowerment score.

Equal weight was attached to each indicator in a way that resulted in unity when sum up all weighted indicators. The study used 1 for empowerment and 0 for disempowerment and thus the aggregate empowerment score should lie between 0 to 1 scale. The cut-off is 0.80 (80%) is set to measure the adequate empowerment following the WEAI method (Roy, Chatterjee and Dutta Gupta, 2019).Chakraborty & Anderson (2011) used principal component analysis to select the dimensions for inclusion in the composite score.

Individual Empowerment Index

We have several questions regarding women's empowerment in our questionnaire. Cronbach's Alpha a popular test for reliability analysis has been calculated. We also calculate the Bartlett test of sphericity to test the hypothesis that variables are not intercorrelated. To check whether the variables are sufficient to conduct factor analysis, we also estimated the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy score. We then use '*factor var list*' command in Stata software to conduct factor analysis. We also used varimax rotation for factor loading. We dropped some poorly loaded variables until all the variables become grouped in different factors. Then we used "*predict*" command to predict the index score. Then we used an 80% cut-off used by OPHI in measuring women empowerment. We used the 80th percentile value as our cut-off value. Those who achieve more than or equal this cut-off value, considered as empowered otherwise disempowered. Finally, we get out women empowerment binary outcome variables.

We have also estimated dimension-wise empowerment by using the same factor analysis method. The grouped variables that loaded in previous analysis in one factor named as a dimension. We then use these dimensions' variables in factor analysis again and predict the score index. After predicting the value, we made its binary form by following the similar method mentioned earlier. We repeated this for all dimensions and get all the dimension-wise women empowerment status which is binary.

3.3.7 Child Nutritional Status/ Anthropometry:

Child anthropometry

The child nutrition outcomes are based on anthropometric z-scores for children under five, calculated using the 2006 WHO Child Growth Standards (WHO Multicentre Growth Reference Study Group, 2006). These standardized indicators are useful for assessing the degree to which the physiological needs for growth and development are met during the crucial period of early childhood.

HAZ: A child is defined as stunted if his or her height-for-age measurement is two or more standard deviations below the median of the reference group.

WHZ: A child is defined as wasted if his or her weight-for-height measurement is two or more standard deviations below the median of the reference group.

WAZ: A child is defined as underweight if his or her weight-for-age measurement is two standard deviations below the median of the reference group.

Among the several child anthropometries, in our study we used *weight-for-height, height-for-age, weight-for-age, Mid Upper Arm Circumference (MUAC).* To collect all the required data, we used available WHO standard tools. Weight was measured in Kg, height and MUAC were in cm. As we need to standardize the analysis with WHO, we took help of WHO Anthro software version 3.2.2 which is available on WHO website. The advantage of this software is that it counts the age of the child at the interview date automatically. So, the result is always being accurate. Moreover, we changed the

Country of that software to Bangladesh, so that we can get the proper reference data as the database depends on the geographic location. The most common way to calculate the distance between observed value and the value of reference population is Z score. In other words, Z score is a measure of the dispersion of the data. We can calculate Z score by the following formulas. Hence, we have used software, so we didn't need to calculate all the Z scores manually.

$$Z_{\text{Score}} = \frac{(Observed\ value - Expected\ value\ of\ Reference\ Population)}{Standard\ Deviation}$$

$$\text{Standard Deviation} = \frac{(50th\ percentile - 5th\ percentile)}{1.82}$$

Malnutrition status can be categorized into different types considering different standard.

Another type of categorization is done on the basis of Z score which is as follows:

Table 3.8: Z-score category for child

Indicators	Z- Score					
	<-3	**≥ -3 to <-2**	**≥-2 to <-1**	**>-1 to ≤ 1**	**> 1 to ≤ 2**	**> 2 to ≤ 3**
Length/ Height for age	Severe Stunting	Moderate Stunting	Normal			
Weight for age	Sever underweight	Moderate Underweight	Normal		Do not use weight-for-age to determine overweight. Weight-for-length/height	
Weight for length/ Weight for Height	Severe wasting/ severe acute malnutrition	Moderate wasting/ moderate acute malnutrition	Normal		Possible risk of overweight	Overweight

(FANTA, 2018)

3.3.8 Mother's nutrition knowledge

Mother's nutrition knowledge is a composite variable that is created using the response of eight different questions in a binary form. The principal component analysis was used to predict the continuous form of this nutrition knowledge score. Afterward, this nutrition knowledge was categorized using the quartile distribution method.

3.3.9 Household Dietary Diversity (HDD)

The HDD is meant to provide an indication of household economic access to food, thus items that require household resources to obtain such as condiments, sugar and sugary foods, and beverages, are included in the score. The HDD is based on the food groups proposed by Food And nutrition Technical Assistance (FANTA) in 2006. All the selected food items in the questionnaires were aggregated into **12** food groups for HDD. The food groups are listed below:

Table 3.9: Different food groups for Household dietary diversity

Food Group	Food Items
Cereals	corn/maize, rice, wheat, sorghum, millet or any other grains or foods made from these
Roots and Tubers	potatoes, yam, or other foods made from roots
Vegetables	pumpkin, carrot, or sweet potato that are orange inside + *other vitamin A rich vegetables (e.g. red sweet pepper)*
	dark green leafy vegetables, including wild forms + *Other vitamin A rich leaves such as amaranth, spinach*
	other vegetables (e.g. tomato, onion, eggplant) + *other locally available vegetables*
Fruits	ripe mango, ripe papaya, and 100% fruit juice made from these + *other locally available vitamin A rich fruits*
	other fruits, including wild fruits and 100% fruit juice made from these
Meat	liver, kidney, heart or other organ meats
	beef, lamb, goat, chicken, duck, other birds
Eggs	eggs from chicken, duck or any other egg
Fish and Seafood	fresh or dried fish
Legumes, Nuts and Seeds	beans, peas, lentils, nuts, seeds or foods made from these
Milk and Milk Products	milk, yogurt or other milk products
Oils and Fats	oil, fats or butter added to food or used for cooking
Sweets	sugar, honey, sweetened soda or sweetened juice drinks, sugary foods such as chocolates, candies, cookies and cakes
Spices, Condiments, Beverages	spices (black pepper, salt), condiments (soy sauce, hot sauce), coffee, tea, alcoholic beverages

(FAO, 2015)

As all the foods are equally important for human body, so using equal weight is likely similar to using no weight for different food items.

Calculation Procedure:

To calculate Household Dietary Diversity (HDD), we aggregated both child's and mother's 24 hours food recall data. The condition like, if a child or mother consumes a specific food of any group, then the household will also consume that food and if the household consumes a food from any food group, we marked that 1 and 0 otherwise. We have avoided the score more than 1 just to avoid overestimation of dietary diversity. So, the score range would be 0 to 12 and the cut-off for this score is as follows:

Table 3.10: Types of dietary diversity for household

Low Dietary Diversity	<= 3
Medium Dietary Diversity	4 to 5
High Dietary Diversity	>= 6

(FAO, 2015)

Household Food Variety (HFV):

From our 14 days food frequency data, we have calculated household food variety score which shows how different varieties of food is consumed by the household. In our questionnaire, we have collected a significant number of different food items which comprises the 12-food group.

Calculation Procedure:

First, we have divided all our food items into the food groups and counted them. For example, if a household consumes cereal for 4 times in a day, we counted them as 4. For consuming fish for 2 times in a day makes the mark for fish 2 and so on. After counting all the items consumed in a day, we then aggregated all the scores of a household and categorize them according to the cutoff point.

Table 3.11: Types of household food variety

Below Standard Value	< 8
Above Standard Value	>= 8

(Oldewage-Theron & Kruger, 2008)

Mothers' Nutritional Status:

BMI: *The ratio of weight (in kilograms) to the square of height (in meters). A woman is considered underweight or thin if her BMI is less than 18.5 kg/m2 and overweight when her BMI is >27.51 (WHO, 1995).*

Table 3.7: Mother's BMI category

Underweight)	**Increasing but acceptable risk**	**Increased Risk**	**High Risk**
<18.5	18.5-23.0	23.01-27.50	>27.51

(World Health Organization, 1995)

3.3.10 Women Dietary Diversity (WDD):

Women's dietary diversity and anthropometry: For the mothers, Minimum Dietary Diversity – Women (MDD-W) (Fanta project, 2014) and BMI was used as nutrition indicators.

Minimum Dietary Diversity – Women (MDD-W): It reflects consumption of at least five of ten food groups namely 1) All starchy staple foods, 2) Beans and peas, 3) Nuts and seeds, 4) Dairy, 5) Flesh foods, 6) Eggs, 7) Vitamin A-rich dark green leafy vegetables, 8) Other vitamin A-rich vegetables and fruits, 9) Other vegetables and 10) Other fruits.

The women dietary diversity (WDD) reflects the probability of micronutrient adequacy of the diet and therefore food groups included in the score are tailored towards this purpose (FAO, 2015). To calculate women dietary diversity, we have used 24 hours food recall method. Data taken from 24 hours recall first categorized into nine food groups and the food groups are as follows:

Table 3.12: Different food groups for women dietary diversity

Food Group	Food items
Starchy staples	corn/maize, rice, wheat, sorghum, millet or any other grains or foods made from these, potatoes, yam, or other foods made from roots
Leafy vegetables	Dark green leafy vegetables like jute leaf, spinach etc.
Vit. A-Rich fruits and vegetables	pumpkin, carrot, or sweet potato that are orange inside + *other vitamin A rich vegetables (e.g. red sweet pepper)*
	ripe mango, ripe papaya, and 100% fruit juice made from these + *other locally available vitamin A rich fruits*
Other fruits and vegetables	other vegetables (e.g. tomato, onion, eggplant) + *other locally available vegetables*
	other fruits, including wild fruits and 100% fruit juice made from these
Organ meat	Liver, stomach
Meat and fish	beef, lamb, goat, chicken, duck, other birds, fish, dry fish
Eggs	Eggs
Legume, nuts and seeds	beans, peas, lentils, nuts, seeds or foods made from these
Milk and milk products	milk, yogurt or other milk products

(FAO 2015)

Calculation procedure of Women Dietary Diversity (WDD):

To calculate Women Dietary Diversity (WDD), we have used mother's 24 hours food recall data. The condition is like, if a mother consumes a specific food of any group, we marked that 1 and 0 otherwise. We have avoided the score more than 1 just to avoid overestimation of dietary diversity. So, the score range will be 0 to 9 as there is total 9 food groups and the cut-off for this score is as follows:

Table 3.13: types of women dietary diversity

Low Dietary Diversity	<= 4
Medium Dietary Diversity	5 to 6
High Dietary Diversity	>= 7

(FAO, 2014)

3.3.11 Child Dietary Diversity Score (CDDS): Nutrition outcome variables

Information about infant and young child feeding (IYCF) practices will be collected based on responses of mothers and caretakers of children under five years old in reference to the preceding 24 hours. Indicators for quality of IYCF include:

For children 6- 23 months

Minimum diet diversity: Consuming at least four food groups out of the seven food groups [(1) grains, roots, and tubers; (2) legumes and nuts; (3) dairy products; (4) flesh foods; (5) eggs; (6) vitamin-A-rich fruits and vegetables; and (7) other fruits and vegetables] (WHO, 2010), if breast-fed and out of six food groups (excluding dairy products) if not breast-fed, in the last 24 hours.

Minimum acceptable diet: Having achieved the minimum diet diversity and minimum meal frequency for solid, semisolid, and soft foods in the last 24 h. Minimum meal frequency is defined as consuming at least two feedings for breast-fed children aged 6–8 months, at least three feedings for breast-fed children aged 9–23 months, and at least four feedings for non-breast-fed children aged 6–23 months, of which at least two feedings must be milk feeds (WHO, 2008).

Table 3.14: Different food groups for child dietary diversity

	Food Group	Food items
1	Starchy staples	All kinds of grains like, rice, rice flour, wheat, bread, formula food, semolina, vermicelli, and White roots like potato, arum
2	Vit. A-Rich fruits and vegetables	pumpkin, carrot, or sweet potato that are orange inside + *other vitamin A rich vegetables (e.g. red sweet pepper)*
		ripe mango, ripe papaya, and 100% fruit juice made from these + *other locally available vitamin A rich fruits*
3	Other fruits and vegetables	other vegetables (e.g. tomato, onion, eggplant) + *other locally available vegetables*
		other fruits, including wild fruits and 100% fruit juice made from these
4	Flesh Foods	Liver, stomach
		beef, lamb, goat, chicken, duck, other birds, fish, dry fish
5	Eggs	Eggs
6	Legume, nuts and seeds	beans, peas, lentils, nuts, seeds or foods made from these
7	Milk and milk products	milk, yogurt or other milk products

(WHO 2014)

Calculation procedure:

To calculate Child Dietary Diversity (CDD), we have used the child's 24 hours food recall data. The condition was like, if a child consumes a specific food of any group, we marked that 1 and 0 otherwise. We have avoided the score more than 1 just to avoid overestimation of dietary diversity. So, the score range will be 0 to 7 as there is a total 7 food group and the cut off for this score is as follows:

Table 3.15: Types of child dietary diversity

Low Dietary Diversity	< 4
Minimum Dietary Diversity	4
High Dietary Diversity	>4

(World Health Organization, 2014)

3.4 Chi square test

Bivariate analyses were conducted between several variables. Chi square nonparametric test was done to identify the variables which might have significant association between our predefined dependent variables, child nutritional status, dietary diversity and women empowerment. All the categories were done following appropriate references such as BDHS 2014 &2017-18 report, FAO and CDC guidelines.

3.5 Regression Analysis/ Models for estimation

Correlation, χ^2 test, robustness of the model, endogeneity, multicollinearity were tested between the independent variables before analysing through regression. The resulting equation to be estimated for child-level nutrition outcomes (Y_i) was as follows:

$$Y_i = \beta_0 + \beta_1 \text{empowerment} + \beta_2 K + \beta_3 M + \beta_4 H + + e;$$

Dependent variables Y is are the child nutritional status (stunting, wasting, and underweight) & dietary diversity. K denotes child characteristics (CDD); M is maternal characteristics like age, education, nutrition knowledge health status [BMI] work hours per week, anti-natal care received, maternal nutrition knowledge etc. H is a vector of household characteristics such as income, place of residence, Water, Sanitation and Hygiene (WASH) Practice, status of caregiver etc. and e is the error term. Our key coefficient of interest is β_1, which captures how women's empowerment is correlated with the nutrition outcome, controlling for a set of observable maternal, child and household characteristics. We expected that women's empowerment is negatively correlated with malnutrition.

All the indicators of child nutritional status (stunting, wasting, and underweight) and dietary diversity have more than two categories. Therefore multinomial Logistic regressions have been used to estimate the probability of affecting the dependent variables by the exposure variables. For the sake of better interpretation, the relative risk ratio was considered instead of the coefficient. On the other hand, binomial Logistic regression has been applied to estimate the probability when the dependent variable can be classified under 2 categories like women empowerment (empowered and disempowered). It could be mentioned here that women empowerment works like a mediator which is considered as an independent variable for child nutritional status as well as a dependent variable when we need to estimate the probability of affecting by other exposure variables. In the regression model, we have used composite indices for some independent variables like women's empowerment, education etc. and again, to find proper explanation, those variables have been presented in categorised form by running separate regression models. As a result, we got 6 to 8 different models for every single dependent variable. To compare the best-fitted model, Akaike information criterion (AIC) was used. The **Akaike information criterion (AIC)** developed by Professor Hirotugu Akaike in 1971 and proposed in 1974, is a statistical model fit measure. The **Akaike information criterion** (AIC) is an estimator of prediction error and thereby relative quality of statistical models for a given set of data. AIC estimates the relative amount of **information** lost by a given model: the less

information a model loses, the higher the quality of that model. Akaike (1973) defined the most well-known criterion as AIC = - ln L + p, where L is the likelihood for an estimated model with p parameters (Hjorth, 1994). For categorical data this amounts to choosing the model that minimizes G^2 - 2v, where G^2 is the likelihood-ratio goodness-of-fit statistic v is the number of degrees of freedom associated with the model. A model with the lowest AIC value usually considered as the best-featured model when there is more than one model.

Since the dependent variable, child nutritional status which was calculated by three different indicators has more than two categories so multinomial Logistic regression model was used to estimate the probabilities of being affected by several exposure variables. For the sake of better interpretation, the relative risk ratio was considered instead of the coefficient. Hence, the exact variables were not identified previously, so different variables or different forms of variables were used to compare the result

Relative risk ratio (RRR)

The relative risk (RR) or risk ratio is the ratio of the probability of an outcome in an exposed group to the probability of an outcome in an unexposed group. Together with risk difference and odds ratio, relative risk measures the association between the exposure and the outcome (Sistrom and Garvan, 2004). It is used in the statistical analysis of the data of ecological, cohort, medical and intervention studies, to estimate the strength of the association between exposures (treatments or risk factors) and outcomes (Ilona, 2011)). Mathematically, it is the expressed as the incidence rate of the outcome in the exposed group, i. e, divided by the outcome of the unexposed group, Iu (Bruce, 2017). As such, it is used to compare the risk of an adverse outcome when receiving a medical treatment versus no treatment, or when exposed to an environmental risk factor versus not exposed. For example, in a study examining the effect of the drug apixaban on the occurrence of thromboembolism, 8.8% of placebo-treated patients experienced the disease, whereas only 1.7% of patients treated with the drug experienced the disease, therefore the risk ratio is calculated as 1.7/8.8, which is 0.19. This can be interpreted as those receiving apixaban had 19% (less likely) the risk of recurrent thromboembolism than did patients receiving the placebo (Motulsky, 2018). In this case, apixaban is considered to be a protective factor rather than a risk factor because it is associated with causing a reduced risk of disease. Assuming the causal effect between the exposure and the outcome, values of RR can be interpreted as follows:

- RRR = 1 means that exposure does not affect the outcome
- RRR < 1 means that the risk of the outcome is decreased by the exposure, which can be called a "protective factor"
- RRR > 1 means that the risk of the outcome is increased by the exposure

3.6 Reason of selecting multinomial and binomial logit model

Structural equation modelling (SEM) is a set of statistical techniques that is used to measure and analyze the relationships of observed and suppressed variables. It examines linear causal relationships among variables, while simultaneously accounting for measurement error (Beran & Violato, 2010). Since, SEM has some limitations regarding the treatment of categorical or ordinal variables, a newer and comparatively extended version of SEM have been introduced namely Generalized Structural Equation Model (GSEM). When distributional properties of categorical variables were taken under consideration, the interpretation of SEM parameter estimates in terms of impact measurement wasn't applied.

Moreover, Standard errors and confidence intervals which are rarely employed in SEM – are generally underestimating the uncertainties of structural model such as selection of relevant variables and proper specification of their influences. Though GSEM has some techniques to overcome these problems but those techniques are critical and needs extensive use of logit or probit model to keep the type II error in a reasonable level (Kupek, 2006). Besides SEM and GSEM has a very limited scope for the post-estimation of a model.

On top of that, we have an extremely complicated conceptual framework. Considering these critical issues, we have used logit model specifically both multinomial and binomial logit (bearing in mind the specification and requirement) instead of structural equation modelling where the coefficients were found identical with GSEM coefficients since the measuring technique is almost same.

4 Descriptive Results of the Study

In this part, we will discuss the descriptive statistics calculated from our primary data, comparison of primary data with available secondary sources (BDHS, 2014), and the bivariate relationship among the variables. Summary statistics, percentage analysis, Pearson chi^2, and graphical representation are used to describe the nature of the data.

4.1 Analyzing Primary Data

In the sampling frame, we categorized urban areas of Bangladesh under 5 categories considering BBS (2015) as mega city, city and town (which are mainly based on population); and according to the necessity of our research as urban and peri-urban. It needs to be mentioned here that there is one mega city in Bangladesh, Dhaka. Therefore, while presenting data, we have categorized most of the variables according to regions, like mega city, urban city, urban town, peri-urban city, and peri-urban town and the proportion of the respondents were about 32%, 25%, 12%, 17% and 16% respectively (Table 4. 1). From our respondents, 56% of them are housewives and 44% of them are working mothers (formally employed or work from home). Among the earning mothers, there are bankers, teachers, entrepreneurs, day labourers, maids, doctors, high class government job holders, private service holders, industrial workers, beggars etc. Most of the families are male headed (97%), who are mostly (90%) husbands of the respondents and fathers of the selected children; and in some cases the elderly fathers/father-in-laws are the heads. Only 3% households were female-headed, who husbands died recently or made divorce. Most of the families are nuclear with some extended and joint families.

Table 4.1: Sample size by type of mothers and regions

(Number of respondents)

Regions	Mega city	Urban city	Urban town	Peri-urban city	Peri-urban town	Total
Frequency	625	487	227	326	313	1978
%	32	25	12	17	16	100

4.1.1 Age of the respondents

It has been found that the mean age of the respondents is 27 years old. The youngest mother has surveyed in our study was only 13 years old and the oldest mother was 45 years old. Most of the mother's (60%) age belongs in 20 to 29 years of age , where 2% mothers belonged to 40 years and above age group (Table 4.1).

Table 4.1: Age of the respondents

Respondent's age (years)	below 20	20-24	25-29	30-34	35-39	40 & above	Total
Frequency (%)	95 (5)	512 (26)	663 (34)	492 (25)	181 (9)	35 (2)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 4.3: Age of getting marriage of the respondents according to different regions

(Number of respondents)

Age of getting married	less than 15 years	15 to 19	20 to 24	25 to 29	30 to 34	Total
Peri-urban city	41 (18)	221 (21)	57 (11)	6 (3)	1 (9)	326 (16)
Peri-urban town	32 (14)	176 (17)	70 (14)	33 (18)	2 (18)	313 (16)
Urban city	31 (13)	254 (24)	149 (30)	48 (26)	5 (45)	487 (25)
Mega city	105 (45)	315 (30)	153 (31)	50 (27)	2 (18)	625 (32)
Urban town	23 (10)	89 (8)	68 (14)	46 (25)	1 (9)	227 (11)
Total	232 (100)	1055 (100)	497 (100)	183 (100)	11 (100)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

From all respondents, about 53% got married at the age between 15 to 19 years, among them 30% were from mega city Dhaka. The result also shows about 12% respondents got married before the age of 15, among them 45% were from mega city. About 41% became mother for the first time at the age between 15 to 19 years, among which 37% were from mega city. The result also shows that only 3% of respondents became mother for the first time before the age of 15, among which 42% were from mega city and 21% of them were from peri-urban areas (Table 4.4).

Table 4.4: Age of becoming a mother for the first time

(Number of respondents)

Age of being mother for the first time	**< 15 years**	**15 to 19**	**20 to 24**	**25 to 29**	**30 to 34**	**>35**	**Total**
Peri-urban city	11 (21)	144 (18)	142 (20)	24 (7)	5 (9)	0 (0)	326 (16)
Peri-urban town	3 (6)	129 (16)	117 (17)	55 (16)	9 (16)	0 (0)	313 (16)
Urban city	8 (15)	165 (20)	179 (25)	119 (34)	15 (27)	1 (33)	487 (25)
Mega city	22 (42)	296 (37)	205 (29)	85 (24)	16 (29)	1 (33)	625 (32)
Urban town	8 (15)	77 (9)	60 (9)	70 (20)	11 (20)	1 (33)	227 (11)
Total	52 (100)	811 (100)	703 (100)	353 (100)	56 (100)	3 (100)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

4.1.2 Educational status of the respondents

Education has an important impact in rapid urbanization or we can say that rapid urbanization does a great influence on the education of the people. It's an important indicator of women empowerment as the education influences the people to take right decisions in every sector of their life. According to BDHS 2017-18, the level of education of the respondents has been categorized into five categories which are no institutional education, incomplete primary education, complete primary education, incomplete secondary education and secondary or higher education. From Table 4.5, it is found that among the respondents, there are about 52% respondents who have completed secondary or higher education and about 12% respondents don't have any institutional education.

Table 4.5: Number of respondents according educational level

Level of education and Regions	No Institutional Education	Incomplete Primary Education	Complete Primary Education	Incomplete Secondary Education	Complete Secondary or Higher Education	Total
Peri-urban city	26 (8)	14 (4)	54 (17)	95 (29)	137 (42)	326 (100)
Peri-urban town	16 (5)	10 (3)	35 (11)	82 (26)	170 (54)	313 (100)
Urban city	39 (8)	15 (3)	39 (8)	72 (15)	322 (66)	487 (100)
Mega city	128 (20)	31 (5)	84 (13)	131 (21)	251 (40)	625 (100)
Urban town	25 (11)	9 (4)	25 (11)	26 (11)	142 (63)	227 (100)
Total	234 (12)	79 (4)	237 (12)	406 (21)	1022 (52)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

About 21% respondents from mega city had no institutional education and most of the respondents have completed secondary or higher education and, in every region, it is more than 40% and highest amount is in urban city which is about 66% (Table 4.5). The study also found that about 53% household head of the families had completed secondary or higher secondary education and 16% of them did not have any institutional education. If we compare among different regions, then it is seen that most of the household heads had completed secondary or higher education and, among the regions, the highest amount was in urban city which was about 64%. It is a matter of concern that about 25% household head of the respondents were from mega city Dhaka who had no institutional education, while it is 16% for all the respondents.

Table 4.6: Educational level of respondent's household head (Number of respondents)

Regions	**Years of schooling of HHH**					
	No institutional Education	**Incomplete Primary Education**	**Complete Primary Education**	**Incomplete Secondary Education**	**Complete Secondary or Higher Education**	**Total**
Peri-urban city	40 (12)	13 (4)	47 (14)	70 (21)	156 (48)	326 (100)
Peri-urban town	27 (9)	16 (5)	32 (10)	58 (19)	180 (58)	313 (100)
Urban city	64 (13)	8 (2)	39 (8)	63 (13)	313 (64)	487 (100)
Mega city	154 (**25**)	24 (4)	88 (14)	104 (17)	255 (41)	625 (100)
Urban town	34 (15)	13 (6)	22 (10)	19 (8)	139 (61)	227 (100)
Total	319 (16)	74 (4)	228 (12)	314 (16)	1043 (**53**)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

The result shows that about 91% respondents were Muslim, about 8% were Hindu and the rest 1% were Christian, Buddhist and other religions. Table 4.6 shows the percentage of religions from different regions.

Table 4.7: Religion of the respondents of different regions (Number of respondents)

Family Religion	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	Total
No religion	1 (25)	0 (0)	2 (50)	0 (0)	1 (25)	4 (100)
Muslim	305 (17)	263 (15)	443 (25)	605 (34)	190 (11)	1806 (100)
Hindu	19 (12)	44 (28)	42 (27)	16 (10)	36 (23)	157 (100)
Christian	0 (0)	1 (25)	0 (0)	3 (75)	0 (0)	4 (100)
Buddhist	0 (0)	5 (83)	0 (0)	1 (17)	0 (0)	6 (100)
Others	1 (100)	0 (0)	0 (0)	0 (0)	0 (0)	1 (100)
Total	326 (16)	313 (16)	487 (25)	625 (32)	227 (11)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Among 91% Muslim respondents, about 34% from Mega city, 25% from urban city and the rests are from other three regions. About 38% households contain 4 members in their families and here we can see 3 and 4 member consisted families whose amount is about 26% and 21% respectively (Table 4.7). So, it can be described as, most of the families were nuclear type families. There are only few families which can be considered as joint families. The average family size of our overall respondents was 4.29 persons which is slightly higher with the Bangladesh HIES data 2000-2016 and that is 4.06 person.

Table 4.8: Family Size of the respondents'

Family size	2	3	4	5	6	7	8	9	10	>10	Total	Average
Number of HH	31	508	748	424	159	63	24	10	11	0	1978	4.29
%	2	26	38	21	8	3	1	1	1	0	100	

Source: author's calculation.

Urbanization process has great impact on infrastructural development. In one hand, many of the buildings were rebuild in a more structured way, on the other hand, with the increasing amount of migrants and unemployed people, slum areas are increasing. The respondents of the study had been living in different types of houses. Among all the respondents, 60% of them lived in rented houses, about 39% stayed at their own houses and also 1% who were recently homeless in Dhaka city who became displaced due to "construction of metro rail" and other development projects and had been living in the government owned land in an illegal way. In Dhaka, about 76% respondents lived in rented houses while in peri-urban city, peri-urban town, urban city and urban town, their amount stood at about 74%, 37%, 50% and 52% respectively (Table 4.9).

Table 4.9: Tenancy of house of the respondents of different regions (Number of respondents)

Region	Tenancy			
	Displaced	Owned	Rented	Total
Peri-urban city	0 (0)	84 (26)	242 (74)	326 (100)
Peri-urban town	0 (0)	197 (**63**)	116 (37)	313 (100)
Urban city	0 (0)	242 (50)	245 (50)	487 (100)
Mega city	18 (3)	135 (22)	472 (76)	625 (100)
Urban town	0 (0)	110 (48)	117 (52)	227 (100)
Total	18 (1)	768 (39)	1192 (60)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 4.10: Total number of rooms of the respondents of different regions and different living area

(Number of respondents)

Total number of rooms	No rooms	Only 1 room	2 - 3 rooms	4 - 5 rooms	> 5 rooms	Total
Peri-urban city	0 (0)	120 (26)	187 (18)	18 (6)	1 (2)	326 (16)
Peri-urban town	0 (0)	41 (12)	213 (21)	57 (19)	2 (5)	313 (16)
Urban city	0 (0)	93 (16)	298 (29)	86 (28)	10 (24)	487 (25)
Mega city	18 (3)	285 (49)	221 (21)	89 (29)	12 (29)	625 (32)
Urban town	0 (0)	40 (7)	117 (11)	54 (18)	16 (39)	227 (11)
Total	18 (1)	579 (29)	1036 (**52**)	304 (15)	41 (2)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Nowadays, in urban regions, people mostly build houses with 3 rooms. Sometimes, in the low income groups, 2-3 families share houses, who also share kitchen and toilet. Among all the respondents, there were about 52% respondents who had 2 to 3 rooms in their house, and only 2% have more than 5 rooms. It was found that about 95% respondents had electricity connection in their house whereas in urban city and peri-urban city it is 100%. More than 90% respondents from each region had electricity connection in their house, while about 2% of total respondents from mega city who do not have electricity facility. About 74% respondents had *pakka* wall in their main room among which 30% were from mega city (Table 4.11). Some respondents of mega city and urban town use some old clothes as their fence.

Table 4.11: The construction material of the walls of the main room according to different regions

(Number of respondents)

Construction Material of The Walls of The Main Room	No wall/ fence/ use clothes	Thatch, grass, sticks, branches,	Katcha	Tin/wood plank	Pakka	Total
Peri-urban city	0 (0)	1 (5)	8 (11)	62 (16)	255 (18)	326 (16)
Peri-urban town	0 (0)	0 (0)	8 (11)	88 (22)	217 (15)	313 (16)
Urban city	0 (0)	1 (5)	5 (7)	87 (22)	394 (27)	487 (25)
Mega city	27 (93)	12 (57)	39 (53)	108 (27)	439 (30)	625 (32)
Urban town	2 (7)	7 (33)	13 (18)	55 (14)	150 (10)	227 (11)
Total	29 (1)	21 (1)	73 (4)	400 (20)	1455 (74)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

About 45% respondents had *pakka* roof as the construction material of their main room. Among those, 38% respondents were from mega city. About 50% had tin as their roof material, among them 25% were from urban city. Here more than 2% respondents were also found who don't have any roof or plastic, 92% of them were from mega city (Table 4.12).

Table 4.12: Number of families shares the kitchen and toilet according to different regions

(Number of respondents)

	Regions	Peri-urban City	Peri-urban Town	Urban City	Mega city	Urban Town	Total
Sharing Kitchen	Not shared	190 (13)	270 (19)	400 (28)	378 (26)	202 (1)	1440 (100)
	Shared	136 (26)	41 (7)	87 (17)	247 (45)	25 (5)	520 (100)
Sharing Toilet	Not shared	173 (13)	251 (19)	384 (30)	319 (25)	173 (13)	1299 (100)
	Shared	153 (23)	63 (9)	103 (15)	306 (45)	54 (8)	679 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Most of the people who were migrated for any reason like searching employment opportunities or any other, they started to live in the places where living cost was comparatively low and in these places, many of the families had to share their kitchen and toilet. Almost all the ready-made garments workers share kitchen and toilet. Table 4.13 represents the amount of families share their kitchen and toilet with others. About 26% respondents share their kitchen with others; among which 44% were from mega city, Dhaka (Table 4.13). About 33% shares their toilets with other families among which 43% were from Dhaka city. About 1% respondents use public toilets who are mainly located in Dhaka (Table 4.13).

Table 4.13: Kind of toilet facility the respondents usually use

(Number of respondents)

Regions	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	Total
Improved toilet	323 (18)	311 (17)	467 (25)	523 (28)	212 (12)	1836 (93)
Unimproved toilet	3 (2)	2 (1)	20 (14)	102 (72)	15 (11)	142 (7)
Total	326 (16)	313 (16)	487 (25)	625 (32)	227 (11)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Among the respondents, about 93% use improved toilet facilities that includes piped sewer system, septic tank, off-set pit latrine with slab and direct pit latrine with slab. Among the respondents who used unimproved toilet facilities, 72% of them are from mega city (Table 4.13).

Section B: General Cleanliness

The study found that among the respondents, about 38%, 32% and 29% used deep tube well, shallow tube well and supply water as their main source of drinking water. About 75% respondents from Dhaka city used supply water as their main source of drinking water. In other regions, it is mostly shallow tube well and deep tube well. Most of the respondents from high class and slum area used supply water as their main source for drinking water. About 60% respondents tested their water source for arsenic and among themselves, about 65% from peri-urban city. About 66% respondents normally didn't treat drinking water. In case of Dhaka city, about 51% respondents treated drinking water of which about 67% respondents used the boiling method to treat their drinking water, but in urban cities, only 19% respondents treated drinking water. About 58% respondents cleaned the water storage container everyday. In peri-urban cities, the amount is about 79% where the amount is the lowest in case of mega city which is 45%. About 92% of the respondents replied that they wash their hands with both soap and water, while about 88% respondents think that washing hand with soap is always necessary. Most of the respondents replied as, they would fall sick if they didn't wash their hands.

Table 4.14: Main sources of drinking water according to different regions

(Number of respondents)

Regions	Supply water	Deep Tube well (>250 feet)	Shallow Tube well (<250 feet)	Waterfall/ spring	Rainwater harvesting	Total
Peri-urban city	11 (3)	128 (39)	187 (57)	0 (0)	0 (0)	326 (100)
Peri-urban town	50 (16)	105 (34)	157 (50)	0 (0)	1 (0.32)	313 (100)
Urban city	22 (5)	302 (62)	158 (32)	1 (0.21)	4 (1)	487 (100)
Mega city	471 (75)	125 (20)	19 (3)	0 (0)	10 (2)	625 (100)
Urban town	25 (11)	91 (40)	111 (49)	0 (0)	0 (0)	227 (100)
Total	579 (29)	751 (38)	632 (32)	1 (0.05)	15 (1)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

About 65% respondents had water availability inside the toilet, but about half of the respondents were from peri-urban town who have these facilities outside toilet. Most of the children defecate in potty and toilet. A maximum number of the respondents disposed the stool by putting or rinsing into toilet. More than 84% respondents from every region disposed solid waste daily.

About 51% respondents answered positively as they saw flies in the area where the food was kept, which is quite surprising as the matter is directly related to hygiene. About 76% respondents trim their fingernails once in a week.

Regional poverty status and multidimensional poverty index

In this study, data has been collected from five types of urban areas where about 32% respondents belonged to mega city and minimum about 12% belonged to urban town. The individual poverty score initially has been calculated for each of the areas. The higher the score, the greater is the poverty, and vice-versa. In the mega city, the mean and standard deviation is the highest among the five regions, indicating that a large number of people are poor here. Lowest mean and standard deviation found in the peri-urban town, where about 2% of people were found in a state of poverty. The lowest numbers of multidimensionally poor people (0.95%) also belonged to this region. A large number of multidimensionally poor (9.05%) has been found in mega city where 20% of its population live in the poverty. When individual deprivation score exceeds 0.50, they are considered as severely poor and the highest number of severely poor people is 8% in mega city. There is no severely poor population found in peri-urban town. One is said to be vulnerable to poor when their deprivation score falls between 0.20 to 0.33. People who are in this status can fall into poverty if they failed to achieve a certain level of income, health, and standard of living. Large vulnerable people (13.60%) have also been found in mega cities. Second highest (12.32%) belonged to the urban areas. A small number (6.39%) of vulnerable people have been found in peri-urban towns. Having a deprivation score from zero to less than 0.20, are called non-poor. A greater number (91.69%) of non-poor people were found in peri-urban town and the lower proportion (66.40%) were found in mega city. Aggregating the five regions into one, the total number of poor people is 9.86% where 4.41% of them are multidimensional poor and 3.44% are severely poor. About 78% of the peoples were living out of poverty and 12.29% of the totals vulnerable to poor.

Table 4.15 Calculation of multidimensional poverty index

Area	Freq. (%)	Deprivation score		H	A	MPI =H*A	No. of poor	Vulnerable to poor	Non-poor
		Mean	Sd						
Peri-urban city	326 (16)	0.11	0.12	0.06	0.42	0.03	32 (10)	59 (14)	248 (76)
Peri-urban town	313 (16)	0.07	0.09	0.02	0.38	0.01	9 (3)	20 (5)	287 (92)
Urban city	487 (25)	0.07	0.11	0.02	0.44	0.01	22 (5)	60 (10)	414 (85)
Mega city	625 (32)	0.16	0.18	0.19	0.47	0.09	165 (26)	85 (7)	415 (66)
Urban town	227 (11)	0.11	0.16	0.14	0.46	0.06	32 (14)	19 (8)	176 (78)
Total	1978 (100)	0.11	0.12	0.06	0.42	0.03	260 (13)	243 (9)	1540 (78)

Source: author's calculation; Figures in parentheses represent percentages.

Section C: Ante-natal Care and Maternal Health

Antenatal care may have a positive relation with the increasing urbanization, as mothers living urban areas have a better chance of getting health services than who live in rural areas. Antenatal care helps the women to be prepared for delivery and recognize warning signs during pregnancy and childbirth. Through preventive health care, women can get access to micronutrient supplementation specially iron, treatment of hypertension to prevent eclampsia, as well as immunization against tetanus etc. Receiving antenatal care at least four times (recommended by WHO), increases the likelihood of receiving effective maternal health interventions during pregnancy. Table 4.16 shows that a positive response comes from about 59% respondents that they had received more than 4 times antenatal care when they were pregnant. Majority of the mother responded that they visited ante-natal care for different purpose. From our study, we found that only 30% mother replied that they listened their fetus heartbeat and 38% replied that their fundal height was measured. About 41% of mothers consumed 101-200 pills in their pregnancy period. In total, the research found that 92% respondents had received antenatal care (Table 4.16) when they were pregnant and from each region the positive response was at least 87% (Table 4.16).

Table 4.16: No. of mothers receiving antenatal care

(Number of respondents)

Regions	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	Total
Yes	307 (94)	302 (96)	465 (95)	542 (87)	210 (93)	1826 (92)
No	19 (6)	11 (4)	22 (5)	83 (13)	17 (7)	152 (8)
Total	326 (100)	313 (100)	487 (100)	625 (100)	227 (100)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 4.17: Times of receiving antenatal care by the respondents

(Number of respondents)

Times of receiving antenatal care	Regions					
	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	Total
Did not receive ANC	19 (13)	11 (7)	22 (15)	81 (54)	17 (11)	152 (100)
Less than 4 times	178 (55)	153 (49)	129 (26)	152 (24)	56 (25)	668 (34)
4 and more times	129 (**40**)	149 (48)	336 (69)	390 (62)	154 (68)	1158 (100)
Total	326 (16)	313 (16)	487 (25)	625 (32)	227 (11)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

About 54% respondents who never visited for the ANC services were from Dhaka city but more than 60% were from this region have received ante-natal care of 4 times or more. We have calculated the times of ANC services the respondents took during pregnancy. In this case we have followed additive method. Since it was found that the highest number as 9 types of ANC services, so the maximum score would be 9 with a minimum of 1. The services the mothers received were: measuring weight, checking blood pressure, checking fundal height, blood test, ultrasonography, tetanus vaccination, counseling about mother's and child nutrition specially about feeding colostrums, as well as awareness about symptoms' of danger sign, receiving iron pills. The correlation coefficient between number of mothers visit doctors or health workers and number of services received is: 0.445 which is significant at 5% level, which may mean that the more the pregnant mothers visit doctors or health

workers, the more they receive the ANC services.

Table 4.18: Level of ANC services received

(Number of respondents)

Level of ANC services received	**No**	**Lowest**	**Medium**	**Highest**	**Total**
	152 (8)	510 (26)	762 (38)	554 (28)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 4.19: Number of ANC services received by the all respondents

(Number of respondents)

Number of services received	1	2	3	4	5	6	7	8	9	Total
Number of respondents	13 (0.7)	46 (2.5)	45 (2.5)	75 (4.1)	105 (5.8)	328 (18)	457 (25)	474 (26)	281 (15.4)	1824 (100)

Table 4.20: Consumption of iron pills

Numbers of Tablets taken	0	<100	101-200	>200
Number of respondents	367 (18.55)	391 (19.77)	810 (40.94)	410 (20.72)

About 17% mothers did not take any iron pill. The highest consumption of iron pills, 201 to 300, was found in mega city which was 64% and also most respondents who did not consume any iron pill were also from mega city which is about 45%. Most of the respondents replied positively as they consumed all the iron pills that they received during pregnancy and the amount is more than 52% in all four regions except mega city, where the number of responses is 33%.

Table 4.21: Pregnancy complications of the respondents according to different regions

(Number of respondents)

Regions	No complication	Having any one complication	More than one complications	Total
Peri-urban city	182 (15)	122 (18)	22 (30)	326 (16)
Peri-urban town	197 (16)	111 (16)	5 (7)	313 (16)
Urban city	313 (26)	156 (23)	18 (24)	487 (25)
Mega city	444 (36)	168 (24)	13 (18)	625 (32)
Urban town	82 (7)	129 (19)	16 (22)	227 (11)
Total	1218 (100)	686 (100)	74 (100)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

It could be mentioned here that most of the respondents who had complications during or after pregnancy, were the housewife mothers. In case of regions, 36% and 24% respondent who did not face any complications and one complication respectively were from mega city. About 30% respondents from peri-urban cities faced more than one complication during pregnancy. About 60%

respondents from every region were pregnant for nine months (Table 4.21). Table 4.22 shows that in mega city, more number of mothers did not get relax time for at least one month after delivery.

Table 4.22: Get relax time for at least one month after delivery

(Number of respondents)

Regions	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	Total
No	47 (14)	52 (16)	122 (25)	217 (35)	45 (20)	483 (24)
Yes	279 (86)	261 (83)	365 (75)	408 (65)	182 (80)	1495 (76)
Total	326 (100)	313 (100)	487 (100)	625 (100)	227 (100)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Anthropometry of the mothers: The study found the mean height and weight of mothers were 152.25 cm and 56.24 kg respectively. Minimum weight recorded was 27.6 kg and the maximum was 105.9 kg, while the minimum height was 108.7 cm and a maximum was 180 cm found from the survey (Table 4.23).

Table 4.23: Anthropometry of the mothers

Variable	Observation	Mean	Std. Dev.	Min	Max
Weight (kg)	1,978	56	11	27	106
Height (cm)	1,978	152	6	108	180

Source: author's calculation; Figures in parentheses represent percentages.

Section D: Child Health

In this section, we have asked the mothers about the birth weight of the child and disease incidence in the last 2 weeks. Most of the children were born with normal weight (Table 4.24).

Table 4.24: Birth Weight (Kg) of the child

Birth Weight (Kg)	Don't know	<2.5	2.5	>2.5-<3.5	3.5	>3.5	Total	Average	Std. Dev.
Freq.	126	243	241	922	241	205	1978	3	1
Percent	6	12	12	47	12	10	100		

Table 4.25: Number of children suffered from 4 diseases according to different regions

(Number of respondents)

Regions	Diarrhea	Blood in Stool	Fever	Cold/ cough/ difficulty in breathing
Peri-urban city	20 (6)	7 (2)	52 (16)	74 (23)
Peri-urban town	44 (14)	12 (4)	52 (17)	91 (29)
Urban city	46 (9)	2 (0.41)	73 (15)	79 (16)
Mega city	85 (14)	16 (3)	121 (19)	108 (17)
Urban town	13 (6)	4 (2)	63 (28)	62 (27)
Total	208(11)	41 (2)	361 (18)	414 (**21**)

Source: author's calculation; Figures in parentheses represent percentages.

Child Anthropometry

We have collected three types of anthropometric data: current weight, length/height and MUAC. To get the exact age of the child, we have taken the help of The Anthro software, where we have put the date of birth of the child and the date of data collection. We have used WHO Anthro Online Analyzer to estimate the anthropometric result on the basis of several categorical variables such as region, area of living, types of mother and sex. In this survey, the information of 52.73% male and 47.27% female child has been listed. The mean age of the surveyed children is 2.06 years. Average weight, height, and MUAC are recorded as 11.28 kg, 80.935 cm, and 15.05 cm, respectively. Minimum age, weight, height, and MUAC were 0.01 years, 2.9 kg, 24 cm, and 6 cm, respectively and the maximum was 4.95 years, 29.55 kg, 117 cm, and 27.92 cm, respectively (Table 4.26).

Table 4.26: Child Anthropometry

Variables	Mean	Std. Dev.	Min	Max
Age (Years)	2.06	0.906	0.011	5
Weight (Kg.)	11	3	3	30
Height (cm)	80.1	12	24	117
MUAC (cm)	15	2	6	28

Table 4.27, 4.28 and 4.29 shows the categorization of frequency of Z score of Length or height for age, weight for age and weight for length or height of the children, according to region. The result shows us that in every case, majority of the children are normal.

Table 4.27: Frequency Categorization of Z-Score of Length or Height for Age on Different Background Characteristics

(Number of respondents)

Regions	Severe Stunting	Moderate Stunting	Normal	Extremely Tall	Total
Peri-urban city	56 (17)	44 (13)	222 (68)	4 (1)	326 (100)
Peri-urban town	52 (17)	40 (13)	215 (69)	6 (2)	313 (100)
Urban city	105 (22)	83 (17)	293 (60)	6 (1)	487 (100)
Mega city	145 (23)	120 (19)	336 (54)	24 (4)	625 (100)
Urban town	43 (19)	31 (14)	141 (62)	12 (5)	227 (100)
Total	**401 (20)**	**318 (16)**	**1207 (61)**	**52 (3)**	**1978 (100)**

Source: author's calculation; Figures in parentheses represent percentages.

Table 4.28: Frequency Categorization of Z-Score of Weight for Age on Different Background Characteristics

(Number of respondents)

Regions	Severe Underweight	Moderate Underweight	Normal	overweight	Total
Peri-urban city	11 (3)	33 (10)	256 (79)	26 (8)	326 (100)
Peri-urban town	9 (3)	35 (11)	238 (76)	31 (10)	313 (100)
Urban city	17 (3)	42 (9)	362 (74)	66 (14)	487 (100)
Mega city	50 (8)	90 (14)	411 (66)	74 (12)	625 (100)
Urban town	8 (4)	21 (9)	161 (71)	37 (16)	227 (100)
Total	95 (5)	221 (11)	1428 (72)	234 (11)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 4.29: Frequency Categorization of Z-Score of Weight for Length on Different Background Characteristics

(Number of respondents)

Regions	Severe Wasting	Moderate Wasting	Normal	Risk of overweight	Over-weight	Obesity	Total
Peri-urban city	11 (3)	15 (5)	205 (63)	51 (16)	23 (7)	21 (6)	326 (100)
Peri-urban town	10 (3)	14 (4)	203 (65)	39 (12)	20 (6)	27 (9)	313 (100)
Urban city	8 (2)	26 (5)	256 (53)	94 (19)	55 (11)	48 (10)	487 (100)
Mega city	42 (7)	50 (8)	347 (56)	88 (14)	46 (7)	52 (8)	625 (100)
Urban town	10 (5)	10 (4)	119 (52)	39 (17)	24 (11)	25 (11)	227 (100)
Total	81 (4)	115 (6)	1130 (57)	311 (16)	168 (8)	173 (9)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Section E: Measuring Women Empowerment

Empowerment is an aggregated measure of numerous dimensions. To determine individual adequacy score, five domains have been taken into consideration in this study, which are: self-esteem, access to and control over resources, attitude and behavior of the husband/family support, decision-making on household issues, and freedom of mobility. The questionnaire was designed in such a way that brought data from the survey in the qualitative form. Afterward, entire data has been quantified for statistical operation. Descriptive statistics for each domain are showing in Table 4.30. Our first domain of women empowerment 'self-esteem' contained five indicators. When it was asked whether they think they are helpless, nearly half of women from mega city responded positive and 29.71% respondents from peri-urban towns answered negative, which is the lowest. About 75% of women from urban cities responded yes to the question that they could work better than others. Also, in megacity, 78% of women hope that they could improve their lifestyle in the future. In the same region, a maximum of 69.44% of women responded that their decision was considered in the family matter. In urban town, a majority of women found that they could speak in front of many people compared to the other regions.

Table 4.30: Positive responses of the indicators for self-esteem

(Number of respondents)

Indicators	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	**Total**
Do you very often think that you are helpless?	147 (45)	93 30)	213 (44)	312 (50)	113 (50)	878 (44)
Do you think that you can do anything better than others?	183 (56)	197 (63)	366 (75)	451 (72)	170 (75)	1,367 (69)
Are you confident that your life will improve in future?	208 (64)	220 (70)	363 (75)	490 (78)	162 (71)	1,443 (73)
Do you think that your opinions are always considered when decisions are made in your family?	162 (50)	129 (41)	325 (67)	434 (69)	131 (58)	1,181 (60)
Can you speak in front of many people?	152 (47)	177 (57)	298 (61)	402 (64)	158 (70)	1,187 (60)

Source: author's calculation; Figures in parentheses represent percentages.

Access and control over resources is another domain with a composition of six indicators defines that which household resource, women have access to and control over them according to their convenience.

A high share of women having their own assets has been found in the urban city. The highest positive response came from the peri-urban city's women when they were asked about their personal savings account. Those women who lived in megacity have better access to their husbands' money. A high percentage of women have a cooking stove in the peri-urban city, and 61.23% of women from urban towns have kitchen equipment that makes their life easier.

Empowerment also has a relation with the attitude and behavior of the husband. A positive attitude and gentle behavior may lead to an increase in the empowerment status to some extent. Five indicators have been included to measure the status of attitude and behavior of partner/ husband.

Table 4.31: Number of respondents who have access to and control over resources ('yes' responses)

(Number of respondents)

Indicators	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	**Total**
Do you own land in your name?	148 (45)	158 (50)	279 (57)	229 (37)	109 (48)	923 (47)
Do you have some savings in your name?	145 (44)	130 (42)	201(41)	198(32)	83(37)	757(38)
Do you have easy access to your husband's earned money as you wish?	95 (29)	77 (25)	243(50)	336(54)	76(33)	827(42)
Do you have your own mobile phone?	257 (79)	262 (84)	393(81)	481(77)	164(72)	1,557(79)
Access to Cooking Stove?	283 (87)	233 (74)	396(81)	461(74)	149(66)	1,522(77)
Have Kitchen Equipment?	178 (55)	168 (54)	300 (62)	262 (42)	143 (63)	1,051 (53)

Source: author's calculation; Figures in parentheses represent percentages.

Table 4.32: Attitude and behaviour of husband (Number of positive responses)

(Number of respondents)

Indicators	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	**Total**
Does your husband take care for you as the mother?	279 86)	273(87)	413(85)	473(76)	173(76)	1,611(81)
Does your husband help you in household works?	205 63)	139(44)	244(50)	291(47)	97(43)	976 (49)
Does your husband read your phone messages?	90 (28)	79(25)	62(13)	87(14)	56(25)	374 (19)
Can you express your opinion when you disagree with your husband?	182(56)	216(69)	382(79)	430(69)	150(66)	1,360(69)
Does your husband get angry, if you make any unwilling mistake?	153(47)	251(80)	273(56)	381(61)	148(65)	1,206(61)

Source: author's calculation; Figures in parentheses represent percentages.

About 87% of women from peri-urban town replied affirmatively that their husband were taking care of them as a mother. In the peri-urban city, majority of the respondents' husband helps them in household work. When they asked about reading their phone messages by their husband, most of the women replied "No" to this question. Greater positive responses came from an urban city when they were asked about expressing an opinion with their husband. About 53% of the husbands never got angry about respondent's unwilling mistakes in the peri-urban city.

Every day, a family takes a lot of decisions. An important decision may be taken by the dominant member of the household. Seven indicators that upgrade the level of empowerment of women, which leads to the decision related to households, have been included in the survey.

Table 4.33: Decision-makers on household issues

(Number of respondents)

Indicators	**Response by**	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	Total
Working	Husband	118 (36)	163 (52)	93 (40)	193(31)	78 (34)	745 (38)
	Herself	41 (13)	20 (6)	88 (18)	164 (26)	40 (18)	353(18)
	Both	158(48)	116 (37)	192 (39)	250 (40)	107(47)	823 (42)
Spending on food	Husband	179(55)	194(62)	222(46)	241(39)	135(59)	971(49)
	Herself	21(6)	29(9)	53(11)	206(33)	27(12)	336(17)
	Both	105(32)	71(23)	179(37)	137(22)	51(22)	543(27)
Cooking Food	Husband	107(33)	81(26)	120(25)	119(19)	80(35)	507(26)
	Herself	72(22)	131(42)	117(24)	245(39)	50(22)	615(31)
	Both	126(39)	63(20)	206(42)	196(31)	51(22)	642(32)
Personal Items buying	Husband	82(25)	77(25)	44(9)	131(21)	59(26)	393(20)
	Herself	172(53)	188(60)	311(64)	305(49)	117(52)	1,093(55)
	Both	67(21)	45(14)	127(26)	178(28)	48(21)	465(24)
Buying Expensive items	Husband	178(55)	158(50)	174(36)	205(33)	101(44)	816(41)
	Herself	15(5)	15(5)	21(4)	82(13)	12(5)	145(7
	Both	118(36)	120(38)	266(55)	283(45)	100(44)	887(45)
Health Expenditure	Husband	149(46)	135(43)	165(34)	196(31)	95(42)	740(37)1
	Herself	16(5)	23(7)	33(7)	94(15)	22(10)	188(10)
	Both	143(44)	142(45)	272(56)	306(49)	104(46)	967(49)
Family Planning	Husband	50(15)	29(9)	31(6)	39(6)	17(7)	166(8)
	Herself	13(4)	9(3)	19(4)	27(4)	11(5)	79(4)
	Both	255(78)	270(86)	434(89)	540(86)	197(87)	1,696(86)

Source: author's calculation; Figures in parentheses represent percentages.

The study found that in the mega city, 26% of women take their decision alone to work outside, whereas 48.47% of women discussed it with their husbands in the peri-urban city. Women in mega city have a greater say on the money spent on the food items, which seems opposite for urban city living women. The decision regarding cooking food has been taken alone by 42% of women in peri-urban towns and in urban cities, the majority of the respondents told that they discussed it with their husbands. In terms of personal items buying, it is mostly done by the respondent herself. But in case of buying an expensive item for the family, the decision mostly were taken by both husband and wife together, where urban city respondents showed the highest percentage. The decision on health expenditure was also made through discussion by both husband and wife and a maximum 56% response came from the urban city. A few women took the family planning decision by her but most women decided with their husbands. About 89% of women responded positively to family planning decisions taken by both the husband and herself in the urban city area.

Freedom of mobility is another domain of women empowerment that describes how much women could move whenever they want. We selected four indicators in this domain. The study found that in the urban city area, women enjoy a higher degree of freedom in visiting their relatives' house compared to other areas. But in the case of going to market, women of mega cities have a greater freedom than other regions. Again, a majority of women from the urban city can go to the hospital and join any meetings any time, which are not seen in other regions.

Table 4.34: Freedom of mobility of the respondents

(Number of respondents)

Indicators	Response	Region					
		Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	Total
Unescorted Visit to relative's house?	Never	50(15)	91(29)	39(8)	94(15)	26(11)	300(15)
	In some cases	159(49)	174(56)	223(46)	270(43)	103(45)	929(47)
	Always	117(36)	48(15)	225(46)	261(42)	98(43)	749(38)
Going to market any time?	Never	42(13)	104(33)	60(12)	87(14)	44(19)	337(17)
	In some cases	186(57)	136(43)	191(39)	234(37)	86(38)	833(42)
	Always	98(30)	73(23)	236(48)	304(49)	97(43)	808(41)
Going to Hospital any time?	Never	58(18)	118(38)	99(20)	140(22)	54(24)	469(24)
	In some cases	190(58)	118(38)	164(34)	249(40)	85(37)	806(41)
	Always	78(24)	77(25)	224(46)	236(38)	88(39)	703(36)
Participating in Community Events?	Never	145(44)	172(55)	95(20)	191(31)	69(30)	672(34)
	In some cases	140(43)	106(34)	181(37)	265(42)	96(42)	788(40)
	Always	41(13)	35(11)	211(43)	169(27)	62(27)	518(26)

Source: author's calculation; Figures in parentheses represent percentages.

Implying equal weight in each domain individual adequacy score has been calculated. Summary statistics show a quick view of the adequacy score and proportion of empowered women in all five regions.

Table 4.35: Summary of regional empowerment status (%)

Region	Freq.	Adequacy score				No of women who achieved adequacy score	No of women who did not achieved adequacy score
		mean	Sd.	max	min		
Peri-urban city	326(16)	0.492	0.201	1	0.088	38 (11.66) (9.62)	288 (88.34) (18.19)
Peri-urban town	313(15)	0.468	0.204	1	0.057	18 (5.75) (4.56)	295 (94.25) (18.64)
Urban city	487(25)	0.593	0.222	1	0.033	147 (30.18)(37.22)	340 (69.82) (21.48)
Mega city	625(32)	0.542	0.235	1	0.033	151 (24.16) (38.23)	474 (75.84) (29.94)
Urban town	227(11)	0.522	0.225	1	0.028	41 (18.06) (10.38)	186 (81.94) (11.75)
Total	1978(100)					395 (19.97) (100)	1583 (80.03) (100)

Source: author's calculation; Figures in parentheses represent percentages

The study found that women from mega city are more empowered compared to the other four regions. In the urban city, 37.22% of women have the adequacy score, which is greater than or equal to 0.80., while the lowest number of empowered women was found in peri-urban town which is 5.75%. Nearly 20% of women have been found empowered in aggregating all five regions.

Table 4.36: Regional average adequacy score for each domain

Regions	Dimensions of women empowerment				
	Self Esteem	Access to & Control Over Resources	Attitude & Behavior of husband	Decision Related to HH	Mobility
Peri-urban city	0.087	0.094	0.109	0.097	0.043
Peri-urban town	0.086	0.091	0.098	0.094	0.031
Urban city	0.107	0.103	0.115	0.113	0.077
Mega city	0.111	0.087	0.105	0.115	0.065
Urban town	0.107	0.089	0.098	0.098	0.063

Average adequacy score for each domain explains how one region may vary from the other regions. The following graph depicts that higher variation found in mobility across all the regions. On the other hand, attitude and behavior of partner/ husband showed less variation in all regions.

Section E: Workload of a mother

To identify the workload of a mother, the activities of the respondents of their last 24 hours (24-hour calendar method was used in the questionnaire) were recorded and categorized into three main categories: (i) productive activities which includes formal labor or office hours and other business activities, (ii) reproductive activities which includes care of children and elderly persons, cooking, cleaning, washing as well as the household chores, cultivating land and trending farm animals (for their own consumption purposes) and tutoring their children and (iii) personal time which includes leisure time, sleeping hours, personal care and rest and religious activities. Though Caroline Moser explained the triple role of women in her gender analysis framework, as production (farm work), reproduction (household work and childcare), and community affairs (Ludgate 2016;) but from the pre-testing of the questionnaire, we found that the urban women generally do not get involved with community affairs specially after having any child. Therefore, we excluded the criteria of community activities. We have also found that most of the respondents from peri-urban town, urban city and mega city were housewives and their amount is about 67%, 67% and 56% respectively and in other two regions, peri-urban city and urban town, most of the respondents were working mothers and their amount is about 45% and 44% respectively. Deichmann et al. (2009) categorized 'work' as wage work and self employment. In that light, we have categorized our respondent mothers as: housewife, working and self Employed. In our sample, we have defined self-employed mothers, those who have flexible timeframe of work. Such occupations are online business (food, cloth, makeup products selling), house maid, tailor etc. On the other hand, working mothers are those who have fixed timeframe for office/ work, for example, banker, government and private job holders etc. In our study, about 56% were housewife, 29% were working and the rest 15% were self-employed mothers.

Table 4.37: Percentage of different mothers from different regions

(Number of respondents)

Region	Occupation of the respondent mothers			
	House wife	Self employed	Working	Total
Peri-urban city	139 (43)	40 (12)	147 (45)	326 (100)
Peri-urban town	209 (67)	53 (17)	51 (16)	313 (100)
Urban city	324 (67)	60 (12)	103 (21)	487 (100)
Mega city	352 (56)	109 (17)	164 (26)	625 (100)
Urban town	90 (40)	36 (16)	101 (44)	227 (100)
Total	1114 (56)	298 (15)	566 (29)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Housewife mothers from urban city spent maximum time for reproductive activities followed by mega city mothers, while mothers from peri-urban cities spent most the time in productive activities followed by the mega city mothers; and housewife mothers from peri-urban cities could spend the highest amount of their time for themselves followed by mothers from urban town. It could be mentioned here that working mothers from peri-urban cities can get least time for their personal activities including sleeping. We have found that almost 65% of our working mothers have a fixed timeframe of work and they are categorized here as working mothers. On the other hand, 35% mothers are self-employed which is 15% of our total sample.

Table 4.38: Time spent in different activities by different types of mothers

Regions	Types of mothers	Reproductive activities (hours)	Productive activities (hours)	Personal time (hours)
Mega city	House wife	13	0.11	11
	Self Employed	6	9	9
	Working	7	8	8
Urban city	House wife	13	0.1	11
	Self Employed	11	4	9
	Working	9	6	9
Urban town	House wife	12	0.4	12
	Self Employed	9	5	10
	Working	8	7	9
Peri-urban city	House wife	11	1	12
	Self Employed	8	5	11
	Working	5	11	8
Peri-urban town	House wife	12	0.35	12
	Self Employed	9	4	10
	Working	7	8	9

Source: author's calculation.

Time of working mothers

We asked same type of questions to all of our working mothers to know the real scenario of family life having a job and the results are summarized here. More than half (63.43%) of our respondents told that they felt their job was more difficult during pregnancy. We also found similar result while conducting FGD with working mothers. After dividing the result on the basis of employment type, we can see that 55% and 68% respondents among self-employed and working mothers respectively opined negatively with the question which has a great impact on mothers' physical and mental health both in short and long run.

When we have asked that whether they (mothers) can spend quality time with their family or not: 51% told that they can. But the classification on the basis of employment told us a different story. Majority of the self-employed mothers told they could not have enough quality time to spend with their children whereas working mothers have mentioned the opposite. There are several reasons behind this. First of all, though self-employed mothers are mostly working from home except housemaid, but they cannot give enough time to their children or family because of distraction on work. They are spending all their day monitoring their child or doing household works but there is lack of enough time. Sometimes they need to work even at night when working mothers can spend time with family. Another reason is, sometimes self-employed mothers do not have as much education as working mothers which may also make the difference.

While talking about maternity leave, almost 60% respondents told that they had a maternity leave but again the division on the basis of employment shows something different. Most of the self-employed mothers didn't have any maternity leave while they were pregnant because of nature of their job whereas a significant number of working mothers had enjoyed a maternity leave just because of the government provision. Though there are 28% of working mothers who didn't get any maternity leave and life was stressful for them. Majority of our respondents told that their job affected their pregnancy decision. Again, majority of the mothers cannot have early leave/leave from workplace when their child is sick. When we divide this on the basis of employment, majority of both

the self-employed and working mothers cannot get early leave. This may not only be detrimental for a nation considering child as the future of the country, but also a great hindrance on practicing women empowerment.

We also have asked the working mothers whether they can do justice to herself, her work and her motherhood and we got a significant number of negative replies (68.29%). Majority of both self-employed and working mothers replied, they cannot do justice.

Table 4.39 Answers of different questions by working mothers

(Number of respondents)

Questions	Self employed		Working	
	Yes	No	Yes	No
Did you get your job difficult when you felt tired or uncomfortable during pregnancy	165 (55)	133 (45)	383 (68)	183 (32)
Are you able to spend quality time with your family members	138 (46)	160 (54)	305 (54)	261 (46)
Did you get maternity leave from your employer?	84 (38)	214 (72)	426 (75)	140 (25)
Does your job affect your pregnancy decision?	107 (36)	191 (64)	441 (78)	125 (22)
Do you get early leave/ leave from workplace when your child is sick?	107 (36)	191 (64)	230 (41)	336 (59)
Do you think, you are doing justice to yourself, your work and your motherhood?	33 (11)	265 (89)	158 (28)	408 (72)

Source: author's calculation; Figures in parentheses represent percentages.

When we have asked the respondent mothers, who helps you generally at your household chores, majority of them replied that they had no helping hands for household works. Those who have helping hands, mother-in-law holds the highest position. And in the case of caregiving to the child when the mother is not at home, again mother-in law (grandmother of the child) holds the highest percentage.

Table 4.40 Who Usually Helps When Mother Need Assistance for HH Chores?

Relationship	Daughter	Husband	Maid	Mother	Mother-in-law	No one	Sister	Sister in law
Frequency	72 (8)	114 (13)	103 (12)	62 (7)	149 (17)	301 (35)	13 (2)	8 (1)

Source: author's calculation; Figures in parentheses represent percentages.

Working hour of working Mothers

The study found that the mean working hours for self-employed mothers was nearly 6.68±3.74 hours and for working mothers, it was 8.22±2.76 hours. The average working hours of self-employed mothers is between the standard work hours but for working mothers, it exceeds the limit of 8 hours/day. It is evident from Table 4.41 that majority of the self-employed mothers spent 4 hours on income generating activities. On the other hand, majority of the working mothers work 8 hours at office.

Table 4.41: Working hours of working mothers

(Number of respondents)

Working Hour	Overall	Self employed	Working
<=4	133(15)	95(32)	38(7)
4 to 8	413(48)	119(40)	294(52)
8to 12	245(28)	58(20)	186(33)
>12	72(8)	25(8)	47(8)
Total	**863(100)**	**297(100)**	**565(100)**

Source: author's calculation; Figures in parentheses represent percentages.

We also asked our working respondents to suggest about office hours according to their choice and convenience. Majority of the total working mothers suggested the office hour of 10 am to 3 pm which is 11% of total respondents, while 5% of the respondents suggested the time frame of 10 am to 2 pm and few self-employed mothers suggest the time frame of 9 am to 1pm.

Table 4.42: Convenient time frame suggested by working mothers

Convenient time frame	10 am to 3 pm	10 am to 6 pm	8 am to 2 pm	8 am to 6 pm	9 am to 3 pm	9 am to 7 pm	others
No. of respondents	187 (33)	92 (16)	47 (8)	73 (13)	95 (17)	62 (11)	17 (3)

Source: author's calculation; Figures in parentheses represent percentages.

We also have classified the questions that were asked to determine the overall family situation of working mothers on the basis of their type of work, self-employed and working (Table 4.43).

When we classified the question of spending quality time with family on the basis of working hour and employment type, we have found that a majority of respondents from both employment categories who are working less than or equal to 8 hours can spend quality time which is opposite for rest of the two working hour categories means they cannot spend quality time. The reason could be that if a woman spends more than 8 hours in an office, then she may not have enough time to pass with her family members. Moreover, she has to work for the household and rarely there is someone to help her, which may mean that they do not have adequate time to spend which would be a quality time.

We have also found that, for most of the cases, in terms of work hours, majority of the self-employed and working category mothers cannot do justice after working more than 8 hours, whereas the majority of the working mothers can do so after working 8 hours or less. All of this negative response may have a negative consequence on the child's and mothers mental and physical health, causing both individual and aggregate level economic loss, and a reverse swing of the career of the mother.

Table 4.43: Responses of working mothers by working hours

(Number of respondents)

Questions	Working hours	Self employed		Working	
		No	Yes	No	Yes
Are you Able to Spend Quality Time with your Family Members?	*<=8*	99	115	118	214
	8 - 12	39	19	104	83
	>12	22	3	39	8
Are you Doing Justice to yourself, your Work and your Motherhood?	*<=8*	121	93	163	169
	8 - 12	48	10	134	53
	>12	22	3	39	8
Does your Job Affect your Pregnancy Decision?	*<=8*	193	21	259	73
	8 - 12	49	9	131	56
	>12	22	3	18	29

Source: author's calculation; Figures in parentheses represent percentages.

However, most of the working mothers found that their job did not affect their pregnancy decision. But mothers working for more than 12 hours mentioned that their job was a factor for their pregnancy decision. We have found that more than 5% of total working mothers who work more than 12 hours are mainly industrial workers. The reason could be: as this job is quite industrious for a pregnant woman so they may feel afraid to becoming a mother.

Section F & G: Care, Knowledge and Nutrition

The study found that majority of the mothers from all regions responded positively regarding the questions about buying food for their child, play different activities like story saying, singing as responsive feeding while feeding the child; and the child fed meals and snacks 4-5 times in a day. But in case of the questions about having a session with health workers or doctors, it was not found satisfactory. Usually most of the mothers took advice from their parents whereas majority of the mothers from mega city and peri-urban city seek information about proper child care from the skilled doctor or health workers.

Table 4.44: Care and food consumption practices

(Number of respondents)

Regions	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town
Do You Buy Food Yourself from The Market for Your Baby?	253 (78)	228 (73)	410 (84)	530 (85)	175 (77)
Do You/ Care Giver Play Different Activities while feeding the child?	212 (65)	209 (67)	320 (66)	432 (69)	151 (67)
Is the Baby Fed Meals and Snacks 4-5 Times in A Day?	294 (90)	232 (74)	346 (71)	523 (84)	164 (72)
Did You Have Any Session with Doctor/Health workers?	150 (46)	109 (35)	223 (46)	339 (54)	108 (48)
Do You Get Angry to The Child When Food Is Refused?	272 (83)	202 (65)	318 (65)	357 (57)	163 (72)

Source: author's calculation; Figures in parentheses represent percentages.

Mother's basic nutrition knowledge: In all regions, majority of the mothers, irrespective of the employment categories, responded positively for all the questions. We have also calculated a composite score of mothers' nutritional knowledge from 10 nutritional indicators. After performing principal component analysis, the predicted score has been categorized into 3 quartiles. Almost equal distribution has been found in the different level of nutritional knowledge. A number of 662 (33%) mothers had lowest level of nutritional knowledge, whereas in case of medium and highest level of knowledge, the numbers are 670 (34%) and 646 (33%).But, majority of the mothers failed to respond the question of what type of food we should regularly eat, like the major and important category of food such as green vegetables, vitamin A rich vegetables etc.

When we asked whether they take five color of food or not, regardless of region majority of them responded positively, while a significant negative reply was found of having egg eaten by all the family members. For every category, majority of them responded that they do not eat egg regularly. Again, we have performed the additive compilation of the similar nutrition knowledge indicators. The highest (24%) score was found 7, that means 24% mothers achieve score 7 out of 10 (Table

4.45).

Table 4.45: Number of respondents with positive responses about basic nutrition knowledge

	Peri-urban City	Peri-urban Town	Urban City	Mega city	Urban Town
Do You Think That Feeding Colostrum to A Baby Is Important?	313 (96)	306 (97.76)	483 (99.1)	614 (98.2)	219 (96.4)
At What Age, It Is Right to Introduce semi solid foods	285 (87.42)	285 (91.05)	462 (95.8)	544 (87.04)	207 (91.2)
Do You Think Children Should Regularly Consume Fast Foods/	25 (7.66)	71 (22.68)	73 (15)	132 (21.12	46 (20.3)
Do You Try to Take At Least Five Colors of Food	191 (58.6)	188 (60.08)	340 (69.8)	333 (53.28)	134 (59)
Do You Wash Vegetables Before Cutting?	262 (80.4)	279 (89.14)	318 (65.3)	524 (83.84)	185 (81.5)
Do You Rinse the Water After Boiling Vegetables While Cooking?	126 (38.65)	113 (36.10)	172 (35.3)	142 (22.72)	81 (35.68)
Do All Members of Your Family Consume egg daily	85 (26.07)	85 (27.16)	159 (32.6)	170 (27.2)	65 (28.6)
Do You Add Sugar to The Milk of The Child?	225 (69.01)	160 (51.12)	197 (40.4)	225 (36)	82 (36.2)
Do You Change the Food Menu Frequently?	247 (75.75)	216 (69)	418 (85.8)	410 (65.6)	159 (70.04)

Source: author's calculation; Figures in parentheses represent percentages.

Table 4.46: Mothers' nutrition knowledge score

Score	1	2	3	4	5	6	7	8	9	10	Total
Freq. (%)	16 (0.8)	52 (2.6)	125 (6.3)	177 (8.95)	249 (12.6)	387 (19.6)	469 (23.71)	403 (20.37)	86 (4.4)	14 (0.7)	1978 (100)

Nowadays, media plays a crucial role in disseminating information. Electronic media has become far more popular compare to print media and others.

Table 4.47: Exposure to media according to region (%)

Indicators	Response	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	Total
Read Newspapers?	No	295(90	256(82)	382(78)	517(83)	179(79)	1,629(82)
	Yes	31(10)	57(18)	105(22)	108(17)	48(21)	349(18)
Watch TV News?	No	63(19)	97(31)	111(23)	270(43)	100(44)	641(32)
	Yes	263(81)	216(69)	376(77)	355(57)	127(56)	1,337(68)
Connected on Facebook?	No	256(79)	214(68)	287(59)	427(68)	133(59)	1,317(67)
	Yes	70(21)	99(32)	200(41)	198(32)	94(41)	661(33)

Source: author's calculation; Figures in parentheses represent percentages.

About 22% of women living in urban city responded that they read newspaper. But in peri-urban city, maximum women watch news on TV which is higher than other four regions. As social media is a great source of both knowledge and entertainment, 41.41% of urban town's mothers are connected to Facebook.

Section H: Dietary Diversity

To measure the dietary diversity, food consumption data were collected from the respondents about themselves, their children and households from 24-hour recall and 14 days food frequency recall from households. Table 4.48 explains the measurement of overall child dietary diversity where the consumption of food was categorized into 7 food groups. Among these food groups, less than 4 food groups, equal to 4 and more than 4 food groups consumption were classified as low dietary diversity, minimum dietary diversity and high dietary diversity respectively. Table 4.48 indicates that about 51% child were at low dietary diversity which was the highest among three categories, and 27% and 22% child were at moderate and high dietary diversity respectively. The result explains that most of the children were getting less than their required amount of diet.

Table 4.48: Measurement of Child Dietary Diversity (CDD) of different regions

Region	**Low** (<4food groups)	**Moderate** (4food groups)	**High** (>4food groups)	**Total**
Peri-urban city	152 (47)	101 (31)	73 (22)	326 (100)
Peri-urban town	147 (47)	89 (28)	77 (25)	313 (100)
Urban city	247 (51)	125 (26)	115 (24)	487 (100)
Mega city	360 (58)	159 (25)	106 (17)	625 (100)
Urban town	105 (46)	51 (22)	71 (31)	227 (100)
Total	**1011 (**51**)**	**525 (27)**	**442 (22)**	**1978 (100)**

Source: author's calculation; Figures in parentheses represent percentages.

Table 4.48 shows the comparison among those regions and found that most of the children of all four regions fall under low dietary diversity and the amount in each region was more than 46%. In mega city, the number of children under low dietary diversity was the highest, which was about 58% among all the children of that region.

Table 4.49 explains the women dietary diversity (WDD) where the consumption of food was categorized into 9 food groups. Among these food groups, consumption of less than or equal 4 food groups, 5 to 6 food groups and more than or equal 7 food groups were classified as low dietary diversity (LDD), moderate dietary diversity (MDD) and high dietary diversity (HDD) respectively. Table 4.49 indicates that about 76% women were at low dietary diversity which was the highest among three categories, and 24% women were at moderate dietary diversity. **There was no woman who had high dietary diversity.** The result explains that most of the women were getting less than their required amount of diet. The results also shows that most of the women from all five regions fall under low dietary diversity and the amount were about 67%, 77%, 73%, 81% and 79%, for peri-urban city, peri-urban town, urban city, mega city and urban town, respectively which was very high in amount. The situation was worse at mega city where only 19% women were at moderate dietary

diversity.

Table 4.49: Measurement of Women Dietary Diversity (WDD) of different regions

Region	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	**Total**
LDD (<=4 groups**)**	220 (67)	240 (77)	357 (73)	508 (81)	179 (79)	**1504 (76)**
MDD (4 groups**)**	106 (33)	73 (23)	130 (27)	117 (19)	48 (21)	**474 (24)**
Total	326 (100)	313 (100)	487 (100)	625 (100)	227 (100)	**1978 (100)**

Source: author's calculation; Figures in parentheses represent percentages.

Table 4.50 explains the measurement of women food variety score (total number of food items consumed in last 24 hours). The result showed that about 55% women were consuming more than or equal to 9 food items in a day which was considered as above standard and other 45% were consuming less than 9 food items in a day.

Table 4.50: Measurement of overall Women Food Variety Score (WFVS)

Status	**Score range**	**No. Of women**	**Percentage**
Below standard	<9	889	45
Above standard	>= 9	1089	55
Mean = 8.92, Std. Dev. = 2.25, Median = 9, Maximum = 19, Minimum = 2			

Table 4.51 represents the measurement of household dietary diversity of five different regions. The results shows that more than 60% households from all five regions achieve high dietary diversity, in case of regions, the households from peri-urban city was the highest which was about 71% and less than 7% households were at low dietary diversity of each region. The result may indicate that the food eaten by mother and the child are not all similar as the other household member(s) eat.

Table 4.51: Measurement of Household Dietary Diversity (HDD) of different regions on 24

hours recall

Region	LDD	MDD	HDD	Total
Peri-urban city	10 (3)	86 (26)	230 (71)	326 (100)
Peri-urban town	12 (4)	113 (36)	188 (60)	313 (100)
Urban city	12 (2)	141 (29)	334 (69)	487 (100)
Mega city	30 (5)	207 (33)	388 (62)	625 (100)
Urban town	16 (7)	56 (25)	155 (68)	227 (100)
Total	**80**	**603**	**1295**	**1978**

Source: author's calculation; Figures in parentheses represent percentages.

Table 4.52: Comparison between 24-hour recall and 14 days food frequency

Parameters	Low Dietary Diversity (≤ 3 food groups)	Medium Dietary Diversity (4 and 5 food groups)	High Dietary Diversity (≥ 6 food groups)	Mean	Standard Deviation
24 hours recall (%)	81 (4)	612(31)	1285(65)	6	2
14 days of the food frequency (%)	0 (0)	0(0)	1978(100)	11	1

Source: author's calculation; Figures in parentheses represent percentages.

Table 4.52 explains the comparison between 24-hour recall and 14 days food frequency of Household Dietary Diversity (HDD) where the consumption of food was categorized into 12 food groups. Among these food groups, consumption of less than or equal 3 food groups, 4 to 5 food groups and more than or equal 6 food groups were classified as low dietary diversity, medium dietary diversity and high dietary diversity respectively. In case of 24 hour recall, about 65% households were at high dietary diversity which was the highest among three categories, and in case of 14 days food frequency recall, 100% households were at high dietary diversity.

Section I: Information about caregivers

The study had categorized caregivers, and their knowledge and ability to provide care. In our study, about 47% mothers (929) were helped by caregivers for rearing their children. We found that grandmothers were mostly the caregivers of the children. There are reasons behind this. Usually grandmothers are experienced, trust worthy and they care their grand-children their level best. It is also the case who had a formal or informal relationship with the child. Table 4.53 presents the

educational qualification of caregivers.

Table 4.53 Some features of Caregivers' according to relationship with the Child

Caregivers' relationship with the Child								
Relationship	Aunt	Brother	Father	Grand Mother	Maid	Others	Sister	Total
Frequency	52 (6)	58 (6)	73 (8)	517 (56)	43 (5)	59 (6)	127 (14)	929 (100)
Educational qualification of the caregivers								
Caregivers' Educational Qualification	No Institutional Education	Incomplete Primary Education	Complete Primary Education	Incomplete Secondary Education	Secondary Complete or Higher	Total		
Frequency	326 (35)	124 (13)	158 (17)	131 (14)	190 (20)	929 (100)		
Perception of mothers about caregivers' knowledge about preparing child's meal								
Care giver has knowledge about preparing the meal				Yes	No	Total		
Frequency				662 (71)	267 (29)	929 (100)		

Source: author's calculation; Figures in parentheses represent percentages.

The average year of schooling for the caregivers was nearly 5 years, which means that they had at least the primary education. Though the maximum level of educational was 16 years but a very high percentage (35%) of caregiver did not have any institutional education. We had a question to the mother that whether the caregiver had knowledge about preparing child's food, almost 71% responded that "Yes, they have the knowledge".

Table 4.53 describes the relationship of caregiver with the child and the knowledge of preparing child's meal. We could see that grandmothers were the majority relatives who were playing the role of a caregiver. Among the grandmothers, 90% have knowledge about the preparation of child's meal and, almost 75% brothers did not have knowledge about preparing the child food.

While considering the relationship to know whether the caregivers know about nutrition, we found that majority (54.16%) of the grandmothers had knowledge whereas 60.47% of the maid didn't know about nutrition. On the other hand, 72% sisters and 84% brothers had no idea about nutrition. While considering the relationship of caregiver with child on the issue of dietary diversity, we found, among all the grandmothers, 50% had the knowledge about dietary diversity. But majority of the maids and sisters (56% and 58% respectively) didn't know anything about dietary diversity. When we asked the respondents that whether the caregivers can follow mothers' instructions or not, we found almost 93% as positive response. Only 7% couldn't follow the instructions.

Table 4.54 explains the relationship between the educational qualification of the caregiver and the knowledge about the preparation of child's meal, knowledge about nutrition and dietary diversity; and whether the caregiver is capable to follow mother's instructions. It was found the mothers perceive that nearly 71% had the knowledge about child nutrition whereas 29% didn't have knowledge. Among all the respondents having knowledge about child's meal preparation, a number of 35% had no institutional education. Majority of the negative reply about nutritional knowledge

was laid on the educational category of 'incomplete primary education' and 'no institutional education', which were 78% and 74% respectively. On the other hand, secondary complete and higher education category had the maximum positive response of 90%. When the question was asked about knowing the dietary diversity, among all the caregivers, 41% had knowledge about dietary diversity. For the question of capability of following mothers' instruction, no institutional education

category possessed the highest frequency and percentage on every option.

Table 4.54 Relationship between Caregivers' with child and relevant factors

Relationship	Aunt	Brother	Father	Grand Mother	Maid	Others	Sister	**Total**
Caregivers' knowledge about preparing the child's meal								
Yes	7 (13)	43 (74)	41 (56)	46 (10)	19 (45)	35 (57)	69 (54)	**241**
No	45 (87)	13 (22)	32 (44)	465 (90)	24 (56)	25 (42)	58 (46)	**662**
Total	52 (100)	58 (100)	73 (100)	517 (100)	43 (100)	59 (100)	127 (100)	**929**
Caregivers' nutrition knowledge								
Yes	42 (81)	9 (16)	42 (58)	280 (54)	11 (26)	16 (27)	35 (28)	435
No	10 (19)	49 (84)	31 (42)	237 (46)	32 (74)	43 (73)	92 (72)	494
Total	52 (100)	58 (100)	73 (100)	517 (100)	43 (100)	59 (100)	127 (100)	929
Caregivers' knowledge about dietary diversity								
Yes	40 (77)	6 (10)	38 (52)	257 (50)	10 (23)	11 (19)	21 (17)	383 (41)
No	12 (23)	52 (90)	35 (48)	260 (50)	33 (77)	48 (81)	106 (83)	546 (59)
Total	52 (100)	58 (100)	73 (100)	517 (100)	43 (100)	59 (100)	127 (100)	929 (100)
Capable of following mother's instructions								
Yes	48 (92)	56 (97)	68 (93)	485 (94)	43 (100)	48 (81)	113 (89)	861
No	4 (6)	2 (3)	5 (7)	32 (6)	0 (0)	11 (19)	14 (11)	68
Total	52 (100)	58 (100)	73 (100)	517 (100)	43 (100)	59 (100)	127 (100)	929

Source: author's calculation; Figures in parentheses represent percentages.

Table 4.55 Relationship between Caregivers' education and knowledge about child food and nutrition

Caregivers' Educational Qualification	Knowledge about preparing the child's meal		Knowledge about nutrition		Knowledge about dietary diversity		Capable to follow mother's instructions		Total
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	
No education	231(71)	93(29)	84(26)	242(74)	73(22)	253(78)	294(90)	32(10)	325(35)
Incomplete Primary	67(54)	57(46)	27(22)	97(78)	19(15)	105(85)	115(93)	9 (7)	124(13)
Complete Primary	114(72)	44(28)	75(47)	83(53)	71(45)	87(55)	148(94)	10 (6)	158(17)
Incomplete Secondary	92(69)	39(31)	78 (60)	53(40)	64(49)	67(51)	123(94)	8 (6)	131(14)
Higher Secondary	158(83)	32(17)	171(90)	19(10)	156(82)	34(18)	181(95)	9 (5)	190(20)
Total	662(71)	267(29)	494(53)	435(47)	383(41)	546(59)	861(93)	68(7)	929(100)

How Long Does the Child know the caregiver: It was found that the caregivers who were the family members, played the role of caregivers usually from the child's birth. Grandmothers and other family members showed the maximum frequency but the maid and others who didn't have any formal relationship with child show the maximum frequency in the category of 1 to 12 months.

Table 4.56: Relationship between Since How Long Does the Child Know the caregiver with Her Relationship with the Child

How Long Does the Child Know Her? (months)	Relationship with The Child							
	Aunt	**Brother**	**Father**	**Grand Mother**	**Maid**	**Others**	**Sister**	**Total**
Till 12 months	14	6	15	106	33	19	13	206
12.1 - 24 months	16	16	24	179	8	22	46	311
24.1 - 36 months	16	30	28	178	2	13	53	320
36.1 - 48 months	6	5	6	52	0	5	14	88
48.1 - 60 months	0	1	0	2	0	0	1	4
Total	52	58	73	517	43	59	127	929

Section J: Adolescent girls' nutritional status and knowledge

In the present study, we had found 145 households with the adolescent girls, who were blood connected relatives of the children. Table 4.57 showed the health status of those adolescents. The result shows that about 48% adolescent girls were at risk (increasing but acceptable) in terms of BMI which ranges from 18.5 to 23.0, about 27% girls were underweight whose BMI was below 18.5 and only 5% were at high risk whose BMI were more than 27.51.

Table 4.57: Health status of adolescent girls in different regions

Regions	**Adolescent BMI**		**No. of adolescents'**	
	Underweight (<18.5**)**	**Increasing but acceptable risk (**18.5-23.0**)**	**Increased Risk (**23.01-27.50**)**	**High Risk** (>27.51**)**
Peri-urban city	3 (2)	13 (9)	7 (5)	4 (3)
Peri-urban town	15 (10)	17 (12)	5 (3)	0 (0)
Urban city	9 (6)	18 (12)	7 (5)	1 (1)
Mega city	10 (7)	13 (9)	4 (3)	1 (1)
Urban town	2 (1)	9 (6)	5 (3)	2 (1)
Total	39 (27)	70 (48)	28 (19)	8 (6)

Source: author's calculation; Figures in parentheses represent percentages.

From Table 4.57, it was clear that about 10% adolescent girls were underweight who were from peri-urban town. On the other hand, the adolescent girls of peri-urban city were at high risk whose BMI were more than 27.51 and the amount was about 3%. About 12% adolescent girls of urban cities, were at increasing but acceptable risk. If we compare the overall results from all five regions then it could be said that the adolescent girls of mega city were in good health status than others. We have also found BMI has a positive relationship with wealth status, like most of the adolescent girls of lower SES category were underweight and at increasing but acceptable risk but the adolescent girls of higher SES were in good health status than others. Again, household heads' education may also play role in adolescents' BMI may be because education had a great impact on choosing nutritious food items for the household's daily consumption. In case of our study, where the household heads had completed secondary or higher education, about 8% adolescent girls were underweight, about 3% of them were at high risk, and a higher number (26%) of them were at increasing but acceptable risk.

The adolescent girls were asked about some questions related to general health features and their food habits. Table 4.58 represents that though about 54% adolescent girls know about dietary diversity but most of them were not maintaining the balance diet. More than 50% adolescent girls answered most of the answers incorrectly and in some questions, all of them answered incorrectly especially the questions related to taking care of infants and children. It was absurd that though a child was available at their home and they were also studying from their textbooks, but their

knowledge level was so poor.

Table 4.58: Answers (correct/ incorrect) from the adolescent girls about general health features

Questions	correct	Incorrect
Have You Heard About Dietary Diversity?	78 (54)	67 (46)
Please Mention Some Names of Iron Rich Foods?	58 (40)	87 (60)
Do You Take Soft Drinks Regularly?	65 (45)	80 (55)
Do You Like Sugary Foods?	84 (58)	61 (42)
Do You Take Fast Foods Frequently?	55 (38)	90 (62)
Did You Participate in Physical Activity	52 (36)	93 (64)
Do You Have Trouble in Sleeping?	21 (14)	124 (86)
How long after birth should a baby start breastfeeding?	52 (36)	93 (64)
What should a mother do with the first milk or colostrum?	2 (1)	143 (99)
If mother thinks her baby is not getting enough breast milk, what should she do?	7 (5)	138 (95)
How often should a baby breastfeed?	1 (1)	144 (99)
Do you think infants under 6 months should be given water if the weather is hot?	62 (43)	83 (57)
At what age should a baby first start to receive liquids other than breast milk?	5 (3)	140 (97)
At what age should a baby first start to receive foods in addition to breast milk?	6 (4)	139 (96)
Name one thing that can happen to children if they do not get enough iron?	38 (26)	107 (74)
What seasoning (food item) is often fortified with iodine?	1 (1)	144 (99)
For how many days do children need extra meal per day after they have been sick?	0 (0)	145 (100)
What needs to be done when the child has diarrhea?	1 (1)	144 (99)
When should you wash your hands?	1 (1)	144 (99)
What are some of the things we can do to encourage children to eat?	0 (0)	145 (100)
What Foods Does A Young Child Need in Order?	1 (1)	144 (99)

Source: author's calculation; Figures in parentheses represent percentages.

As the adolescents were the primary caregiver and also considered as future mothers so their nutritional knowledge about infant and young children matters most. The results from Table 4.59 explains that most of the adolescent girls didn't know about the questions related to infants and child nutrition and in some questions, it could be seen that no adolescent girls know the right answers of the questions. Table 4.59 consists of the responses of the adolescent girls on the knowledge about nutritional and health aspects of infant and young child. We had divided all the data into five different regions.

Table 4.59: Knowledge of adolescent girls of different region related to infant and young child nutrition (Number of adolescents)

Questions	Peri-urban city		Peri-urban town		Urban city		Mega city		Urban town	
	W	R	W	R	W	R	W	R	W	R
How long after birth should a baby start breastfeeding?	22 (15)	5 (3)	21 (14)	16 (11)	21 (1)	14 (10)	18 (12)	10 (7)	11 (8)	7 (4)
What should a mother do with the first milk or colostrum?	26 (18)	1 (1)	37 (26)	0 (0)	34 (23)	1 (1)	28 (19)	0 (0)	18 (12)	0 (0)
How often should a baby breastfeed?	26 (18)	1 (1)	37 (26)	0 (0)	35 (24)	0 (0)	28 (19)	0 (0)	18 (12)	0 (0)
If mother thinks her baby is not getting enough breast milk, what should she do	26 (18)	1 (1)	37 (26)	0 (0)	29 (20)	6 (4)	28 (19)	0 (0)	18 (12)	0 (0)
Do you think infants under 6 months should be given water if the weather is hot?	17 (12)	10 (7)	21 (14)	16 (11)	19 (13)	16 (11)	13 (9)	15 (10)	13 (9)	5 (3)
At what age should a baby first start to receive liquids other than breast milk?	26 (18)	1 (1)	37 (26)	0 (0)	32 (22)	3 (2)	27 (19)	1 (1)	18 (12)	0 (0)
At what age should a baby first start to receive foods in addition to breast milk?	26 (18)	1 (1)	37 (26)	0 (0)	31 (21)	4 (3)	27 (19)	1 (1)	18 (12)	0 (0)
Name one thing that can happen to children if they do not get enough iron?	22 (16)	5 (3)	23 (16)	14 (10)	26 (18)	9 (6)	19 (13)	9 (6)	17 (11)	1 (1)
What seasoning (food item) is often fortified with iodine?	27 (19)	0 (0)	36 (25)	1 (1)	35 (24)	0 (0)	28 (19)	0 (0)	18 (12)	0 (0)
For how many days do children need extra meal per day after they have been sick?	27 (19)	0 (0)	37 (26)	0 (0)	35 (24)	0 (0)	28 (19)	0 (0)	18 (12)	0 (0)
What needs to be done when the child has diarrhea?	27 (19)	0 (0)	36 (25)	1 (1)	35 (24)	0 (0)	28 (19)	0 (0)	18 (12)	0 (0)
When should you wash your hands?	27 (19)	0 (0)	37 (26)	0 (0)	35 (24)	0 (0)	28 (19)	0 (0)	18 (12)	0 (0)
What are some of the things we can do to encourage young children to eat	27 (19)	0 (0)	37 (26)	0 (0)	35 (24)	0 (0)	28 (19)	0 (0)	18 (12)	0 (0)
What Foods Does A Young Child Need in Order	27 (19)	0 (0)	36 (25)	1 (1)	35 (24)	0 (0)	28 (19)	0 (0)	18 (12)	0 (0)

Source: author's calculation; Figures in parentheses represent percentages; *W = Wrong Answer, R = Right Answer*

From the above table, we could easily see that, in every question, majority of the adolescent girls, answered negatively or gave us the wrong answer irrespective of regions. This was a clear indication that there was a knowledge gap about infant or child nutrition among our next generation mothers which may have a great consequence on nation building.

4.2 Comparison of primary and secondary data

We have used Bangladesh Demographic and Household Survey 2014 (BDHS-2014) data as our secondary data source. All the data in BDHS were collected across from the country with nationally representative sample size. We first separated the data from the whole data set to match our requirements. We retain only those observation where respondent was a mother and having at least one 6 to 59 months child. After then we matched the variables with our primary data and retain the following variables. Due to a smaller number of variables, we didn't run any regression or developed any index. We just computed the percentage and compared it with our primary data.

Mother's working status was present in both data sets. From the following **Error! Reference source not found.**, we can see the difference between our study and the BDHS-2014 study. The graph shows that the percentage of working mothers has almost 20% increased over the period. That represent the rapid urbanization makes more scope for women to work outside.

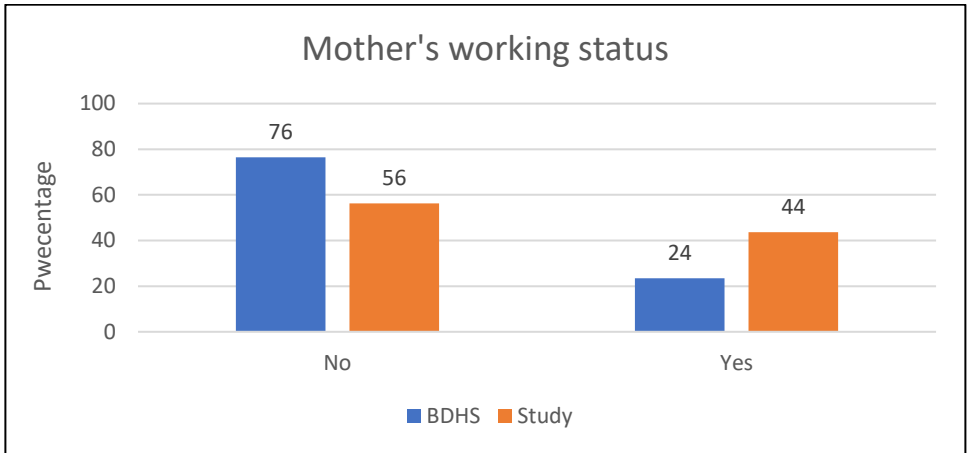


Figure 4.1: Mother's working status

Respondents' education was also a crucial factor in both studies. From **Error! Reference source not found.**, its clearly visible that number of illiterate women had fallen over the period. On the other hand, the percentage of higher educated women has risen almost double. The graph also shows that primary and secondary education completed women is also falls and indicating that they are entering

into higher education.

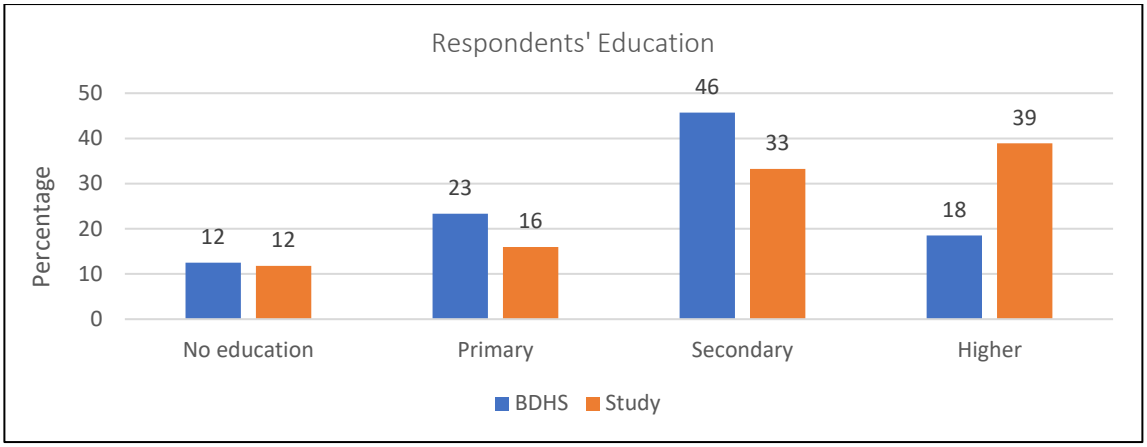


Figure 4.2: Respondent Education

Bangladesh is a country where Muslim people occupy the majority of the population. **Error! R eference source not found.** is also showing the same evidence. In both study Muslim family and other religious family is almost in similar percentage.

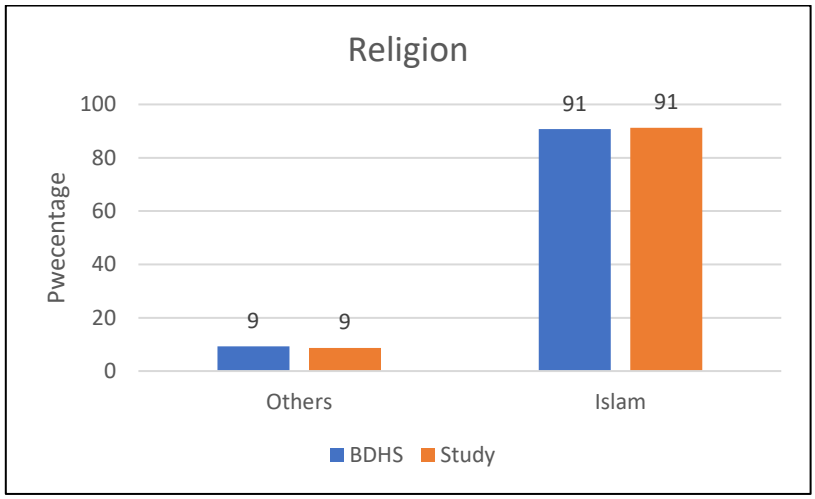


Figure 4.3: Religion of the Household

We didn't find the adequate variables that we can develop women empowerment index. But we found some variables that are similar to our study. In **Error! Reference source not found.**, it is s howing that the person who decided the large household purchase. In this calculation we kept respondent only and respondent and her husband as empowered, otherwise disempowered.

Similar technique has been used in both studies.

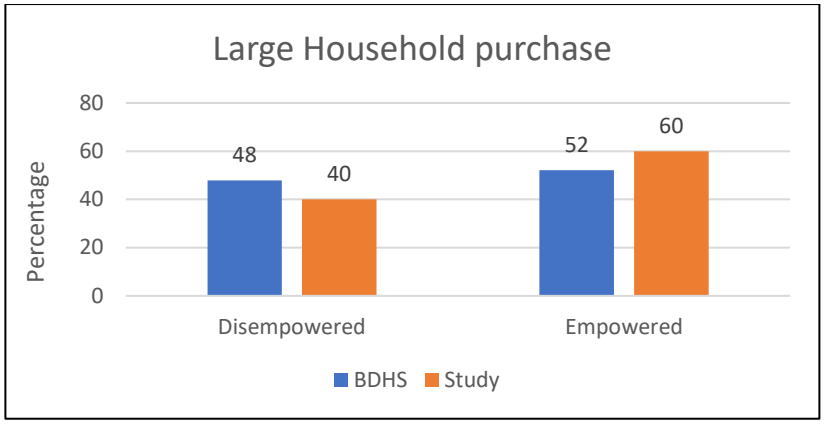


Figure 4.4: Decision related to large household purchase

It is transparently visible from the above graph that the decision-making power both jointly and alone by the women herself had increased over the period. The person who decides health expenditure also follows the same calculation method. In **Error! Reference source not found.**, it is a lso clear that taking decision in health purpose has also rises.

Visiting relatives' house was also present in both studies. In **Error! Reference source not found.**, i t is found that, 62% women could visit their relatives' house whenever they wanted in our study, where the 38% couldn't go to their relatives' house from BDHS-14 study. That reveals mobility has

been increased now.

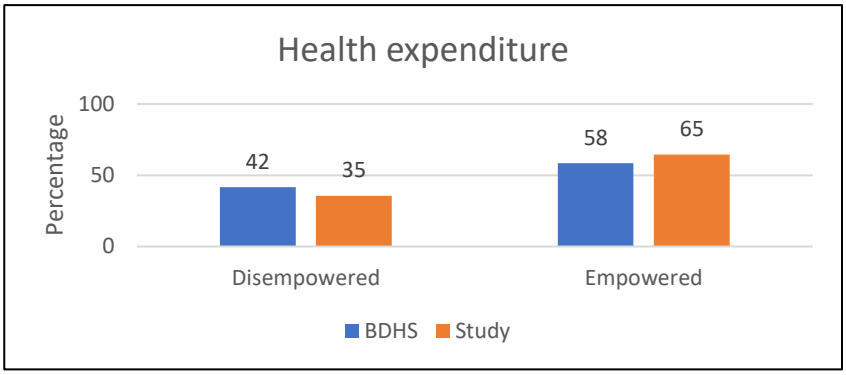


Figure 4.5: Decision related to health expenditure

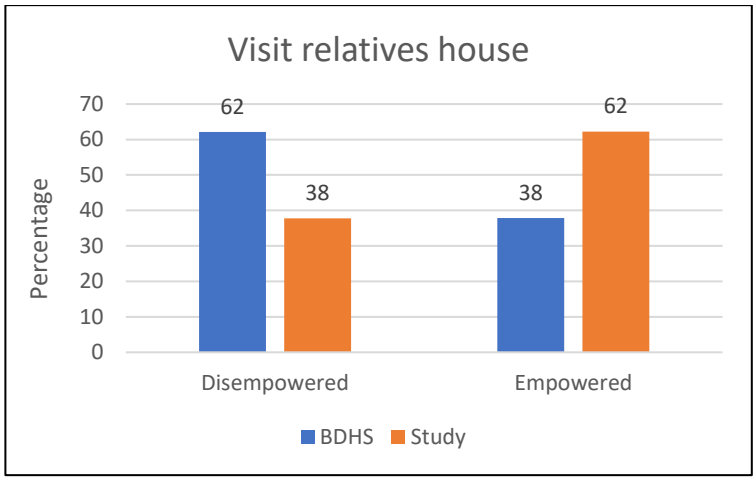


Figure 4.6: Visit to relatives' house

Another important variable that is beating practiced by the husband is also estimated. **Error! Reference source not found.** represent that the incidence of beating by husband has also fall over the periods.

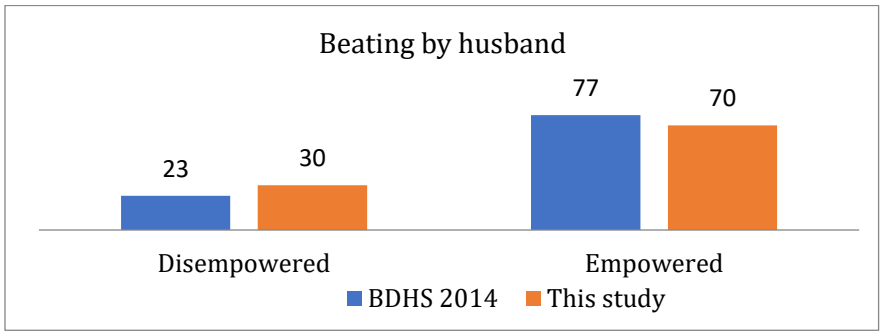


Figure 4.7: Beaten by Husband

Child nutritional status can be measured by three different indicators such as stunting, wasting and underweight. As compared to BDHS 2014 data, we can see that almost 20% child was severely stunted whereas 16% were moderately stunted in BDS 2014 these numbers were 10 and 22%

respectively. The amount of normal child had been decreased while conducting this study to 61% which was 67% in 2014 (Figure 4.8).

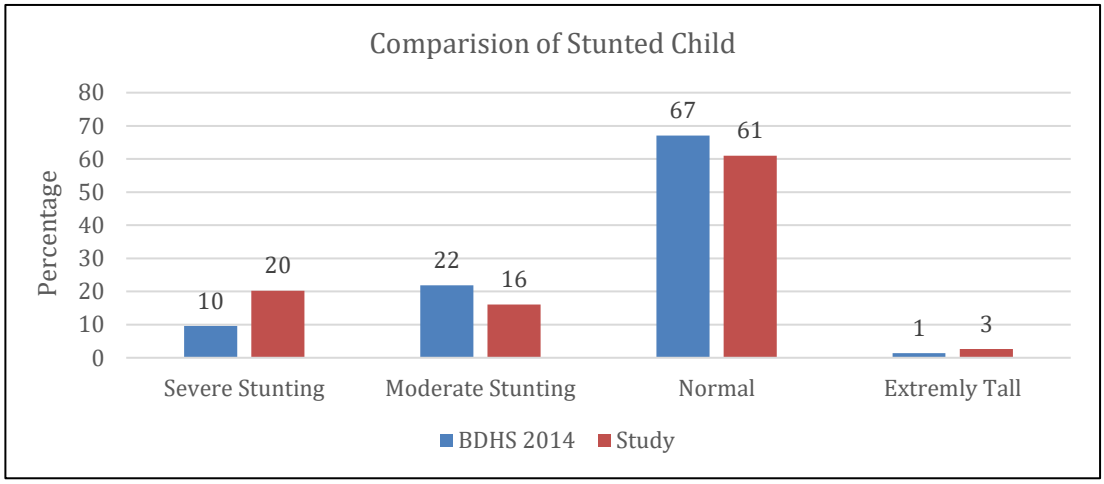


Figure 4.8: Comparison of child nutritional status (Stunting)

Almost a similar kind of trend can be found in the case of wasting. Though the percentages of severely wasted children were the same, the amount of moderately wasted children has decreased from 9% to 6% over the period of time. Similarly, the number of normal children had been decreased from 79% to 57%. On the other hand, overweight and obesity now can be found largely among children (Figure 4.9).

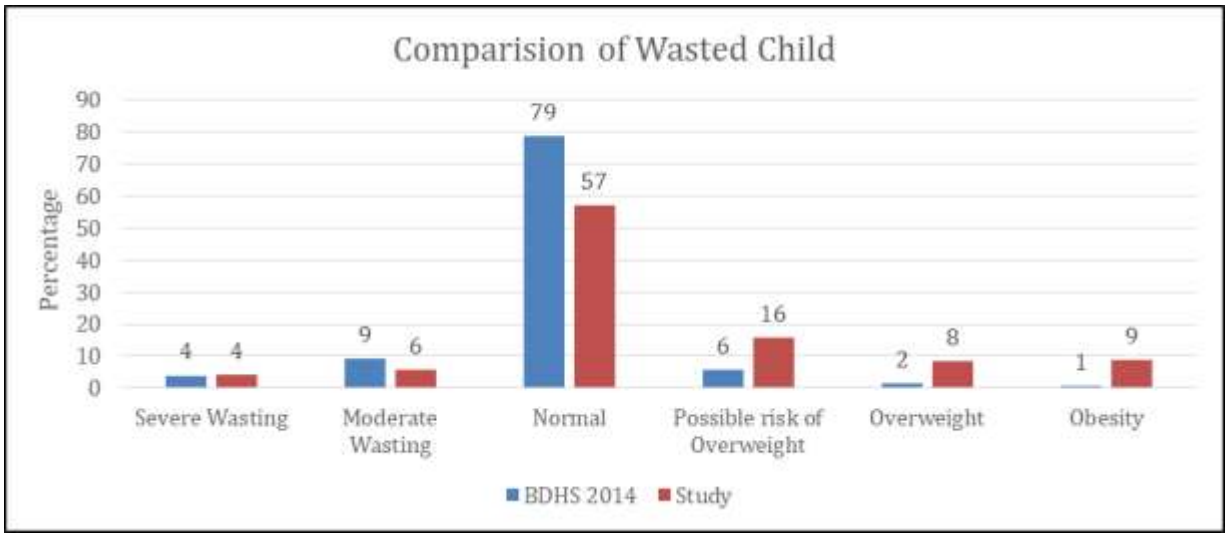


Figure 4.9: Comparison of child nutritional status (Wasting)

From Figure 4. 10, we can identify the difference between underweight children found in 2014 data and in our data. We can see that the number of severely and moderately underweight children had been decreased from 7% to 5% and 20% to 11%, whereas the number of the normal and overweight children had been increased from 70 to 72 percent and 42 to 12% respectively.

From Figure 4.11, we can compare the wealth index of the households calculated in 2014 and study in 2020. From the figure, we can see that the amount of poorest of the poor and middle-class families

had been increased from 9 to 21%, 7 to 19%, and 14 to 20% respectively. On the other hand, the percentage of the richer and richest family has been decreased from 28% to 23% and 42% to 16% respectively. This is an indication that the number of middle-class families is increasing and the number of high-class families is decreasing.

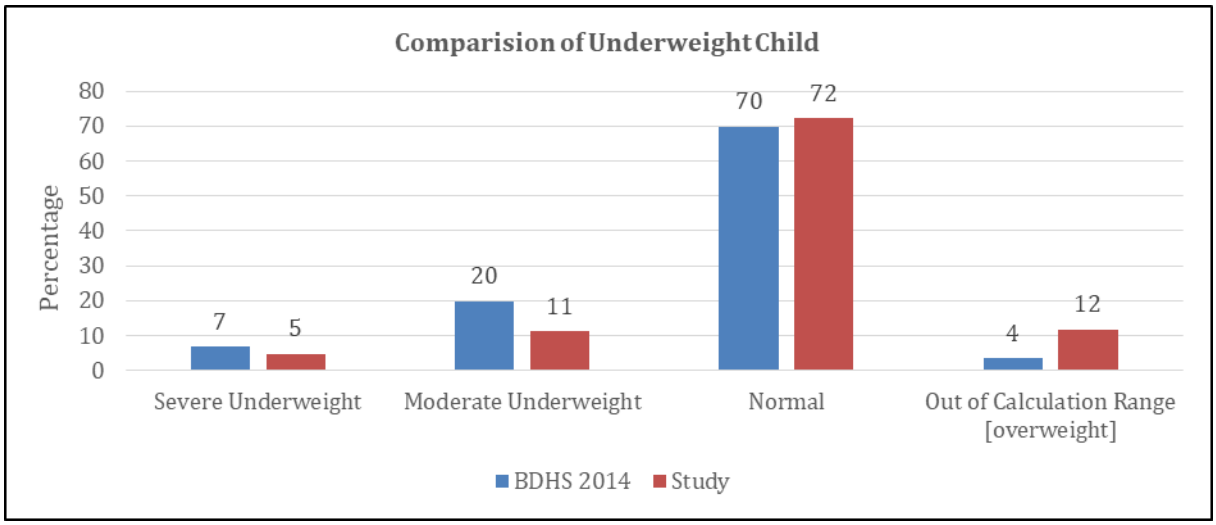


Figure 4. 10: Comparison of child nutritional status (Underweight)

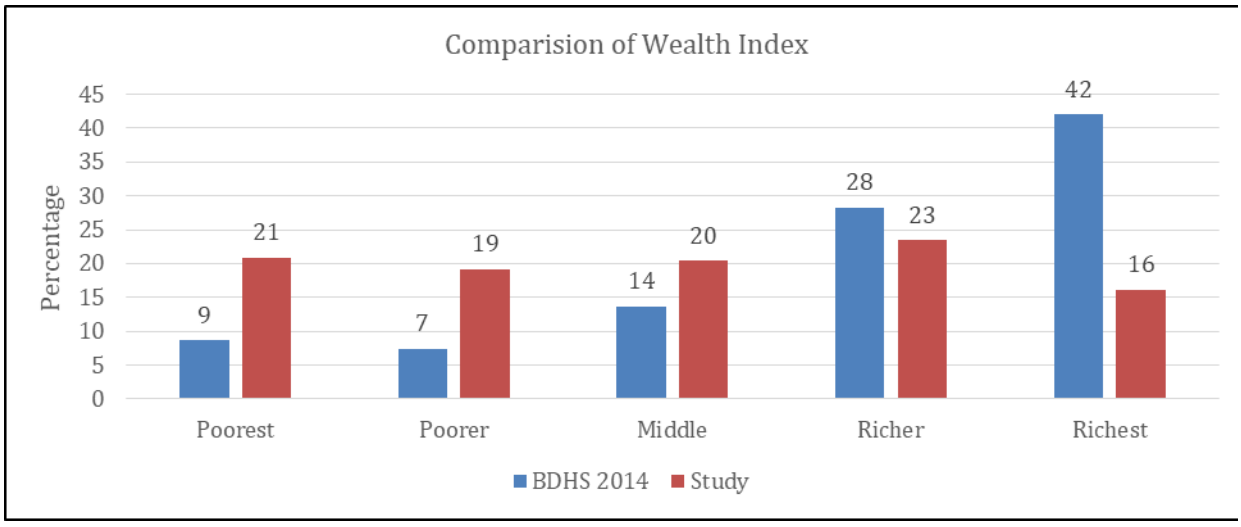


Figure 4.11: Comparison of household wealth index

In the case of child dietary diversity (Figure 4.12), the comparison between BDHS 2014 data and our survey data shows that the amount of child with having low dietary diversity has been decreased from great achievement towards SDG. On the other hand, the number of children having moderate and high dietary diversity had been increased from 6% to 27% and 3% to 32% respectively. These positive findings indicate that over the period of 6 years, children's dietary condition had been

improved which reduces child malnutrition.

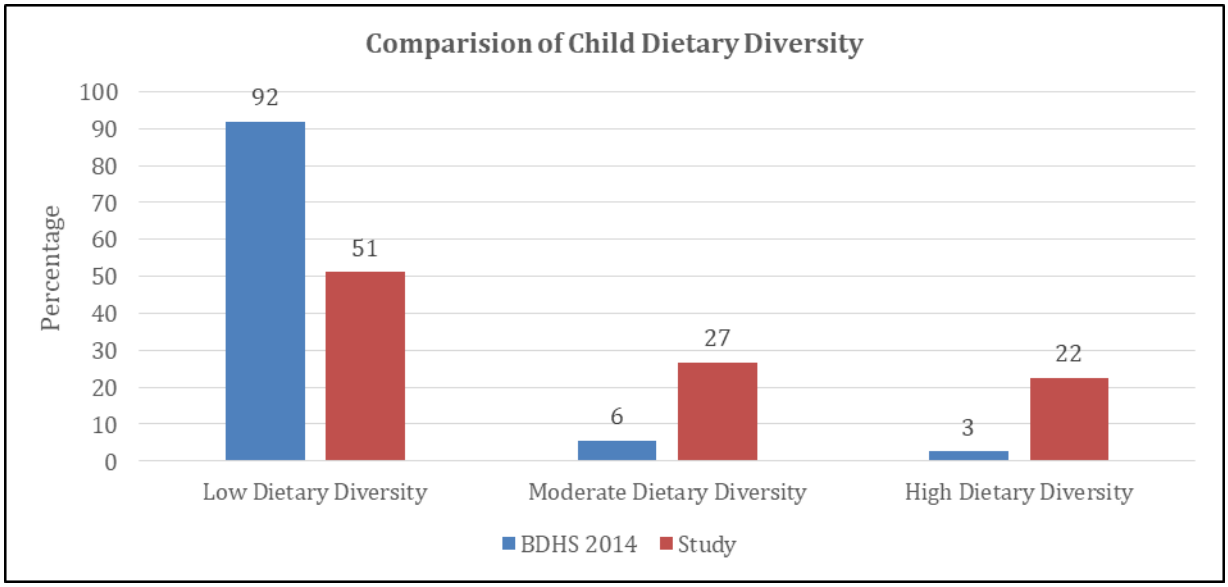


Figure 4.12: Comparison of child dietary diversity

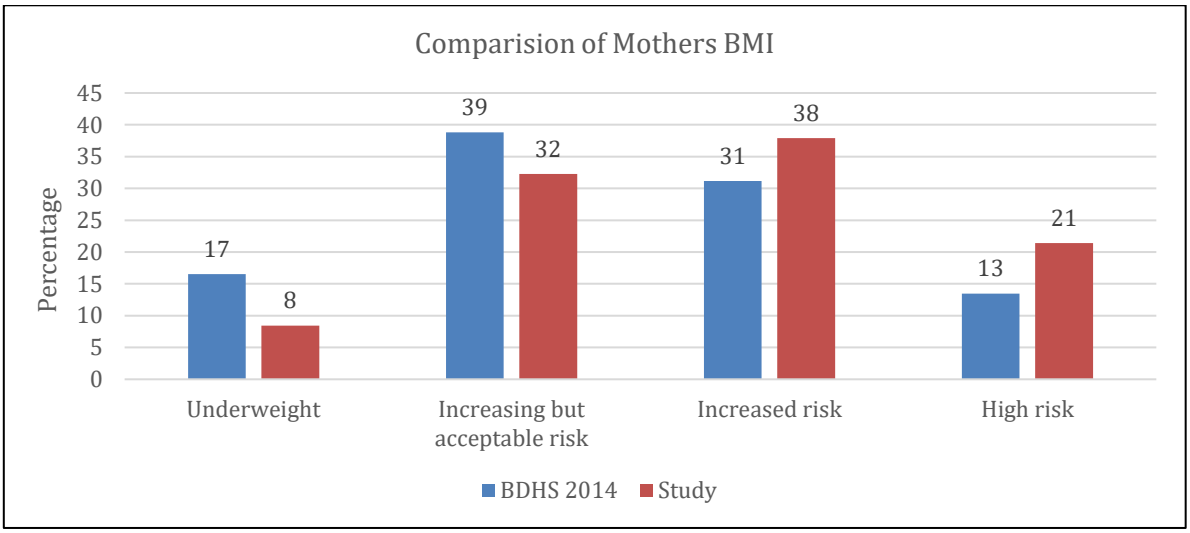


Figure 4.13: Comparison of Mothers' BMI

Mothers' nutritional status has been measured by using body mass index (BMI). From

, we can see that over the period of 6 years, the number of underweight mothers had been decreased

from 17 to 8% along with mothers with increasing but acceptable risk which is from 39% to 32%. On the contrary, mothers with the risk of obesity had been increased from 31% to 38% for those who have a moderate risk of obesity and 13% to 21% for those who have a high risk of obesity.

4.3 Bivariate analysis

We have done the bivariate test between different categorical variables. Chi square nonparametric test was done to identify the variables which might have significant association between our predefined dependent variables, child nutritional status and women empowerment. The justification of doing chi square test is that our variables are categorical in nature. It tells us only whether there is association is present among variables and not indicate the direction of association (positive or negative).

From **Error! Reference source not found.**, we can identify those variables which have significant a ssociation with the three measures of child anthropometry. Respondents' age has a highly significant association between underweight as well as stunting and wasting. Though stunting and wasting is significant at 5% but underweight is significant at 1%. On the other hand, mothers' educational status is highly significant with all these three measures at 1% level of significance. Likewise, respondents' living area, sanitation, age of the first baby born, child, women and household dietary diversity, mother's nutritional status, mother's nutrition knowledge and practice along with household wealth index are associated with child nutritional status.

Hence household ownership is associated with wasting and underweight but there is no association with child stunting. Similarly, the age of first marriage has significant association with wasting and underweight but no such relationship with stunting. Moreover, child sex has no association with any of these anthropometric variables.

Table 4.60: Summary of bivariate associations between child, maternal and household

characteristics and nutritional status of children (n = 1978)

Variables	Empowerment	Weight for Height (WHZ)	Weight for Age (WAZ)	Height for Age Z-score (HAZ)
Age	24.20***	20.45**	30.75***	25.58**
Education	29.47***	47.93***	101.61***	45.66***
Area of living	86.18***	36.95***	92.14***	51.48***
Household Ownership	3.28^{NS}	0.538^{NS}	6.90**	0.324^{NS}
sanitation	63.26***	9.64**	18.69***	12.26**
Age of getting married	69.60***	22.45***	39.69***	13.05^{NS}
Age at first baby born	67.10***	22.13**	50.07***	28.34***
Child Sex	0.14 ^{NS}	3.72^{NS}	1.85^{NS}	0.93^{NS}
Child Dietary Diversity	3.35^{NS}	19.80***	14.72***	27.47***
Women Dietary Diversity	9.85***	12.55***	23.97***	7.59**
Household Dietary Diversity	6.71**	14.86***	32.42***	15.45**
Mother's BMI	20.15***	55.78***	90.95***	24.02***
Mothers Nutrition Knowledge	111.00***	15.94***	31.48***	8.54**
Wealth Index	62.26***	63.36***	137.55***	41.74***
Empowerment	-	8.411**	5.37**	3.08^{NS}

*** p<0.01, ** p<0.05, *p<0.1, ^{NS} Not significant; Source: Summary of Appendix tables

Table 4.60 shows us the summary of how different variables are associated with women empowerment and child nutritional status. It is also proving information about the probable independent variables for regression analysis. All the tables of bivariate associations have been shifted in Appendix section

From the above tables, we can see that most of the explanatory variables are significant in 1% to 10% level of significance. Among them, mother's education, times of ante-natal care received, mother's dietary diversity, productive working hours, month of the delivery, status of ante-natal care, housing status, drinking water status and mother knowledge about child nutrition are significant at 1% level of significance. Some of the empowerment dimensions such as access to and control over resources, mobility, exposer to media etc. were also found significant at 1% level of significance. But the age of getting married was found insignificant though it might have an effect on child nutrition level. To achieve the direction of the association among the variables, we have conducted regression analysis that has been discussed in the next chapter.

5 Statistical Analysis - Regression

This analysis aim to empirically determine how dimensions of women's empowerment influence children's nutritional outcomes among households in urban areas of Bangladesh. Therefore, in this section, we are going to discuss the relationship between the outcome variables (child nutritional status indicators) with independent variables (different maternal factors, household factors, etc.). Correlation, χ^2 test, the robustness of the model, endogeneity, multicollinearity, etc. were tested between the independent variables before analysing through regression. Since the dependent variable, child nutritional status which was calculated by three different indicators has more than two categories so multinomial Logistic regression model was used to estimate the probabilities of being affected by several exposure variables. For the sake of better interpretation, the relative risk ratio was considered instead of the coefficient. To explore the in-depth causes, different variables or different forms of variables were used. For example, While checking multicollinearity among the five dimensions, we found self-esteem and decisions taken in the households have multicollinearity with access to resources dimension, which may mean that those who have better access to and control over resources, are more self-esteemed and better able to take decisions at their household. Again mother's education and nutritional knowledge had a significant level of multicollinearity. Therefore, we have used either education or nutrition knowledge in a model. Wherever we have categorized education, we used four categories such as no institutional education, up to secondary education, secondary to higher secondary education and higher education. As a result, we got 6 to 8 different models for every dependent variable. Since there is more than one model, so to identify the best one, we have calculated the Akaike information criterion (AIC). The Akaike information criterion (AIC) is an estimator of prediction error and thereby the relative quality of statistical models for a given set of data. AIC estimates the relative amount of information lost by a given model: the less information a model loses, the higher the quality of that model.

5.1 Regression Analysis: Factors influencing stunting

Table 5.1 represents the multinomial logistic regression model where the dependent variable is child height for age (HAZ) Z score which is known as stunting. We have categorized stunting into three broad categories: severely stunted (Children whose height-for-age z-score is <3.0 standard deviations (SD)), moderately stunted (height-for-age z-score is <-2.0 SD) and not stunted/Normal/ Healthy (height-for-age z-score is ≥-2 to ≤ 2 SD)

As the dependent variable has three outcomes so we have done multinomial logistic regression model, considering the normal category as the base outcome category (also known as reference category). Here we have conducted 6 regression analyses. In model 1 to 3, we have used empowerment as a binary outcome variable but in model 4 to 6, we have considered three different dimensions of empowerment as independent variables. In model 2 and model 6, education was used as categorical variable, where in model 3 and model 4, it was years of schooling. In model 1 and 5, nutrition knowledge was used in lieu of education. We have tried to maintain the consistency regarding the reference category of independent variables, e.g., we have used no institutional education as the reference category of education variable, no ANC visit in case of ante-natal care during pregnancy, low level of knowledge in case of mother's nutrition knowledge low dietary diversity in case of both women and child dietary diversity, unimproved system in case of sanitation Practice, disempowered in case of women empowerment.

In case of height for age Z score (stunting), we have used two types of regressions. In one type, we have used binary outcome 'women empowerment' variable (model 1 to model 3) and in the other type, we have used three dimensions of the empowerment (model 4 to model 6). Among the first 3 models, model 3 and among the last 3 models, model 5 has the lowest AIC. So, in this case we will further discuss these two models separately.

Table 5-2: Factors influencing stunting

Base outcome = Normal	**Relative Risk Ratio (Standard Error)**					
Independent Variables	***Model 1 AIC = 3527.08***	***Model 2 AIC = 3531.85***	***Model 3 AIC = 3524.68***	***Model 4 AIC = 3510.28***	***Model 5 AIC = 3510.19***	***Model 6 AIC = 3515.33***
In case of Severe Stunting						
Respondent Education (Ref: no institutional education, in case of category)						
Level of education (year of schooling)			0.962** (0.014)	0.978 (0.017)	-	
Up to Secondary	-	0.647*** (0.119)	-	-	-	0.784 (0.152)
Secondary - Higher Secondary	-	0.702 (0.161)	-	-	-	0.949 (0.241)
Higher Education	-	0.683** (0.154)	-	-	-	0.942 (0.246)
Ante-natal Care during Pregnancy (Ref: low ANC care)						
Medium	1.108 (0.163)	1.048 (0.155)	1.143 (0.169)	1.151 (0.173)	1.132 (0.17)	1.085 (0.164)
Highest	0.675*** (0.105)	0.703*** (0.111)	0.731*** (0.116)	0.733** (0.117)	0.699*** (0.11)	0.715*** (0.114)
Mothers' nutrition Knowledge (Ref: Low)						
Medium	0.981 (0.141)	-			1.124 (0.175)	
Highest	0.667*** (0.11)	-			0.798 (0.151)	
CDD (Ref: Low dietary diversity)						
Moderate Dietary Diversity	0.574*** (0.084)	0.576*** (0.085)	0.585*** (0.086)	0.606*** (0.09)	0.596*** (0.088)	0.602*** (0.089)
High Dietary Diversity	0.67*** (0.108)	0.639*** (0.104)	0.682*** (0.111)	0.704*** (0.116)	0.707*** (0.116)	0.676*** (0.111)
Sanitation Practice (Ref: unimproved)						
Improved	0.494*** (0.071)	0.492*** (0.072)	0.501*** (0.072)	0.542*** (0.082)	0.547*** (0.083)	0.549*** (0.084)
Women Empowerment (Ref: dis-empowered)						
Empowered	1.434*** (0.206)	1.349*** (0.195)	1.401*** (0.2)			
Attitude and behaviour of Partner				0.902 (0.058)	0.907 (0.059)	0.897** (0.058)
Access & Control Over resources				0.878 (0.073)	0.852*** (0.066)	0.825*** (0.069)
Mobility				1.269*** (0.076)	1.286*** (0.078)	1.25*** (0.076)
Constant	0.768** (0.11)	0.996 (0.176)	0.893 (0.133)	0.76 (0.15)	0.655*** (0.116)	0.742 (0.161)

Base outcome = Normal	**Relative Risk Ratio (Standard Error)**					
Independent Variables	***Model 1 AIC = 3527.08***	***Model 2 AIC = 3531.85***	***Model 3 AIC = 3524.68***	***Model 4 AIC = 3510.28***	***Model 5 AIC = 3510.19***	***Model 6 AIC = 3515.33***
In case of Moderate Stunting						
Respondent Education (Ref: No institutional education)						
Level of education (year of schooling)			0.948*** (0.015)	0.973 (0.018)		
Up to Secondary		0.561*** (0.111)				0.69** (0.143)
Secondary to Higher Secondary		0.444*** (0.112)				0.612** (0.17)
Higher Education		0.45*** (0.109)				0.633 (0.178)
Ante-natal Care during Pregnancy (Ref: Low level of care received)						
Medium	1.018 (0.164)	1.001 (0.162)	1.037 (0.168)	1.05 (0.173)	1.05 (0.172)	1.032 (0.169)
Highest	0.859 (0.139)	0.936 (0.155)	0.942 (0.156)	0.943 (0.157)	0.899 (0.148)	0.945 (0.157)
Mothers' nutrition Knowledge (Ref: low)						
Medium	0.767** (0.119)				0.91 (0.152)	
Highest	0.564*** (0.098)				0.71** (0.142)	
CDD (Ref: low dietary diversity)						
Moderate Dietary Diversity	0.869 (0.134)	0.879 (0.136)	0.878 (0.135)	0.91 (0.141)	0.903 (0.14)	0.915 (0.142)
High Dietary Diversity	1.106 (0.182)	1.114 (0.186)	1.133 (0.189)	1.191 (0.202)	1.188 (0.2)	1.184 (0.201)
Sanitation Practice (Ref: unimproved)						
Proper	0.771 (0.126)	0.8 (0.133)	0.781 (0.129)	0.878 (0.151)	0.882 (0.151)	0.899 (0.156)
Women Empowerment (Ref: Dis-empowered)						
Empowered	1.155 (0.185)	1.119 (0.18)	1.14 (0.182)			
Attitude and behaviour of Partner				0.919 (0.063)	0.935 (0.066)	0.918 (0.063)
Access & Control Over resources				0.807*** (0.072)	0.795*** (0.066)	0.807*** (0.071)
Mobility				1.193*** (0.078)	1.204*** (0.079)	1.183*** (0.078)
Constant	0.418*** (0.069)	0.549*** (0.109)	0.48*** (0.083)	0.348*** (0.077)	0.319*** (0.064)	0.388*** (0.093)

**** 1%, ** 5%; * 10% level of significance*

In the case of model 3 of Table 5.1, it could be mentioned here that as the year of schooling of a mother increases by 1 year, children will be 0.96 times less likely to be severely stunted and almost 0.95 times less likely to be moderately stunted when comparing with healthy child. This result is statistically significant at 1% level as well.

In case of ante-natal care received by mother during pregnancy period, we have categorized the data into 3 categories, such as low, medium and high. Low category is considered as reference category. Here, only highest category has been found significant at sever stunting group. All other categories have been found to be statistically insignificant for all other cases. Compared to low ANC, if the clinical care increased from low to highest category, a child will 0.73 times less likely to be severely stunted. Similar findings is also mentioned by Kuhnt and Vollmer (2017), in which they found that at least one ANC visit reduced the probability of neonatal mortality by 1.04% points and lower probability of infant mortality by 1.07%. Having at least four ANC visits reduced the probability of infant mortality by 0.42%. They also found that at least one ANC visit is associated with a 3.82%, 4.11% and 3.26% points reduced probability of giving birth to a low-birth-weightbaby, stunting and underweight respectively. Having at least four ANC visits reduced the probability by an additional 2.83%, 1.41% and 1.90% points, respectively.

Similarly, the findings revealed that if the child dietary diversity increases from low to moderate level and low to high level then the child will be 0.59 times and 0.68 times less likely to be severely stunted respectively. In case of an upgrade from low to high dietary diversity, child will be 0.68 times and 0.71 times less likely to be severely stunted for model 3 and 5 respectively. But, in moderate stunting group, no category shows any statistically significant effect. As the sanitation practice improves from improper to proper, child will be 0.50 times less likely to be severely stunted. And sanitation practice has no significant effect for moderate stunting child group. As mother becomes empowered from a disempowered situation, the child will be almost 1.40 times more likely to be severely stunted and it has no significant effect for moderately stunted. In case of ante-natal care, it shows that low to medium category does not significantly influence child nutritional status but there is 69% less likely chance for an upgrade from low to highest ante-natal care received during pregnancy. When we compare healthy child with moderately stunted child, we can see that, due to an upgrade in the ante-natal care from low to medium or high level, there is no significant impact but the result is quite similar to the previous result of the severe stunting and normal comparison.

From model 5 we can also see that mother's nutrition knowledge can play a vital role on child nutritional status improvement. Considering normal as the base category and moderate stunting as the comparison category, we can see that if the nutrition knowledge of the respondents' increases from low to medium, then that does not bring a significant change in child nutritional status. But if the nutritional knowledge increases from low to highest level, then the child will be 0.71 times less likely to be moderately stunted. But we did not find a statistically significant relationship in case of severe stunting.

If the child dietary diversity upgrades from low to moderate level, then the child will be almost 0.60 times less likely to be severely stunted which is almost 0.71 times for an upgrade to high from low dietary diversity. But when we consider moderate stunting, then the child dietary diversity cannot

play statistically significant role, hence, the upgrade from low to moderate dietary diversity can affect positively, means the child will be less likely to be stunted.

If the sanitation practice improves from improper to proper, then the child would have 0.55 times less probability of being severely stunted but it shows non-significant impact for moderately stunted group. In case of model 3, it was found that if mothers upgrade from disempowered to empowered status, the child would be 1.4 times more severely stunted, though it is not found significant in case of moderately stunted group/category, but the result is surprising as we expected. Therefore, we decomposed the empowerment in its' 3 dimensions: attitude and behaviour of partner, access & control over resources, and mobility (model 5). We found that if the mother has an access and control over resources, the child will be 0.85 times and 0.79 times less likely to be stunted in case of severe and moderate stunting. But if mothers' mobility increases, the result shows that there is a more chance of the child to be severely and moderately stunted by 0.28 times and 0.20 times respectively. Partner's attitude and behaviour has been found insignificant at both severe and moderate stunting groups for children.

5.2 Regression Analysis: Factors influencing wasting

Low weight-for-height is defined as wasting, which often indicates recent and severe weight loss, although it may persist for a long time. Table 5.2

Table 5.3presents the multinomial logistic regression model where we have considered weight for height Z score (WHZ) as the dependent variable. In this case, we have categorized the Z score into three categories:

1. Wasted (Range): Children whose weight-for-height z-score is <-3 to <-2 standard deviations
2. Normal/ Healthy (Range): children whose weight-for-height z-score is ≥-2 to ≤2 standard deviations
3. Above normal (Range): Children whose weight-for-height z-score is > 2 to ≤ 3 standard deviations. They have the risk of obesity or those who are suffering from overweight.

As the dependent variable has three outcomes so we have done multinomial logistic regression considering the normal/healthy group as the base outcome category (also known as the reference category). All the figures in Table 5.2 show the relative risk ratio with their respective level of significance and standard error in the parenthesis. Among the six models, we have used binary outcome of empowerment in the first three models (model 1 to model 3) and in the last three models we have used three different dimensions of empowerment. So, among these two broad categories, we will discuss model 3 and model 5 (Table 5.2) since the AIC of these models are lowest.

Table 5.3: Factors influencing child wasting

Base outcome = Normal	Relative Risk Ratio (Standard Error)					
Independent Variables	*Model 1 AIC = 3570.08*	*Model 2 AIC = 3549.73*	***Model 3 AIC = 3543.26***	*Model 4 AIC = 3540.98*	***Model 5 AIC = 3533.94***	*Model 6 AIC = 3536.1*
In case of wasted						
Child care support *(Family)*	0.709*** (0.117)	0.748** (0.124)	0.712*** (0.118)	0.735** (0.122)	0.753** (0.125)	0.724** (0.12)
CDD (Ref: Low)						
Moderate Dietary Diversity	0.647*** (0.127)	0.706** (0.14)	0.692** (0.137)	0.688** (0.137)	0.709** (0.142)	0.701** (0.14)
High Dietary Diversity	0.657** (0.146)	0.791 (0.182)	0.785 (0.182)	0.806 (0.187)	0.841 (0.197)	0.833 (0.195)
Mothers BMI (Ref: underweight)						
Increasing but acceptable risk	0.459*** (0.105)	0.508*** (0.118)	0.521*** (0.122)	0.547*** (0.128)	0.549*** (0.129)	0.559*** (0.132)
Increased the risk	0.265*** (0.065)	0.317*** (0.079)	0.328*** (0.083)	0.357*** (0.092)	0.363*** (0.094)	0.371*** (0.096)
High risk	0.315*** (0.086)	0.383*** (0.106)	0.397*** (0.111)	0.43*** (0.123)	0.443*** (0.127)	0.453*** (0.13)
Women Empowerment (Ref: Dis-empowered)						
Empowered	1.387** (0.263)	1.462*** (0.282)	1.395** (0.27)			
Access & Control Over resources				0.72*** (0.067)	0.805*** (0.083)	0.789*** (0.085)
Attitude and behaviour of Partner				1.021 (0.085)	1.09 (0.094)	1.041 (0.087)
Mobility				1.144 (0.094)	1.152** (0.095)	1.129 (0.094)
Mothers' nutrition Knowledge (Ref: Low)						
Medium		0.534*** (0.104)			0.574*** (0.12)	
Highest		0.477*** (0.1)			0.553*** (0.136)	
Respondent's Education (Ref: No Institutional Education)						
Up to Secondary			0.602*** (0.127)			0.698 (0.157)
Secondary to Higher Secondary			0.352*** (0.113)			0.463*** (0.164)
Higher Education			0.433*** (0.128)			0.618 (0.215)
Constant	0.557*** (0.116)	0.657** (0.141)	0.779 (0.194)	0.416*** (0.096)	0.572*** (0.145)	0.598** (0.179)

Base outcome = Normal	Relative Risk Ratio (Standard Error)					
Independent Variables	*Model 1 AIC = 3570.08*	*Model 2 AIC = 3549.73*	***Model 3 AIC = 3543.26***	*Model 4 AIC = 3540.98*	***Model 5 AIC = 3533.94***	*Model 6 AIC = 3536.1*
In case of above normal						
Child care support*(Family)*	0.97 (0.097)	0.954 (0.096)	0.941 (0.095)	0.959 (0.097)	0.955 (0.097)	0.941 (0.096)
Child *Dietary Diversity* (Ref: *Low)*						
Moderate Diversity	0.977 (0.117)	0.952 (0.114)	0.953 (0.115)	0.956 (0.116)	0.95 (0.115)	0.958 (0.117)
High Diversity	1.278*** (0.159)	1.245** (0.159)	1.121 (0.146)	1.155 (0.149)	1.175 (0.153)	1.097 (0.144)
Mothers BMI (Ref: Low)						
Increasing but acceptable risk	1.142 (0.245)	1.109 (0.239)	1.06 (0.23)	1.006 (0.22)	1.002 (0.219)	1.004 (0.22)
Increased risk	1.294 (0.273)	1.232 (0.263)	1.147 (0.248)	1.063 (0.234)	1.053 (0.232)	1.053 (0.232)
High risk	1.696*** (0.374)	1.597*** (0.356)	1.523** (0.344)	1.385 (0.316)	1.355 (0.31)	1.388 (0.319)
Women Empowerment (Ref: Disempowered)						
Empowered	1.17 (0.145)	1.169 (0.146)	1.067 (0.135)			
Access & Control Over resources				1.238*** (0.075)	1.237*** (0.082)	1.184*** (0.084)
Attitude and behaviour of Partner				0.912** (0.051)	0.914 (0.052)	0.914 (0.051)
Mobility				1.113*** (0.057)	1.124*** (0.058)	1.077 (0.056)
Mothers' nutrition Knowledge						
Medium		1.364*** (0.171)			1.222 (0.165)	
Highest		1.174 (0.154)			0.965 (0.149)	
Respondents' Education (Ref: No Institutional Education)						
Up to Secondary			0.817 (0.141)			0.738** (0.136)
Secondary to Higher Secondary			1.085 (0.218)			0.901 (0.202)
Higher Education			1.468*** (0.284)			1.143 (0.259)
Constant	0.413*** (0.084)	0.373*** (0.078)	0.48*** (0.113)	0.51*** (0.107)	0.485*** (0.109)	0.597*** (0.155)

**** 1%, ** 5%, * 10% level of significance*

From Table 5.2, we can see that child care support from family is important for child nutritional status. If the child gets care from family members, then the child would be 0.71 times and 0.75 times

less likely to be significantly wasted by model 3 and 5 respectively, but in case of above normal child, the result is not statistically significant. Our results show that child dietary diversity is an important factor for child nutritional status. If the child dietary diversity increases from low to moderate, then the child would be 0.69 times to 0.71 times less likely to be wasted and this result is significant at 5% level of significance. But at healthy group this result is not statistically significant.

Mothers' nutritional status is calculated by the body mass index (BMI), which is very important for child nutritional status as well. Our findings revealed that if mothers BMI increases from underweight to acceptable risk, then the child would be 0.52 times to 0.55 times less likely to be wasted. Similarly, with an increase from underweight to an 'increased risk of obesity' category, the child would be 0.33 times to 0.36 times less likely to be wasted, which is 0.40 times to 0.44 times for mothers with a 'high risk of obesity' for model 3 and 5 respectively. All the results are statistically significant at a 1% level. The strong positive association between maternal and children's nutritional status shows that malnutrition is intergenerational in nature.

We can see that if the mother's empowerment status increased from disempowered to empowered, then the child would be almost 1.46 times more likely to be wasted, which is surprising and this result is statistically significant at a 5% level (model 3). But when we segregated the empowerment in model 5 into three dimensions, then we found, the children would be less likely to be stunted by 0.81 times, when mother have the access to and control over resources, but the unexpected results remain in mobility dimension, which tells us the children would be 1.15 times more likely to be wasted when mothers mobility increases (model 5). However, attitude and behaviour of the partner does not show any significant relation with child wasting.

In case of above normal child, the binary 'empowerment' did not show significant relationship but in the decomposed format, it indicates that if mother has the increased access to and control over resources and mobility, the child has the probability of being more likely to be above normal by 1.23 times and 1.12 times respectively (model 5).

We have already discussed earlier that mothers' nutritional knowledge and education are correlated with each other so we cannot include these two variables together in a single model. That is why we have used mothers' nutrition knowledge in model 5 and mothers' education in model 3 as a categorical variable. The findings show that if mother's nutrition knowledge upgrades from low to medium then the child would be almost 0.58 times less likely to be wasted which is almost 0.55 times for an upgrade in mother's nutritional knowledge of lowest to highest. Mothers' education is also very important for child nutritional status. If the mother has at least up to a secondary level of education then the child would be 0.60 times less likely to be wasted compared to those mothers who have no institutional education. Again, if the educational status upgrades from no institutional education to 'secondary to higher secondary' level of education, then the child would be 0.35 times less likely to be wasted which is 0.43 times for those mothers who have 'higher education'. All the results are statistically is significant at 1% level.

Comparing a child of above normal nutritional status with the 'normal' child in terms of wasting, we can see that a few of variables came out as statistically significant. As we have discussed the three dimensions of women empowerment, only two of them - access to and control over resources and mobility came out as significant. If the 'access to and control over resources' and mobility increases, then the child would be 1.23 times and almost 1.12 times more likely to be the above normal child (model 5). These two results are statistically significant at a 1% level. Again Table 3 indicates that only if the educational status of the mother upgrades from no institutional education to a higher level of education, then the child would be almost 1.46 times more likely to suffer from overweight or obesity.

5.3 Regression Analysis: Factors influencing underweight

Table 5.4present a multinomial logistic regression model where we have considered weight for age Z score (WAZ) as the dependent variable. In this case, we have categorized the score into three broad categories such as:

1. Severe underweight: Children whose weight-for-age z-score is <-3.0 SD;
2. Moderate underweight: Children whose weight-for-age z-score is <-2.0 to ≤ 1 SD; and
3. Normal-(Healthy): Children whose weight-for-age z-score is >1 SD

As the dependent variable has three outcomes so we have done multinomial logistic regression considering the normal as the base outcome category (also known as the reference category). All the figures in Table 5.3 show the relative risk ratio with their respective level of significance stars and standard errors in the parenthesis. We have total of 9 models, to identify the best-fitted model we have used the Akaike information criterion (AIC). From this table, we can see that model 1, model 4, and model 5 have the lowest AICs in their categories. We have included household socio-economic status or household wealth index which is a categorical variable, which have the five categories: lowest, second, middle, fourth, and highest. We have considered the lowest as the base category, since the socio-economic status of household and women empowerment as interdependence, so we did not include both the variables in a model.

Table 5.4: Factors affecting child underweight (*Base outcome = Normal)*

	Relative Risk Ratio (standard error)								
Independent variables	***Model 1 AIC = 2006.33***	*Model 2 AIC = 2012.32*	*Model 3 AIC = 2008.42*	***Model 4 AIC = 1989.17***	***Model 5 AIC = 1984.09***	*Model 6 AIC = 1997.04*	*Model 7 AIC = 1991.79*	*Model 8 AIC = 1994.86*	*Model 9 AIC = 1987.17*
In case of severe underweight									
Mothers Education (Ref: No institutional Education)									
Years of schooling			0.899*** (0.022)					0.953 (0.03)	0.944*** (0.028)
Up to Secondary		0.507*** (0.137)				0.734 (0.207)	0.665 (0.187)		
Secondary to Higher Secondary		0.386*** (0.154)				0.75 (0.341)	0.666 (0.292)		
Higher Education		0.142*** (0.069)				0.286*** (0.16)	0.295*** (0.161)		
Mothers BMI (Ref: underweight)									
Increasing but acceptable risk	0.548** (0.168)	0.59** (0.182)	0.614 (0.19)	0.664 (0.206)	0.67 (0.208)	0.677 (0.209)	0.677 (0.21)	0.686 (0.212)	0.693 (0.216)
Increased risk	0.356*** (0.118)	0.397*** (0.132)	0.415*** (0.139)	0.513** (0.175)	0.503*** (0.172)	0.517** (0.176)	0.501*** (0.171)	0.52** (0.177)	0.514** (0.175)
High risk	0.216*** (0.09)	0.241*** (0.101)	0.25*** (0.105)	0.324*** (0.138)	0.309*** (0.131)	0.327*** (0.14)	0.307*** (0.131)	0.328*** (0.14)	0.313*** (0.133)
Mothers Nutrition Knowledge (Ref: Low level of knowledge)									
Medium	0.349*** (0.099)			0.505*** (0.151)	0.459*** (0.139)				
Highest	0.457*** (0.129)			0.827 (0.272)	0.767 (0.255)				
Sanitation Practice (Ref: Not improved)									
Improved	0.484*** (0.114)	0.535*** (0.128)	0.539*** (0.129)	0.641** (0.158)	0.651** (0.162)	0.661** (0.161)	0.675 (0.168)	0.655** (0.16)	0.675 (0.168)
Socioeconomic Status(Ref: low status)									
Second				0.546*** (0.163)		0.554** (0.169)		0.575** (0.177)	
Middle				0.214*** (0.092)		0.225*** (0.097)		0.236*** (0.104)	

	Relative Risk Ratio (standard error)								
Independent variables	***Model 1 AIC = 2006.33***	*Model 2 AIC = 2012.32*	*Model 3 AIC = 2008.42*	***Model 4 AIC = 1989.17***	***Model 5 AIC = 1984.09***	*Model 6 AIC = 1997.04*	*Model 7 AIC = 1991.79*	*Model 8 AIC = 1994.86*	*Model 9 AIC = 1987.17*
Fourth				0.262*** (0.111)		0.321*** (0.139)		0.312*** (0.14)	
Highest				0.339*** (0.152)		0.467 (0.22)		0.413** (0.196)	
Women Empowerment (Ref: Dis-empowered)									
Empowered	1.296 (0.342)	1.37 (0.365)	1.292 (0.341)						
Attitude and behaviour of Partner					1.08 (0.126)		1.033 (0.115)		1.046 (0.117)
Access & Control Over resources					0.572*** (0.084)		0.625*** (0.095)		0.621*** (0.095)
Mobility					1.108 (0.126)		1.126 (0.128)		1.102 (0.124)
Constant	0.353*** (0.102)	0.389*** (0.124)	0.391*** (0.115)	0.374*** (0.109)	0.161*** (0.06)	0.381*** (0.12)	0.188*** (0.077)	0.377*** (0.112)	0.183*** (0.073)
In case of moderate underweight									
Mother's Education (Ref: No institutional Education)									
Years of schooling			0.929*** (0.016)					0.969 (0.021)	0.978 (0.02)
Up to Secondary		0.517*** (0.102)				0.658*** (0.14)	0.708** (0.148)		
Secondary to Higher Secondary		0.361*** (0.103)				0.587** (0.189)	0.646 (0.203)		
Higher Education		0.317*** (0.085)				0.555** (0.181)	0.651 (0.209)		
Mothers BMI (Ref: underweight)									
Increasing but acceptable risk	0.652** (0.144)	0.67** (0.149)	0.681** (0.152)	0.747 (0.167)	0.755 (0.17)	0.758 (0.17)	0.761 (0.172)	0.761 (0.171)	0.761 (0.172)
Increased risk	0.338*** (0.08)	0.353*** (0.085)	0.359*** (0.087)	0.424*** (0.104)	0.432*** (0.106)	0.429*** (0.106)	0.437*** (0.108)	0.43*** (0.106)	0.437*** (0.108)

	Relative Risk Ratio (standard error)								
Independent variables	***Model 1 AIC = 2006.33***	*Model 2 AIC = 2012.32*	*Model 3 AIC = 2008.42*	***Model 4 AIC = 1989.17***	***Model 5 AIC = 1984.09***	*Model 6 AIC = 1997.04*	*Model 7 AIC = 1991.79*	*Model 8 AIC = 1994.86*	*Model 9 AIC = 1987.17*
High risk	0.227*** (0.065)	0.245*** (0.071)	0.245*** (0.071)	0.289*** (0.086)	0.285*** (0.084)	0.3*** (0.089)	0.293*** (0.087)	0.297*** (0.088)	0.29*** (0.086)
Mothers Nutrition Knowledge (Ref: Low)									
Medium	0.587*** (0.101)			0.728** (0.134)	0.789 (0.148)				
Highest	0.371*** (0.076)			0.519*** (0.119)	0.592*** (0.142)				
Sanitation Practice (Ref: Not improved)									
Improved	0.707*** (0.12)	0.721** (0.125)	0.702*** (0.12)	0.823 (0.145)	0.888 (0.16)	0.823 (0.146)	0.904 (0.165)	0.8 (0.141)	0.882 (0.159)
Socioeconomic Status (Ref: low status)									
Second				0.842 (0.172)		0.873 (0.185)		0.838 (0.178)	
Middle				0.425*** (0.111)		0.415*** (0.112)		0.399*** (0.109)	
Fourth				0.523*** (0.138)		0.493*** (0.14)		0.483*** (0.14)	
Highest				0.482*** (0.147)		0.452*** (0.15)		0.439*** (0.145)	
Women Empowerment (Ref: Disempowered)									
Empowered	1.089 (0.208)	1.038 (0.2)	1.042 (0.198)						
Attitude and behaviour of Partner					0.878* (0.069)		0.853*** (0.065)		0.851*** (0.065)
Access & Control Over resources					0.709*** (0.069)		0.697*** (0.073)		0.689*** (0.071)
Mobility					1.116 (0.088)		1.092 (0.087)		1.1 (0.086)
Constant	0.573*** (0.127)	0.713 (0.173)	0.649** (0.145)	0.564*** (0.126)	0.303*** (0.083)	0.64** (0.154)	0.326*** (0.098)	0.576*** (0.131)	0.288*** (0.084)

**** 1%, ** 5% and * 10% level of significance.*

We can see from model 1 that if mothers' BMI increases from underweight to increasing risk, then the child would be almost 0.55 times less likely to be severely underweight which is 0.65 times for moderately underweight. This result is statistically significant at 5%. It is quite similar for mothers who have an increased risk of overweight as well as obesity. But model 1, model4, and model 5 shows that if the BMI of the mother increases from underweight to increased risk, then the child would be 0.36 times to 0.51 times less likely to be severely underweight which is 0.34 times to 0.43 times less likely for model underweight. All these results are statistically significant at 1% level. Similarly, if a mother's BMI increases from underweight to higher risk of obesity, then the child would be 0.21 times to 0.31 times less likely to be severely underweight which is 0.23 times to 0.29 times for moderately underweight.

As we have seen that mother's nutrition knowledge is important for child nutritional status; in the case of underweight, if mother's nutritional knowledge increases from lowest to medium category, then the child would be 0.35 times to 0.51 times less likely to be severely underweight which is 0.59 times to 0.73 times in moderately underweight group. Similarly, if the nutritional knowledge of the mother increases from lowest to highest, then the child would be 0.45 times less likely to be severely underweight at model 1 and for moderately underweight, the scores are 0.52 times and 0.59 times in model 4 and model 5 respectively.

Sanitation practice is important for a child's nutritional status. If a household has a proper sanitation facility rather than an improper one, then the child would be0.48 times to 0.65 times less likely to be severely underweight which is almost 0.70 times less likely for moderately underweight. All the results are statistically significant at a 1% level.

Household socioeconomic status shows a very strong indication of child nutrition. Model 4 shows that if the socioeconomic status improved from the lower level to the second level, then the child would be almost 0.55 times less likely to be severely underweight which is 0.21 times, 0.26 times and 0.34 times for middle fourth, and the highest levels of socioeconomic status of the household respectively. All the results are statistically significant at a 1% level. Similarly, when we compare a normal child with a moderately underweight child, we can see that if the socio-economic status increases from the lowest level to the middle level, then the child would be 0.43 times less likely to be moderately underweight, which is 0.52 times and 0.42 times for fourth and the highest level of socio-economic status of the household respectively.

If the mother becomes empowered from disempowered, we do not find any significant relationship either in case of severely underweight, or moderately underweight. Now if we segregate the women empowerment into the previous three dimensions of empowerment such as attitude and behaviour of the partner, access to and control over resources, and mobility - the result came out with different meaning. If the mother receives positive attitude and behaviour from the partner, then the child would be 0.88 times less likely to be moderately underweight (model 5), but in case of severely underweight, the result is not significant. If the mothers access to and control over resources increased, the child would be 0.57 times less likely to be severely underweight and 0.71 times less likely to be moderately underweight, but mobility is not found significant in case of child underweight, though the tendency tells that the child would be more likely to be underweight, when mothers' mobility increases.

5.4 Regression Analysis: Factors affecting child dietary diversity

The following Table 5.4 shows the regression result where child dietary diversity was taken as a dependent variable, which has three categories: low, medium and high dietary diversity. As the category is more than two, so, we used multinomial Logistic regression model here. In this model

high dietary diversity has been taken as base outcome. According to AIC criteria, model 1 and model 5 are the best fitted here.

Table 5.5: Factors affecting child dietary diversity (*Base outcome = High Dietary Diversity)*

Independent Variables	Relative Risk Ratio (standard error)					
	Model 1 AIC =3794.24	*Model 2 AIC = 3801.12*	*Model 3 AIC = 3808.81*	*Model 4 AIC = 3803.81*	***Model 5 AIC =3787.7***	*Model 6 AIC = 3794.3*
In case of Low Dietary Diversity						
Respondent Education (Ref: No Institutional Education)						
Year of schooling	0.892*** (0.019)				0.9*** (0.019)	
Up to Secondary		0.479*** (0.162)				0.492*** (0.167)
Secondary to Higher Secondary		0.355*** (0.131)				0.377*** (0.141)
Higher Education		0.223*** (0.082)				0.239*** (0.089)
Socioeconomic Status (Ref: Low)						
Second	0.563*** (0.153)	0.512*** (0.141)	0.43*** (0.115)	0.475*** (0.132)	0.61** (0.172)	0.555*** (0.158)
Middle	0.368*** (0.099)	0.314*** (0.085)	0.252*** (0.066)	0.307*** (0.094)	0.434*** (0.135)	0.366*** (0.115)
Fourth	0.274*** (0.076)	0.228*** (0.063)	0.158*** (0.041)	0.193*** (0.061)	0.317*** (0.105)	0.26*** (0.085)
Highest	0.215*** (0.063)	0.186*** (0.054)	0.121*** (0.033)	0.151*** (0.05)	0.255*** (0.088)	0.218*** (0.074)
WDD (Ref: low dietary diversity)						
Moderate Dietary Diversity	0.472*** (0.064)	0.478*** (0.065)	0.509*** (0.07)	0.52*** (0.072)	0.487*** (0.067)	0.491*** (0.068)
Women Empowerment (Ref: Disempowered)						
Empowered	0.876 (0.13)	0.897 (0.134)	0.883 (0.131)			
Attitude and behaviour of Partner				0.844*** (0.062)	0.822*** (0.059)	0.812*** (0.058)
Access & Control Over resources				0.935 (0.103)	0.974 (0.107)	0.998 (0.111)
Mobility				0.943 (0.059)	0.948 (0.059)	0.958 (0.061)
Mothers Nutrition Knowledge (Ref: Low)						
Medium			0.876 (0.157)	0.942 (0.171)		
Highest			0.532*** (0.097)	0.616*** (0.118)		

Independent Variables	Relative Risk Ratio (standard error)					
	Model 1 AIC =3794.24	*Model 2 AIC = 3801.12*	*Model 3 AIC = 3808.81*	*Model 4 AIC = 3803.81*	***Model 5 AIC =3787.7***	*Model 6 AIC = 3794.3*
Constant	22.568*** (5.327)	21.939*** (6.987)	14.516*** (3.139)	11.434*** (2.976)	18.196*** (5.135)	18.65*** (6.65)
In case of Moderate Dietary Diversity						
Respondent Education (Ref: No Institutional Education)						
Year of schooling	0.915*** (0.021)				0.922*** (0.021)	
Up to Secondary		0.662 (0.243)				0.678 (0.25)
Secondary to Higher Secondary		0.516* (0.208)				0.55 (0.223)
Higher Education		0.329*** (0.131)				0.362*** (0.147)
Socioeconomic Status (Ref: Low)						
Second	1.015 (0.303)	0.904 (0.273)	0.779 (0.229)	0.876 (0.267)	1.101 (0.339)	0.981 (0.306)
Middle	0.862 (0.254)	0.729 (0.216)	0.588** (0.168)	0.755 (0.252)	1.033 (0.35)	0.863 (0.295)
Fourth	0.653 (0.201)	0.557** (0.168)	0.381*** (0.109)	0.518** (0.179)	0.811 (0.292)	0.675 (0.241)
Highest	0.525*** (0.169)	0.467*** (0.148)	0.298*** (0.089)	0.412*** (0.148)	0.661 (0.248)	0.573 (0.213)
WDD (Ref: Low)						
Moderate Dietary Diversity	0.47*** (0.07)	0.477*** (0.072)	0.494*** (0.075)	0.511*** (0.078)	0.486*** (0.074)	0.489*** (0.075)
Women Empowerment (Ref: Disempowered)						
Empowered	0.747** (0.123)	0.771 (0.128)	0.748** (0.123)			
Attitude and behaviour of Partner				0.982 (0.079)	0.971 (0.076)	0.962 (0.075)
Access & Control Over resources				0.85 (0.1)	0.885 (0.104)	0.904 (0.108)
Mobility				0.862*** (0.059)	0.869*** (0.059)	0.882** (0.061)
Mothers Nutrition Knowledge (Ref: Low)						
Medium			1.159 (0.227)	1.201 (0.238)		
Highest			0.729 (0.146)	0.804 (0.169)		

Independent Variables	Relative Risk Ratio (standard error)					
	Model 1 AIC =3794.24	*Model 2 AIC = 3801.12*	*Model 3 AIC = 3808.81*	*Model 4 AIC = 3803.81*	***Model 5 AIC =3787.7***	*Model 6 AIC = 3794.3*
Constant	5.317*** (1.367)	4.671*** (1.617)	3.474*** (0.83)	2.564*** (0.734)	4.023*** (1.234)	3.726*** (1.441)

**** 1%, ** 5% and * 10% level of significance.*

The result shows that if the mother's education increased, the child is almost 0.90 times less likely to have low dietary diversity and 0.92 times less likely of having moderate dietary diversity (model 5). In case of socio- economic status, the poorest category is taken as the base category. According to model 1 and model 5, if the socioeconomic status shifts from poor to second class, then the child would 0.56 times and 0.61 times less likely of having low dietary diversity. When the socioeconomic status shifts from poor to the middle class, it shows 0.36 times and 0.43 times having low dietary diversity; while in the case of shifts from poor to the fourth class, then the score are 0.27 and 0.31, and for shifts to highest categories, the scores are 0.21 and 0.25. In case of moderate dietary diversity, we only found if the socioeconomic status reaches to the highest categories, then the child is less likely 0.52 times of having moderate dietary diversity.

Women's dietary diversity is also considered in this model and low dietary diversity is considered as a base category. If women's dietary diversity increases from low to moderate, then the child would be 0.47 times and 0.48 times less likely of having both low and moderate dietary diversity.

According to model 1, if the empowerment status of women (binary) is shifted from disempowered to empowered, then the child would be0.75 times less likely of having moderate dietary diversity.

In model 5, we don't take 'empowerment' as a single variable. Here, we have considered the dimensions. If the attitude and behaviour of the husband or partner is favourable, then mothers are 0.82 times less likely of having low dietary diversity, though it is not significant in the case of moderate dietary diversity. Access to control our resources is not a significant variable here. Finally, if the mobility of a mother increases, then the child would be 0.87 times less likely of having low dietary diversity.

5.5 Regression Analysis: Factors affecting women dietary diversity

As the research intends to measure mothers' nutritional status, therefore factors affecting women's dietary diversity was also explored. Table 5.5 represent the women's dietary diversity as a dependent variable which is categorized into two groups: low and medium dietary diversity. As the variables are categorized into two groups, we used binomial logistic regression here. Here the independent variables are: women's reproductive work, productive work, socioeconomic status, wealth index, respondents' education, nutrition knowledge, empowerment status. In case of model 1, 2 and 3, binary form of WE is considered. In model 1, respondent's education has been measured in terms of years of schooling, in model 2, education category has been used, while in model 3, nutrition

knowledge has been used. In case of model 4, 5 and 6, WE have been considered as dimensions, with remaining all other variables the same as 1, 2 and 3 respectively. In case of model 7 and 8, socioeconomic status/ wealth index have been considered as an independent variable, as it has the multicollinearity problem with WE. In model 7, education is included where as in model 8, nutrition knowledge has been considered. When we considered women empowerment as a binary outcome variable, model 3 is fitted well and in case of taking dimensions of women empowerment, model 6 had a better fit.

Mothers' nutritional knowledge had also three categories: lowest, medium and highest nutritional knowledge. Holding other variables as constant, if mother's nutritional knowledge improved from low to medium, then the probability of low to medium dietary diversity increased almost 2.38 times (model 3) and 0.467 times (model 8). And if the nutritional knowledge improved from low to higher, then the probability of low to medium dietary diversity will increase almost 4.58 times, 1.15 times and 1.93 times in the case of model 3, model 6 and model 8 respectively.

Table 6.5: Factors affecting women dietary diversity (*Reference category = Low Dietary Diversity)*

Independent Variables	Odds Ratio (standard Error)							
	Model 1 AIC = 2064.66	*Model 2 AIC = 2073.33*	*Model 3 AIC = 2013.86*	*Model 4 AIC = 1941.41*	*Model 5 AIC = 1943.41*	*Model 6 AIC = 1916.93*	*Model 7 AIC = 2003.53*	*Model 8 AIC = 1958.22*
Respondents' education (Reference: No institutional education)								
Years of schooling	1.142*** (0.016)			1.015 (0.018)			1.04*** (0.019)	
Up to Secondary		2.909*** (0.724)			1.044 (0.282)			
Secondary to Higher Secondary		4.353*** (1.173)			0.949 (0.287)			
Higher Education		7.302*** (1.864)			1.237 (0.37)			
Mothers' nutrition knowledge (Reference category: Low)								
Medium			2.384*** (0.379)			1.295 (0.224)		1.467*** (0.252)
Highest			5.58*** (0.842)			2.247*** (0.399)		2.931*** (0.498)
Reproductive work (Hours)	0.885*** (0.021)	0.889*** (0.021)	0.901*** (0.021)	0.908*** (0.022)	0.908*** (0.022)	0.907*** (0.022)	0.891*** (0.021)	0.896*** (0.022)
Productive work (Reference: Zero hour)								
1 to 8 hours	0.566*** (0.094)	0.54*** (0.091)	0.642*** (0.107)	0.641*** (0.109)	0.623*** (0.108)	0.655*** (0.112)	0.661*** (0.111)	0.691*** (0.117)
More than 8 hours	0.615*** (0.127)	0.569*** (0.119)	0.662** (0.14)	0.629*** (0.136)	0.607*** (0.133)	0.648*** (0.141)	0.711 (0.151)	0.731 (0.157)
Women Empowerment (Reference: Disempowered)								

Independent Variables	Odds Ratio (standard Error)							
	Model 1 AIC = 2064.66	*Model 2 AIC = 2073.33*	*Model 3 AIC = 2013.86*	*Model 4 AIC = 1941.41*	*Model 5 AIC = 1943.41*	*Model 6 AIC = 1916.93*	*Model 7 AIC = 2003.53*	*Model 8 AIC = 1958.22*
Empowered	1.366*** (0.178)	1.353*** (0.178)	1.311*** (0.173)					
Attitude and behaviour of partner				1.133** (0.075)	1.136** (0.075)	1.057 (0.072)		
Access to and control over resources				2.324*** (0.201)	2.336*** (0.2)	2.085*** (0.168)		
Mobility				1.046 (0.059)	1.039 (0.059)	1.019 (0.058)		
Socioeconomic status/Wealth index (Reference: Low)								
Second							1.795*** (0.455)	1.673*** (0.42)
Middle							4.595*** (1.119)	3.742*** (0.876)
Fourth							5.474*** (1.418)	4.306*** (1.017)
Highest							5.934*** (1.614)	4.562*** (1.128)
Constant	0.373*** (0.114)	0.347*** (0.125)	0.392*** (0.12)	0.727 (0.234)	0.786 (0.299)	0.572** (0.183)	0.24*** (0.082)	0.221*** (0.077)

**** 1%, ** 5%, * 10% level of significance*

In model 3, if the respondents' reproductive time increased by one hour, mothers are almost 90% less likely to have low dietary diversity. The productive working hours have been divided into three categories; zero hour; 1 to 8 hours and more than 8 hours. Taking zero hour as a base category, if the productive work shifts from zero hours to 1 to 8 hours, then mothers are almost 0.64 times less likely to have low dietary diversity and if it shifts from zero hours to more than 8 hours, its' almost 0.66 times less likely to have low dietary diversity. If the empowerment status moves from 0 to 1, then the probability of low dietary diversity from medium dietary diversity will increase almost 1.31 times, holding other variables constant.

Model 6 shows that if the mother's reproductive work time increases by 1 hour, the probability of them having low diversity is almost 0.90 times. Taking 0 hours as base category, if the reproductive work hours increase from 0 hour to 1 - 8 hours and from 0 hours to >8 hours, then in both cases, the probability of having low dietary diversity is 0.65 times.

Model 3 shows that empowered mothers have the more probability of having moderate dietary diversity than disempowered mothers by 0.31 times. As we mentioned earlier, in model 6, we used the dimensions of women empowerment, it is found that if the respondent gets the access and control over resources, then the probability of medium dietary diversity will increase almost 2.08 times.

5.6 Regression Analysis: Factors affecting women empowerment

In this study, empowerment and its dimensions have been calculated as a composite score, and then categorised as binary as well. In Table 5.6 women empowerment has been considered as a dependent variable that is binary in nature and we used a binomial Logistic regression model here. In this model, we tried to see which factors may affect women empowerment status. The following table shows the estimated odds ratio, significance level and standard error. The result shows that mothers' working status, mother's age, age at first marriage and wealth index significantly influence urban Bangladeshi mothers' empowerment.

In this model, our first independent variable is mothers' working status which is binary in nature, taking value 1, if the mother works outside and 0, otherwise. From this result, we may express that if our mothers work outside, then the probability of being empowered increases by almost 0.27 times. This is significant at 10% level. Again, if the mother's age increased by 1 year, the probability of being empowered will increase by 2.3% and this is also significant at 10% level. If the age at first marriage is delayed for 1 year, the probability of being improved as empowered from disempowered is almost 0.037 times. This is also statistically significant at 10% level. Finally, we used the wealth index as a socio-economic indicator, which is a categorical variable and the poor is taken as a base category. If the status shifts from poor to4th and richest class, the rich then the probability of a mother being empowered increases by 1.66 times and 1.52 times, holding all other variables as constant.

Table 5.7: Factors affecting mothers' empowerment

Overall women empowerment status (base = disempowered)	**Odds ratio (standard error)**
mothers' working status ref = Not employed	
Employed	1.273* (0.157)
Mother's age (years)	1.023* (0.013)
Education (base= no education)	
primary to higher secondary	0.775 (0.139)
tertiary	1.082 (0.251)
Spousal age difference	1.014 (0.014)
Religion (base= others')	
Muslim	0.949 (0.193)
Mothers age at first marriage	1.037* (0.021)
Wealth index *(base= poor)*	
Second	0.737 (0.163)
Middle	1.016 (0.227)
Fourth	1.661** (0.378)
Highest or Rich	1.522* (0.371)
Constant	0.0531***(0.03)

**** 1%, ** 5% and * 10% level of significance.*

Women empowerment has also been measured from different dimensions separately. A woman may be disempowered in overall empowerment measurement and also, she could be empowered in one or more dimensions. Point to be noted that, overall empowerment measure considered all the dimensions. On the other hand, dimension-based empowerment measure shows us how our women are empowered in different dimensions. This is also providing a holistic view for policy formulation and tells us which dimension should be more prioritized by the stakeholders. The following Table 5.7 shows the multinomial logistic regression results of different dimension-wise empowerment statuses that affected by the different factors.

When mother is employed, then the probability of being empowered rises 2.42 times in access to & control over resources dimension and 1.94 times in decision related to household dimension (Table 5.7). If mothers' age increases by 1 year the probability of being empowered will increase almost 1.02 times in self-esteem, access to & control over resources and mobility dimension. But almost 1% less likely of being empowered in decision related to household dimension, if mothers' age rises by 1 year. Where more aged mothers are empowered to make decisions and have greater freedom of movement, their children's nutritional status tends to be better. Conversely, young mothers' experience of low self-esteem and negative attitude from the family members, disability to take decisions and control over resources, disempower them and undermines their own and their children's nutritional status.

Table 5.8: Factor affecting different dimensions of women empowerment.

Variables	Dimension 1	Dimension 2	Dimension 3	Dimension 4	Dimension 5
	Self Esteem (base =disempowered)	**Access to and control over resources** (base = disempowered)	**Attitude and behaviour of husband** (base = disempowered)	**Decision related to Household** (base = disempowered)	**Mobility** (base = disempowered)
	Odds ratio (standard error)				
Mothers' working status (Ref = not employed)					
Employed	1.116 (0.119)	2.419*** (0.32)	0.946 (0.097)	1.935*** (0.228)	1.202 (0.149)
Age	1.023** (0.011)	1.027* (0.014)	0.989 (0.01)	0.996* (0.012)	1.02* (0.013)
Education(base= no education)					
Primary to higher secondary	1.271 (0.188)	1.241(0.29)	1.399** (0.19)	0.952 (0.162)	0.73* (0.132)
Tertiary	2.826*** (0.563)	1.781** (0.473)	2.04*** (0.393)	1.019 (0.227)	1.058 (0.245)
Spousal age difference	0.98* (0.012)	0.993 (0.016)	0.993 (0.012)	1.007 (0.014)	1.005 (0.014)
Religion (base= others')					
Muslim	1.073 (0.195)	1.873*** (0.447)	1.239 (0.214)	3.105*** (0.806)	0.841 (0.168)
Age at first marriage	1.036* (0.018)	1.047** (0.023)	1.036** (0.018)	1.082*** (0.021)	1.037* (0.021)
Wealth index (base= poor)					
Second	0.969 (0.172)	0.126*** (0.037)	1.511** (0.248)	0.675* (0.142)	1.009 (0.226)
Middle	1.08 (0.199)		2.761*** (0.476)	1.185 (0.244)	1.344 (0.307)
Fourth	1.663*** (0.318)	2.006*** (0.321)	2.08*** (0.381)	1.435* (0.312)	2.110*** (0.49)
Rich	1.913*** (0.396)	1.938*** (0.344)	2.588*** (0.517)	1.762** (0.405)	1.947*** (0.49)
Constant	0.095*** (0.041)	0.023*** (0.014)	0.226*** (0.092)	0.017*** (0.008)	0.053*** (0.026)

**** 1%, ** 5 and * 10% level of significance respectively.*

In reality, in many cases, young mothers are from a lower socio-economic background. Another issue is: in well-off societies, the family members of the husbands sometimes choose the very young girls as their bride who will not argue with them, which is a socio-cultural matter in Bangladesh. These reasons might have a great concern.
If mothers' education rises from no education to primary to higher secondary, then women become almost 1.40 times more likely of being empowered in the attitude and behaviour dimension, but 73% more likely of being disempowered in the mobility dimension. If mothers' education rises from no education to tertiary education the probability of being empowered rises 2.82, 1.78, 2.04 times in the self-esteem, access to and control over resources and attitude and behaviour of husband dimensions respectively. If spousal age difference increases, women are likely to be disempowered by 0.98 times in the self-esteem dimension.

If the mother belongs to a Muslim family, then the probability of 1.87 times and 3.10 times rises of being empowered in the access to resources and decision related to household dimensions respectively. If the age of getting married is delayed 1 year, then mothers would be 1.036 ~~times~~, 1.047, 1.036, 1.082 and 1.037 times more likely to be empowered in all the dimensions. Except dimension 2 (access to and control over resources), if the socio-economic status rises from poor to second class, mothers are 0.97 times less likely of being empowered in self-esteem, 1.51 times more likely in attitude and behaviour of husband and 0.68 times less likely in dimension decision related to household. In dimension 2, we took the middle class as a base category as the poor category women do not have any resources (Table 5.8). If the status falls from middle to second class, then mothers are 0.12 times less likely of being empowered from disempowered. We did not use the poor category, as a base here as the poor class has no empowered women in our study and for this reason it was omitted by the model. This has been shown in the following **Error! Not a valid bookmark self-reference.**.

Table 5.9: Tabulation of access to and control over resources and wealth index

Access to & control over resources	Wealth index					
	Poor	**Second**	**Middle**	**Fourth**	**Rich**	**Total**
Disempowered	413 (100)	365 (96)	293 (73)	248 (54)	167 (52)	1486 (75)
Empowered	0 (0)	15 (4)	110 (27)	215(46)	152 (48)	492 (25)
Total	413 (100)	380 (100)	403 (100)	463 (100)	319 (100)	1978 (100)

If the status rises from poor to the middle class, women are more likely of being empowered by 2.76 times in the 'attitude and behaviour of husband' dimension. If the status rises from poor to fourth class, 2.006 times more likely of being empowered in dimension 2. If the status raises middle class to the fourth class, then almost 1.006 times more likely of being empowered in dimension 2. And if the socio-economic status shifts from poor to the fourth class, women are 1.66, 2.08, 1.44 and 2.11 times more likely of being empowered in the self esteem, attitude and behaviour of husband, decision related to household and mobility dimensions. Finally, if the status moves from poor to the rich class almost 1.91 times more likely of being empowered in self-esteem dimension. If it is rise from middle to rich class then 1.94 times more likely of being empowered in access to and control over resources dimension, holding all other things constant if the socio-economic status shift from poor to rich class, women are more likely of being empowered by 2.58 times, 1.76 times and 1.95 times in the attitude and behaviour of husband, decision related to Household and mobility dimensions respectively.

5.7 Regression results' summary

In our study several regression models have been constructed. Overall women empowerment was found to have been significantly and positively associated with mother's working status, mother's age, age at first marriage and wealth index.

Table 5.9: Regression results' summary

Independent Variables	Dependent variables										
	WE	SE	CR	AH	DH	M	CDD	WDD	HAZ	WHZ	WAZ
Mother's working status	*	*ns*	***	*ns*	***	*ns*	-	-	-	-	-
Age	*	*	ns	ns	ns	ns	-	-	-	-	-
Age at 1st marriage	*	*	**	**	***	*	-	-	-	-	-
Spousal age difference	ns	*	ns	ns	ns	ns	-	-	-	-	-
Wealth index	**	***	***	***	**	***	***	***	-	-	***
Mothers' education	ns	***	**	***	***	**	***	**	***	***	***
Ante-natal care	-	-	-	-	-	-	-	-	***	-	-
Women Dietary diversity (WDD)	-	-	-	-	-	-	***	-	-	-	-
Child dietary diversity (CDD)	-	-	-	-	-	-	-	-	***	**	-
Child care support (caregiver)	-	-	-	-	-	-	-	-	-	***	-
Productive work	-	-	-	-	-	-	-	***	-	-	-
Reproductive work	-	-	-	-	-	-	-	***	-	-	-
Sanitation	-	-	-	-	-	-	-	-	***		**
Mother's (BMI)	-	-	-	-	-	-	-	-	-	***	***
Mother's nutritional knowledge	-	-	-	-	-	-	***	***	**	***	***
Mobility	-	-	-	-	-	-	***	ns	***	**	
Access to and control over resources	-	-	-	-	-	-	ns	***	***	***	***
Attitude and behavior of the partner	-	-	-	-	-	-	***	**	**	**	***
Women empowerment	-	-	-	-	-	-	**	***	***	**	ns

*Note: WE = Women Empowerment, SE = Self Esteem, CR = Access to and Control over resources, AH = Attitude and behavior of husband, DH = Decision related to HH, M = Mobility, CDD = Child Dietary Diversity, WDD = Women Dietary Diversity, HAZ = Stunting, WHZ = wasting, WAZ = underweight, ns = not significant; *** 1%, ** 5%, * 10% level of significance*

Mother's age, tertiary education, age at first marriage and wealth index are significantly positive and spousal age differences has significantly negatively associated with the self-esteem dimension. Mother's working status, mother's age, tertiary education, religion, age at first marriage are significantly positively associated and second and middle class wealth index are significantly negatively associated with access to and control over resources dimension. Attitude and behaviour of husband dimension has found significantly positive association with respondent's education, age at first marriage and wealth index respectively. Mother working status, religion, age at first marriage, and wealth index except second class has significantly positive and second class wealth index has significantly negatively associated with decision related to household dimension. Mobility dimension has significantly positively associated with respondent's age, age at first marriage, fourth and richest class wealth index and significantly negatively associated with respondent's primary to higher secondary education.

Women dietary diversity has also significant relationship with several variables. All kinds of improvement in socio-economic status, respondent's higher education and overall women empowerment has positive associated and respondent's productive and reproductive work hours has negative associated with women's dietary diversity.

Respondent's year of schooling, all the class of socio-economic status, women dietary diversity and attitude and behaviour of husband dimension of women empowerment has been found to have significant positive association when child dietary diversity is taken as a dependent variable.

When we consider stunting as a dependent variable, we found a significant positive relationship with highest ante natal care during pregnancy, highest mother's nutrition knowledge, child dietary diversity, sanitation practice, access to and control over resources. Only mobility dimension was found to be significantly negatively associated with stunting.

Wasting is also an outcome variable which also shows significant relationship with many explanatory variables. Family care support, moderate child dietary diversity, mother's BMI, mother's nutritional knowledge and access to and control over resources are positively associated with wasting while mobility dimension of women empowerment has showed a negative relation with wasting.

Our last outcome variable is underweight. It shows a significant positive relationship with mother's BMI, mother's nutritional knowledge, proper sanitation practice, access to and control over resources, attitude and behaviour of husband but mobility shows a significant negative association with underweight.

5.8 Conclusion:

In this chapter we have identified the important influencing factors those are affecting women empowerment, child and women dietary diversity and child nutritional status. From all the above estimations we can conclude that, in case of women empowerment, mother's employment and household wealth index are the most important factors that influencing the empowerment of the women and bring enabling environment for rearing child for them as mothers. Both mothers formal and practical knowledge, women's status in the household, improved sanitation, child care system and ante-natal care received are the most important factors those are affecting child nutritional status; whereas household wealth index is an additional significant factor for better child dietary diversity.

6. Discussion of the study

Based on the descriptive results statistical analysis and results from focus group discussions (FGDs), the study found that mother age, age at first marriage and baby born, education, receiving ante-natal care, child dietary diversity, child care support/ role of caregivers, mother's working status, sanitation – play a significant role in the linkages between women empowerment and child nutrition. This section is an attempt to discuss the whole issues

6.1 Mother's education

It has been found in this study that mothers' education is the best predictor for health and nutrition. Education plays very significant role to improve the quality of life and mothers' education status is one of the most important determinants of (mal)nutrition. Education of a girl leads her to form a family in a better socio-economic status, with influencing the way time, health, diet resources are allocated and used based on priority which in turn, affect child's nutritional status. Education also has the potential of improving socio-economic status by upgrading drinkable water, sanitation and housing quality, and affecting child health. In this study, about 12% respondents have no institutional education and about 52% have completed secondary or higher education. It has been found from this study that as the level of education increases, level of the mother's self-esteem and control over resources improved. Husband's attitude towards wife becomes better when the wife's level of education increases. Again, more educated mothers are more likely to enjoy freedom of movement than the less educated. Level of education also improves CDD and WDD. The study found that the children of more educated mothers are less likely to be stunted and wasted while we did not find significant relationship for the underweight. The study also found that literate mothers are more likely to participate in income-generating activities, enabling them to smooth consumption and avoid financial constraints to afford nutritious food. Literate women are also more likely to consume more diverse diets. According to a study done in Bangladesh, children of mothers with secondary or higher education were at a lower risk of childhood stunting as compared to children of uneducated mothers (Hasan, et al, 2016). Maternal education has been associated with the better nutritional condition during pregnancy and after birth, which is an important factor of better child's health throughout life (Victora, et al, 2008). Education may provide the capability of overcoming poor water, sanitation and hygiene practices (including open defecation), which contribute to high burdens of gastrointestinal diseases, particularly environmental enteropathy (Dangour et al. 2012). Tette, et al, (2016) mentioned that a low level of maternal education has been associated with poor feeding practices, leading to malnutrition. After conducting a review study, Galgamuwa, et al, (2017) found a strong association between maternal education and higher socioeconomic status. Ozaltin, et al, (2017) mentioned that uneducated girls have a higher probability of being undernourished. Undernourished girls again have a higher probability of becoming an undernourished mother and, therefore, are at a greater risk of giving birth to low-birth-weight babies.

Aurelia Lepine and Eric Strobl (2013) mentioned about a study done by Glewwe (1999) and Thomas, Strauss, & Henriques (1991) in Malawi, where they mentioned that women's education positively affects child nutrition through the use of preventive and curative modern health care and the better use of information received by reading newspapers, listening to a radio or watching TV. They also found that, low level of education is not generally associated with malnutrition while the higher secondary level of education is associated with improved nutritional status of children, but mothers' high level of education is associated with malnourished children. Wamani et al; (2007) found that among mothers with no formal education, the prevalence rate of stunting averaged 44% in rural Uganda while it was 24% in those with secondary education. Abuya et, al, (2012) and Govindaraj (2018) also mentioned mothers' education as a strong predictor of child's nutritional status in urban slum settings, even after controlling for other factors. Sraboni et al (2014) suggested that household wealth, education, and occupation are more important determinants of nutritional status. Fakir and

Khan (2015) found that the children of illiterate mothers have the probability of being severely malnourished by more than 40 percent. An increase in one unit of education decreases the probability of being severely malnourished by more than 30 percent.

On the other hand, Appoh and Sturla (2005) found that though maternal formal education was not associated with nutritional status, rather maternal nutrition knowledge was independently associated with nutritional status – which suggests that mother's practical knowledge about nutrition may be more important than formal education for child nutrition outcome. But in a study conducted by UNESCO in 2013, it was found that twenty-two million fewer children would be stunted if all mothers reached secondary education. Educated mothers are more likely to ensure that their children receive the best nutrients to help them prevent or fight off ill health, know more about appropriate health and hygiene practices and have more power in home to make sure that the children's nutritional needs are met (Das, 2014).

6.2 Mothers' nutrition knowledge

Mothers' nutrition knowledge is another important factor for a child's nutritional status. In almost all the regression models of nutritional status, mothers' nutrition knowledge was used. There is a very general concept that an educated mother will have a better nutritional knowledge but this is not always applicable. The main clue found in our research is: mother's need to have a certain level of education to get at least a moderate or higher level of nutritional knowledge. In case of this research, at least a secondary level of education is important to have highest level of nutritional knowledge. This statement can be visualized by the graph below.

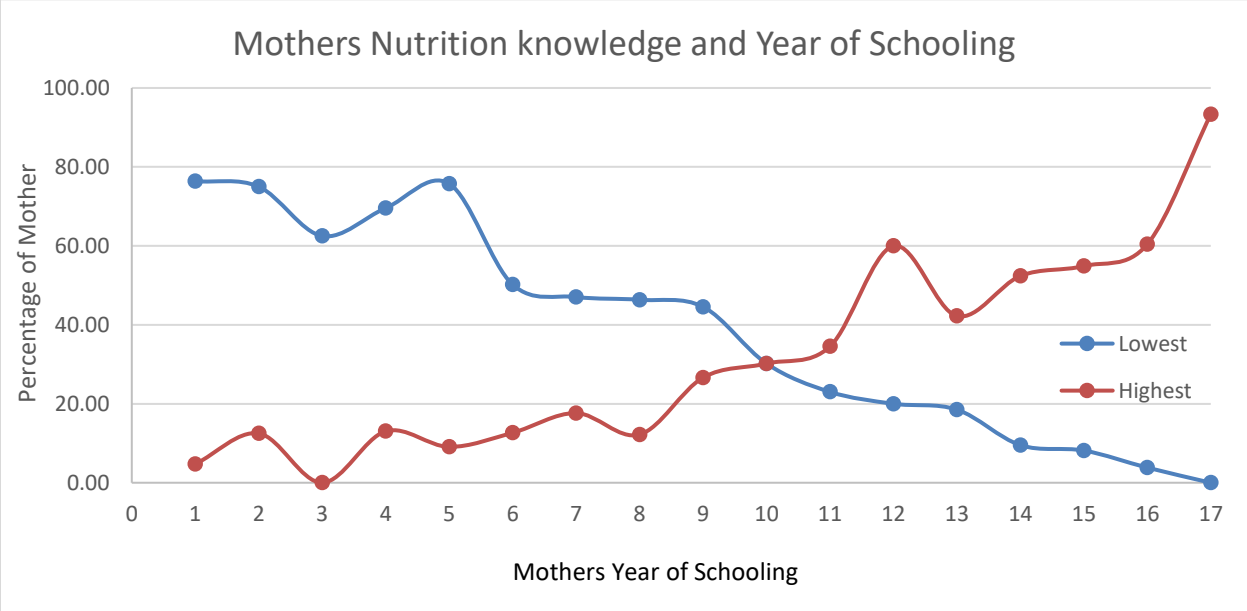


Figure 7.14: Mother's nutrition knowledge and year of schooling

From Figure 7, it is seen that initially the number of mothers having highest level of nutrition knowledge is less than the number of mothers having lowest knowledge which inverses as the year of schooling increases. That means, as the year of schooling increases the number of mothers with highest nutrition knowledge also increases which illustrates the positive correlation between mother's education and highest level of nutrition knowledge. At 10 years of formal schooling, the number of mothers with highest and lowest nutrition knowledge became equal and afterward the number of highest nutrition knowledge mother remains higher. So, we can summarize that, at least

11 years of formal schooling is important to have highest level of nutrition knowledge considering the current national course curriculum of our country.

6.3 Receiving ante-natal care

Antenatal care is one of the crucial factors for protecting the health of women and their unborn children. Regular contact with a doctor, nurse or midwife during pregnancy allows women to receive information and services vital to their health and that of their future children. The World Health Organization (WHO) has updated its recommendations from a minimum of four antenatal care contacts to a minimum of eight contacts to reduce perinatal mortality and to improve women's experience of care. However, data reporting at the global, regional and country levels are currently only available for a minimum of four visits, aligned with the previous recommendation (WHO, 2018).

Nutrition education and counseling is an integral part of ANC that influences maternal and child health outcomes. Through this form of preventive health care, women can learn from skilled health personnel about healthy behaviors during pregnancy, better understand warning signs during pregnancy and childbirth, and receive social, emotional and psychological support at this critical time in their lives. Counseling advice to pregnant woman revolves around taking adequate rest, reducing physical workload, improvements in dietary practices, and eating adequate nutrition led to better nutritional status of mothers and the adoption of healthy behaviours that can influence child anthropometry (White et al, 2006). UNICEF (2021) mentioned that through antenatal care, pregnant women can also access micronutrient supplementation, treatment for hypertension to prevent eclampsia, as well as immunization against tetanus. It is said that the lowest levels of antenatal care are observed in sub-Saharan Africa and South Asia (Smith et al., 2003).

In this study, about 60% of mothers visited health care for more than 4 times. We have conducted FGDs with current RMG workers and as well with previous workers who left the job after having children. We found that they rarely received ANC services at that time; they were working in the factory. They visited doctor 2 or 1 times in the factory (not more) but the doctor used to give supplements like calcium, iron, etc. which are a little expensive but they did not buy any of these. It seems, ANC services are still not a concern of the poor mothers. In those communities, one concept works very well among the elderly is: if the mother eats nutritious food during pregnancy and if they take more tablets (supplements), then the size of the baby would be bigger and Caesarean operation will have to be done during child delivered. After the baby is delivered, to keep the baby healthy, they did not consult with doctors.

Though we did not include in our interview schedule, what kind of services did they receive, but through FGD, it was known that in Bangladesh, ante-natal care visits do not provide social, emotional and psychological counseling. They normally provide the medical tests with some advices. But poor physical or mental health in mothers might be expected to have adverse consequences on their children's health, nutrition and psychological well-being. Our FGD respondents who became mothers in the developed countries mentioned that they had to attend parental counseling session and therefore their (Bangladeshi) husbands were so helpful that they had faced less difficulty in their pregnancy and post delivered life. She said, "Parenting classes are obligatory is to raise the children which is just like formal education. For example, me and my husband were taught exactly what causes a baby to cry, what to feed the baby and when, about post partum depression etc. Because of this, despite being concentrated, it did not seem difficult for me to complete the housework and our study with the new born child. I also spent 8-12 hours a day for sleeping. But in the case of the second child, I had to face a lot of hardships, as he was born in Bangladesh." According to her, it is very difficult to

raise a child in Bangladesh without the help of another family member. Here we could mention about some experiences of our respondents.

RHH1 (A housewife from a wealthy family) said, "I received full maternity care (ANC) for my child and also got the emotional support that is needed from my family". But RHH2 said, "I didn't get the emotional support that a mother needs at this time. RHH5 said, "I got the physical support a mother needs during pregnancy, but I don't get the emotional support from my husband or family. At this time, I did not find such closeness to my husband. But I think the closeness of the husband is very important at this time. In our society, husbands do not pay attention to psychological and emotional aspect." RHH4 agreed and said, "The male society does not understand the emotional change that mothers experience during this time." She also added, "Like other countries in the world, our country should also pay more attention to the issue of counseling and parenting. Then maybe future mothers can be saved from such problems. RHH6 said: "I didn't get much physical and emotional support at the time. At that time, my depression level reached a point where I sometimes felt like I had strangled the baby."

Again, poor pregnant mothers do not get any pleasant behavior from the health services as they are poor. Therefore, they feel demotivated to visit hospital or health care centers. At the same time, many of the families are reluctant to provide ante-natal cares to the future mothers, and pregnant mothers alone do not feel comfortable to visit, if they do not feel severe complexity.Women's lack of control over the resources as well as decision to seek care is a barrier of receiving care, especially in communities where women cannot go to the hospital without the permission of their husbands or other family elders—even when there is an obvious need for hospital care.

Our findings show that ANC visits were found to be significant protective factors against malnutrition in children (stunting and wasting), though there is a great disparity in terms of mothers' receiving ANC, wealth status, level of education and other socio-economic categories. Economic status, maternal education, women's status, etc. influence receiving ante-natal services. Besides, poverty, and cultural beliefs and practices may also act as a barrier to receive ANC. Poverty contributes to limit access to the choice and number of foods available to pregnant women. To overcome the issues, many international agencies are implementing micronutrient supplements which are cheaper and more feasible and can improve dietary quality by providing several key nutrients, such as iron, vitamin A, folate, and zinc; in lieu of suggesting only iron or folic acid. There are also programs in Bangladesh, but the mothers are reluctant to visit the health service actors.

In our data, we have found that almost 40% mothers had faced post pregnancy complication, before, during and after giving birth like, pre-eclampsia, low birth weight of neo-natal's, hypertension, postpartum anemia, urinary-tract infection etc. We have found that though the mothers receive iron and folic acid, but many of them didn't take properly. Mothers not consuming iron supplementation during their pregnancy were more likely to have low birth weight infants. To realize the necessity of iron supplementation, mothers' education, their health concern etc. are very important. For this, we need to emphasize on improving quality of ANC programs. Another issue may be applied here which was mentioned by Ramakrishnan (2004) is: "pregnancy may be too narrow a window to improve anemia, and efforts to include all women of reproductive age are needed".

Women's status is a very important factor which influences to receive care through the family's response to the woman's pregnancy. Poor women status in the family affects physical and mental well-being. We have found that in Bangladesh, to get proper care during pregnancy and after giving birth, women frequently move to their maternal home for child birth. Ramakrishnan (2004), Smith et al. (2003) mentioned that women status in South Asia is the lowest where more than one-half of the world's low birth weight infants are born. Ramalingaswami et al. (1996) had termed it as "Asian

enigma,", where they found that despite better indicators of food security and country's GDP, women's status as the main reason for higher rates of malnutrition in South Asia, therefore the level of receiving ante-natal care is also very low.Jat et al. (2011) conducted a study on influence of factors on the use of maternal and reproductive health services in Uttar Pradesh of India where they mentioned about positive relationship between the use of antenatal care and factors such as women's education, household's standard of living, cast and religion. The better educated women are, more aware about their health, know more about availability of maternal health care services and use this awareness and information in accessing the health care services. They also stated that education of husband might be playing a similar role in supporting the women's access to the health services.

Though comfortable pregnancy and childbirth are critical windows of opportunity to get healthy infants for a nation, yet, significant gaps in coverage and quality of ante-natal care, delivery and post-natal care remain. The barriers to the use of maternal health services in urban Bangladesh are lack of access to resources needed to pay for health expenses, poor perceptions about health care facilities, traditional views of family members, cultural norms regarding women's mobility and beliefs about the causes of difficult labor that influence perceived need for services (FGD report). Women's empowerment across various dimensions may help to mitigate the effects of some of these barriers.

Several studies found that women's empowerment increases the use of ANC and delivery in health facilities (Ahmed et al., 2010; Gabrysch , et al., 2009; Singh et al., 2012; Say et al, 2013; Moyer, et al., 2013, Corroon, et al., 2014). The studies captured the economic, sociocultural, psychological, and cognitive dimensions of empowerment. Economic empowerment enables women to overcome financial barriers to accessing services; and may also help to mitigate the effects of physical access (make able to pay for the costs of travel to reach health facilities). Education and wealth are the most often used measures for economic empowerment, and these are repeatedly associated access to ANC facilities. Some studies found positive associations between ANC services and access to, or control over household resources, women's freedom of movement and perceptions of gender norms, while few studies examined the measures related to psychological and cognitive empowerment (knowledge of pregnancy complications) and ANC services. Some studies found that participation in household decision-making was positively associated with the access to maternal health services (Sado et al., 2014; Hou et al., 2013). The effect, however, may be contextual, as other studies found no significant associations between participation in household decision-making and the use of maternal health services (Shimamoto, et al. 2015; Singh et al., 2016). Some literature also shows the correlation between women's empowerment and quality of services, who mentioned that women of higher economic status receive better quality of care during pregnancy, delivery, and after delivery, as well as care of the infant, maybe because they have the economic resources to afford this level of care and have the skills to interact with providers and navigate the health care setting to demand better quality of care. Very often, poorer women with low education are more likely to be disrespected and treated poorly in health facilities. (Afulani, 2015; Moyer et al., 2014; Joshi et al., 2014).

In our FGDs, a teacher of a public university said, "Now is the right time to inform every family in our country about counseling and parenting to save the mothers of future generations, where most of the families have a misconception about these matters." Supporting her, another high official mother mentioned, "We need to pay more attention to the issue of parenting-counseling."

A school teacher mentioned, "It is different in the case of higher-level employees. Since we have a lot of work to do outside, we get support from the doctors. But things are a little different around us. I feel very bad about this. Since I am getting a lot of opportunities due to being self-reliant but many of them may not visit a doctor because of being at home. The problem is more in the case of housewives."

6.4 Child dietary diversity

In our sample, about 51%, 27% and 22% child were at low, moderate and high dietary diversity respectively. Underweight children consumed fewer food groups (2.6 vs 3.3) and a lower proportion met the minimum DDS (11% vs 17%) compared to well-nourished children. This unexpected finding may point out the need for behavior changes communication that diverse diets are important for a child's general health.

The pattern of child food consumption would explain the child's dietary diversity. From the graph, it is very clear that in everyday meal, almost all child consume rice with fish or vegetables or both. Though the consumption of vegetables is quite similar for all children a very few children consume vitamin A-rich vegetables whereas most of them consume potatoes or other vegetables such as brinjal, okra, etc.

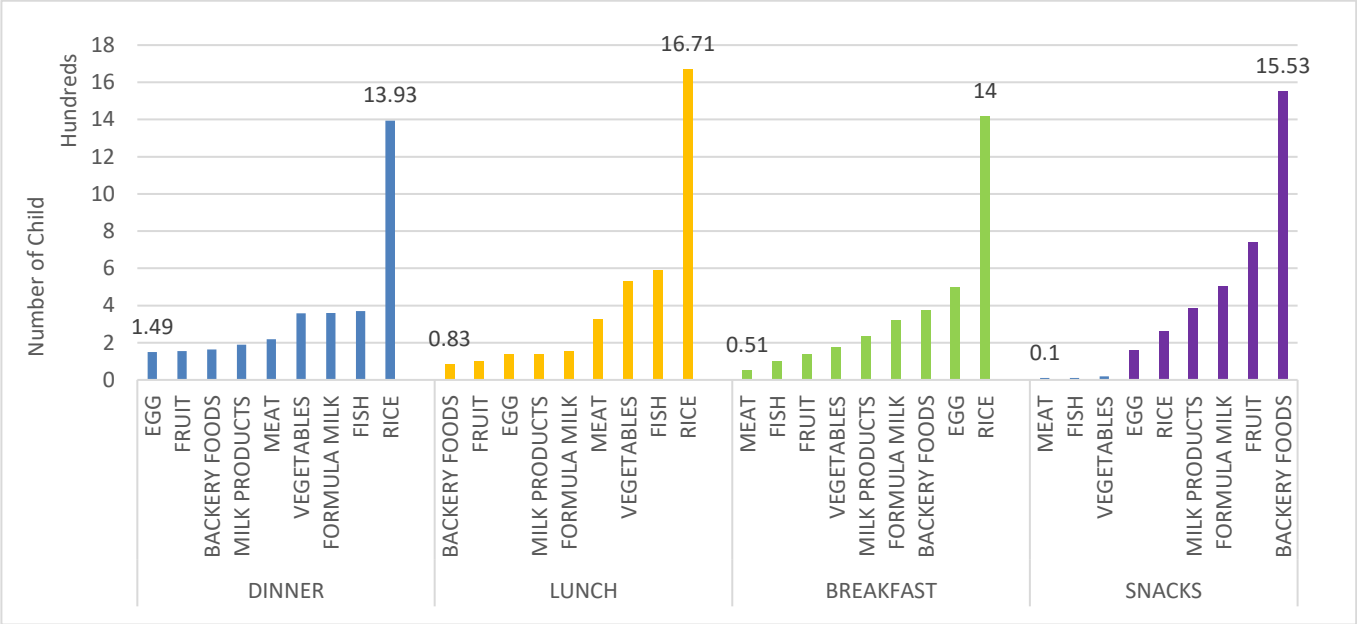


Figure 6.3: Number of children consumed different types of food in the meals

At breakfast, about 1400 children consume rice and more than 400 children consume eggs, while 51 children consume meat. At lunch, rice consumption increases to 1671 child with which almost 600 children consumes fish and nearly 600 children consume vegetables. At dinner almost 1400 child consumes rice and nearly 400 children consume fish. A great concern is, in every meal, the number of children who consume bakery food is very high. It has the highest number of the child which is nearly 1600 whereas the number of children who consume milk products is nearly 400. It is very common in the middle class and lower-middle-class families that, whatever they consume in lunch, they consume almost a similar type of food in dinner as well. It is also found that almost 800 children consume a single item of food in breakfast whereas about 850 children consume double item.

Table 6.2: Measurement of Child Dietary Diversity (CDD) on the basis of the types of their mothers

Types of mothers	Child Dietary Diversity			
	LDD	MDD	HDD	Total
Housewife	546 (49.01)	309 (27.74)	259 (23.25)	1114 (100)
Self-employed	175 (58.72)	77 (25.84)	46 (15.44)	298 (100)
Working	290 (51.24)	139 (24.56)	137 (24.2)	566 (100)

Total	1011	525	442	1978

Table 6.2 describes the measurement of Child Dietary Diversity (CDD) on the basis of the types of their mothers. The results shows that more than 49% children are under low dietary diversity whether the mother is housewife, self-employed or working outside and the amount is highest whose mothers are self-employed and the amount is about 59%. Though the working mothers get less time to take care of their children but it may tells that access to income has a positive relation with dietary diversity.

Our FGD findings tells that the status malnutritional status in reality may actually not indicate that children are taking diverse food; rather they are mostly taking junk food or carbohydrate dependent food, regardless the class. For different reasons, whether working or not, urban mothers are stressful so that most of them spend less time to prepare meals. Again, due to available fast foods and less awareness about those, mothers are repeatedly giving those foods and feel satisfied that at least the children like something which is less time consuming. We found that in the slum areas, the mothers start their complementary feeding to children with some sweet biscuits, chips, cakes, and many other foods with less nutritional value - which may increase the height and weight. We may find those children as healthy in terms of short period but in the long run, it might not. Busy-ness of family members specially mother, easy accessibility, advertisement, convenience, taste, cheaper options etc. are the main influencing factors of choosing fast foods. Das (2014) expressed that these food behaviours may affect the child's chances of survival, reduces immunity, reduces their ability to learn, increases their chances of dropping out of school and makes them less productive in later life.

Another issue is providing formula milk with excessive sugar, which was mostly given through bottle. It could be mentioned here that fresh milk is not largely available in urban market or sometimes it is overpriced. So, most of the families do not buy fresh milk from the market. They buy formula milk instead of fresh milk. Formula milk is not referred by the doctors and health workers for the children as it contains different ingredients which may not be healthy for children. Child mothers or caregivers usually mixed more sugar on it to make it tastier without knowing the bad health outcome of excessive sugar. To get an overall picture, we may also mention the responses of some of the working mothers who participated in FGDs.

C6: *"Children of working mothers may suffer with malnutrition for up to three years. It is not possible for a working mother to ensure nutrition. After coming from office, I try all the time to see if the baby's stomach is full. I don't think about nutrition, at the end of the day, it is not possible for me to run after them for an hour for feeding."*

E2: *"When I go to the office in the morning, I try to feed the baby a full egg. Actually when I'm at office, it seems that it is more important to fill his stomach than nutrition. But on weekend, I stay at home; I keep giving one after the other so that the nutritional needs are met at least a little bit."*

E5: *"My child eats very little; I always have to mess around. She goes away as soon as she sees the food. Whatever I do, I try to give her only eggs or chicken. When I can't feed her anything, I just give her white rice to eat like this."*

E6: *"Breastfeeding is recommended for two years with exclusively for six months but then complementary food has to be adjusted slowly. It is seen that the child takes one year to adjust complementary food. In that case, maternity leave needs to be reconsidered or work time needs to be*

adjusted, I think. In addition to leave, there is a need for a daycare center in every organization so that the distance between the working mothers and the baby is reduced and the issue of feeding is reduced."

T1: *"Our babies have to get used to the bottle feeding a month before our joining because after 6 months of leave, we try to adjust them with this feeding."*

Mothers who are the RMG workers mentioned that the children mostly eat rice three times a day and sometimes just with leftover soup of the curry. Sometimes they cook noodles for the child. *Chatpati* is eaten a lot by the children which is prepared in a dirty environment in the street. If the child does not want to eat, they take him to the shop/store without changing the food menu. For this reason, the child eats outside foods more. A well-off housewife respondent RHH2 said,

"Working mothers are more conscious about feeding their children nutritious food than housewives. But a housewife can change food menu to give to a child."

We have found most of the low educated and lower SES category mothers do not provide complementary food in a planned way, rather they depend on breast feeding. And most of the well-off housewife mothers were reluctant to breastfeed and sometimes at the age of 3 or 4 months, they start complementary foods, like banana, *khichuri*, apple juice and other fruit juices. And due to lack of helping hand, they also do not provide sufficient complementary foods.

6.5 Income-time dilemma of working mothers and housewife mothers

In the current research, mothers' working status has been found a significant predictor variable that affects overall women empowerment. Opportunity to work outside form home may enable a woman to take several advantages for improving herself. In addition, working women get attach to the outside world continuously knowing their surroundings, finding more ways to upgrade her quality and standard of life. That means they get autonomy in their personal life, household decision, resource use, physical and financial mobility, and achieve a dignity in the community she belonging. But how it mother's working status could affect child nutritional status?

More than 70 years ago, the Lancet reported a naturalistic experiment, carried out in two post-war German orphanages, showing that a loving matron was a stronger predictor of children's weight gain than additional food rations (Widdowson 1951). Torun (1976), Popkin (1980) had also echoed the same that physical activity and social stimulation may also affect the growth of children. It is true that working mothers are able to provide more calories and nutrients to their children than non-working mothers. But working mothers normally face time constraints and it may affect the welfare of the child. Engle et al. (1997) mentioned that maternal employment can increase income, but may also decrease maternal time for child care. In this study, 43% of mothers are employed either formally or informally or self-employed, regardless of SES. This study found that maternal employment predicts more control over resources and decision-making capabilities in mothers, which suggests that it empowers women. But majority of the self-employed mothers said that they couldn't have enough quality time to spend with their family whereas working mothers have told opposite of this.

Women are equally engaged in productive, reproductive and care work. The reproductive activities which are in the form of unpaid labor performed in the households tend to not be accounted for. Actually, time spent only on child care is difficult to measure as mothers perform it together with all family and personal care. Women are culturally responsible not only for caring the children but also the other members of the family. Also, sometimes there are multiple child care providers and women also perform multi-task child care with their other activities, a finding which is very similar to Jain

and Zeller (2015) in Bangladesh. These insights indicate that women do not reduce their time in cooking and household chores even though there is high demand on their time due to many other new engagements every day. Instead, they cut down time on activities specially the children which can be substituted by other members of the household and family. Moreover, mothers from lower SES spend relatively more time in the management of households like cooking, cleaning, washing and taking care of household members, and they do not have enough mechanical instruments to ease their works. Hirway and Jose (2011) revealed that poorer people in developing countries is likely to spent much more time on household activities. They also mentioned that cash-poor households do not have easier access to these facilities and not even available to buy in the market; or the technology used by the poor is likely to be of a lower standard, demanding more time and more manual efforts. So, there is a great reduction of time for working women in low-income household. In case of RMG workers, we found that most of the workers leave their children at their origin with parents or parents in laws and even with unrelated neighbors.

Our study shows that housewife mothers spent an average of 11.37 hours per day as their personal time, which is the higher than working mothers. And the working outside mothers spent most of their time in productive activities. Housewife mothers also spent maximum time of a day in reproductive activities including child care, cooking and other activities. Self-employed mothers are mostly working from home except housemaid, but they cannot give enough time to their children or family because of distraction on work. Most of them mix their family life and work life together with prioritizing works. They spend all day for monitoring their child, doing household works and productive works. There is no time separated for them, when the children are small. We have found, a significant percentage of respondents from both employment categories who work less than or equal to 8 hours can spend quality time with the children, but who work more than 8 hours, cannot spend time for the families specially RMG workers, bankers etc. A simple explanation could be, if a woman spends more than 8 hours in an office, after reaching at home, she has to work for the household and rarely there is someone to help her, at the end of the day, though someone worked whole day and she also would like to get rest when the mother is at home. So, this is clear that they do not have adequate time to spend which would be a quality time. However, time spent by women outside the home either for paid work or unpaid work does not affect their food consumption or that of their children. In addition, women spend less time on leisure and personal care and this further affects their nutritional status.

We have found that working mothers provide less breast feeding, when the mothers are in low paid jobs and as well, when their workplace is far. With the increasing urbanization and industrialization, the rate is increasing as mothers need to return to their work. On the other hand, the employers in Bangladesh are not mother-friendly as the employees expect. Jantzer et al., 2018; K. M. Johnson & Salpini, 2017; A. M. Johnson et al., 2015; found that women feel largely unsupported by managers and their organizations, affecting the exclusive and continued breastfeeding rates among working mother in many countries. Our finding is as similar as Bonet et al., 2013; Lewallen et al., 2006; Dodgson et al., 2004; Lakatiet al., 2002; who mentioned that exclusive breastfeeding practices, in particular, remain quite low among employed mothers. Breastfeeding during early life, in particular, is crucial for life long health benefits, optimal psychosocial development and stimulating child–mother bonding (Moore et al., 2016). Breastfeeding is a critical aspect of caring for infants and young children, as breast milk remains the single most important food for newborn and infants, which promotes sensory and cognitive development and protects them against infectious and chronic diseases (World Health Organization, 2018).

Today, returning to work while still breastfeeding presents a challenge in many parts of the world (Chuang et al., 2010; Neilsen, 2004; Bonet et al., 2013Thomas-Jackson et al., 2016). Like the study

conducted by Thomas-Jacksonet al. (2016), maternal return to work, especially within 6 months after giving birth, is a major barrier to the initiation and continuation of breastfeeding and complementary feeding. The lack of infrastructural facility of keeping child nearby workplace, support from employers and colleagues and inadequate facilities are among the challenges faced by employed mothers. Early termination of breastfeeding may also cause disappointment and distress to the mothers and health problems for themselves and their infants (WHO/UNICEF, 2015). UNICEF mentioned about a properly equipped room for mothers to breastfeed their children and express milk in workplaces is an obligation for employers. The recommended room should be clean and comfortable and include equipment such as chair, hand washing facilities and refrigerator (UNICEF, 2020). We may mention feelings of some of the working mothers here:

E3: *" I was working in the secretariat of Bangladesh. When my maternity was over, I used to start for office at 7 am and come back at 7 pm. In the middle of this time, my child was not breastfed, I had various problems. Since my office was in Dhaka, it was not possible to come in the middle and to feed the baby. We had to go through a lot of hardships together. In fact, it is a very complicated moment for every mother. Our mind stays at home, so no attention comes to work properly."*

E4: *"I took my maternity leave a month ago because I had some physical problems. After six months, when I joined and stayed away from the baby and worked from 6 am to 7s pm, my milk flow gradually decreased. When my baby was ten months old, she was totally stopped breastfed. When she was 8 months old, I started to give her formula milk, but it didn't match her body. She got very sick, had diarrhea, the milk was not adjusting and she didn't want to eat other foods. So that she was sick for many days, about 1 month. I also had to work in the office when my daughter got sick. My whole family was having a hard time, the baby was crying at home, being sick, my mother was not able to feed the baby, I was not able to breastfeed her, these hurt a lot to a mother and without being mother no one can understand these feelings.My daughter's condition was very bad, she was underweight."*

M1, a banker, said that she had a problem with breastfeeding her baby. When she was busy at office, her clothes would get wet because she could not breastfeed his baby. She had to change her clothes in the middle of office work. She was upset that this food was her child's right and she could not give it to her child. She would throw them away and cry.

E4: *"Not all infants can start to eat complementary food, when they are only five months old, but mother has to rejoin the work at that time. My baby was taken cared by a 13-year-old working girl who did not pay attention to my child and I could not concentrate in normal office work leaving her. Life becomes more miserable when the husband's posting is away and he is not near."*

M6 said, *"My mother takes care the babies and she may have tried to feed the baby. But it is not possible to eat as carefully as the child's mother."*

A housemaid G2 said, *"Breast feeding is very important. It helps to develop child brain. Lactogen is not as nutritious as breast milk. But if the baby is small and mother works outside, in this case, there is no way but giving the baby lactogen".* About providing complementary food, *she said, "I should not feed anything to the baby before six months, just breast milk. After six months, the baby will be fed fruit juice, milk and khichuri. After seven or eight months, I will be able to feed the rice with pulses, milk and vegetables a little bit."* She has learnt this from her house owner, who is a school teacher.

Day care could be a viable solution. Private Day care centers would be very expensive, which all classes of families may not afford. In case of public, initiatives can be taken, but we never know, how much time it would take to meet standard. In some countries, day care could not be a solution as sometimes sick children, far from the home and work place, limited time, and often do not meet the standards as parents want. Zerfu et al. (2021), Majee et al., (2016) also mentioned about the presence and use of social support groups, lactation breaks in the workplace, supportive work environments and facilities and childcare options to facilitate the combining of work with breastfeeding. There is a programme in Kenya named Governments 'Baby Friendly Community Initiative (BFCI)', 'Baby Friendly Work-places Initiatives (BFWI)'.

Mothers' income is spent for the whole family. We have found a smaller increase in the food consumption of small children <5 happened in a household from the income that a mother earns. In the families of higher socioeconomic status, mothers buy more food, may not necessarily translate to proper consumption, again due to mother's time constraints. Many mothers try to satisfy their children either by providing more rice or foods with trans-fats with the money they earned, as they lack time to prepare foods by changing menu. In the working mothers' families, children are taken care by the siblings or other family members or unprofessional maids, so total child care time may not decrease, but reduction in quality care provided by the mother (like stimulation, healthy clean environment, comfort feeling etc.) may not be replaced adequately by the others. So, small increases in child diet may not compensate the reduced quality of care. This negative impact would be muted if mother has a job compatible with the child care. But we cannot suggest the decline in child nutritional status by preventing women from working. Effort needs to be given to examine the nature of the work place, so that working mothers may find their job compatible with their work – which might be a better option for both mother and child welfare. Factors to be considered include mothers' working hours, proximity from home to work place, the availability of child care in the work place. Education/ Training can be provided for the educated young forces, who could take the responsibility of child day care centers. Attention could be given on the development of various healthy ready foods as a substitute.

There is a need to increase/improve theirs access to the home and kitchen appliances needed for routine housekeeping tasks to reduce household workloads, and save the time and energy burdens of household work including food processing and preparation, even for low status households. In this light, measuring empowerment may be needed to reconsider so that linkages between increasing resources controlled by women and nutrition as well as linkages between women's empowerment and nutrition are established empirically.

The mother's allocation of her time between income-earning activities and work within the household has important implications for the selection and design of nutrition policy intervention programs. The research shows that in poor households, there is a negative relationship between the mothers' labor force participation and child health and nutritional status. A separate social policy may need to be designed for low-income households with economically active mothers.

6.6 Sanitation

Sanitation is another important factor for child nutritional status specially for stunting and underweight. A toilet facility that is developed by following all the hygiene guideline is considered as improved sanitation and otherwise is known as unimproved sanitation facility. Only a better and healthy food habit cannot alone ensure better child nutritional status unless the sanitation facility does improve, because a 7 days long diarrheal disease can affect the child nutritional attainment badly. A certain level of education (at least primary) and household wealth status (at least upper middle class) is necessary for a better sanitation facility. Good sanitation is a vital tool for the absorption of nutrients by the body. Enteric infections have a transparent effect on weight loss, loss

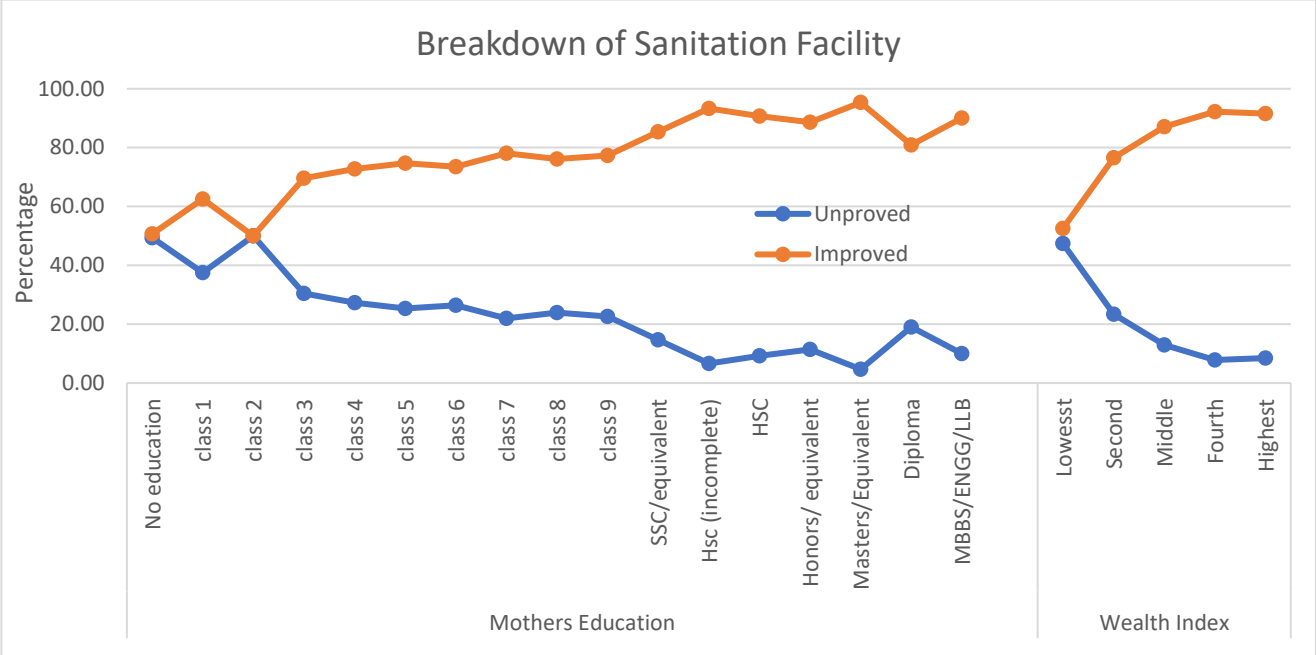
of key micronutrients, and therefore the non-absorption of key nutrients into the blood leading to underweight and other associated symptoms and effects. Enteric infections can also lead to chronic inflammatory responses, inhibiting protein synthesis, and malabsorption of nutrients, among others, that are all associated with obesity. Malapit and Quisumbing (2015) found that in Ghana, women's empowerment which was measured after the participation in credit decisions, influenced to improve the diet quality but does not reduce the likelihood of being underweight which could be explained that some diseases contribute to poor absorption of nutrients. It has also implications that diet may not translate to improved nutrition status, which also depends on other underlying household and community-level processes, such as access to health services, water and sanitation, and childcare capacity and feeding practices that may point to a role for appropriate behavior change communication (BCC) messages. So, there should be a strong focus on diet quality and safe hygienic practices in order to combat malnutrition.

This statement can be visualized by the graph below which can be divided into two major parts: Sanitation facility vs. mother's formal education and sanitation facility vs. household wealth index. Here sanitation facility includes both infrastructure of the toilet and defecation practice. From the graph of mother's education and sanitation facility we can see that, when the mother has 2 years of formal schooling, the number of improved and unimproved toilet facility holding household become equal. Afterwards, as the year of schooling increases, the number of improved sanitation facility holding household increases which reaches at the peak point when the mother has masters or equivalent degree.

When the sanitation facility is classified into wealth index, we can see that, always the number of improved sanitation facility holding household is higher than the unimproved one. When the household is in the lowest level of wealth, the difference between the number of improved and unimproved sanitation facility holding household is very low. So, at least lower middle class or second level of household wealth index is important to have improved sanitation facility, though this level defers since the hygiene can be practiced at any level of household wealth status. In one word, hygiene is not only a matter of wealth rather it is a matter of knowledge and practice.

In this way, women's education, SES, and empowerment status influence water, sanitation, and hygiene practices, which in turn affect child nutrition. The reason may be because an empowered mother has increased access to and decision-making around the use of financial resources, enabling the purchase of soap for hand washing, supplies to ensure toilet cleanliness or even WASH-related hardware such as toilets and safe drinking water. It may even be that empowered mothers have the time and decision-making autonomy to translate their knowledge into improved WASH practices, like hand washing with soap and water, proper child stool disposal, and creating barriers between animals and therefore the home.

Figure 7.15: Relationship between sanitation facility, mother's education and wealth index.



Cunningham et al. (2018) mentioned that purchase of soap for hand washing, supplies to ensure toilet cleanliness or even WASH-related hardware such as toilets and safe drinking water- all needs travel to market, substantial time, and financial resources. It may be a fact that empowered mothers have the knowledge of time management, mobility, and decision-making autonomy to translate their knowledge into improved WASH practices, such as proper child stool disposal, and hand washing with soap water.

6.7 Freedom of mobility of mothers

It has always been presumed that higher mobility results in better empowerment attainment by women and consecutively better child nutrition outcomes and this study is about re-verifying this presumption. But this investigation found that mobility is negatively associated with child nutrition indicators. The result of linkages between mobility and child nutritional status does not have the expected outcome. In this study, mobility is a composite score of 4 indicators: unescorted visit to relative's house, going to market, going to hospital and participating in community events. To justify such finding, the composite form of 'mobility' dimension of women empowerment has been segregated and consequently performed some descriptive analysis and in-depth analysis in FGD. Correspondingly, this study has calculated Person chi^2 and Kendall's tau-b to determine the association among variables, its directions and modes.

Urban mothers', who can go relative's house unescorted, is a mobility measurement variable (0 stand for other than relatives and 1 stand for relatives). Another variable is the source of information on health.

Table 7.10: Association between mobility indicator and mother's sources of health information

	Go to relative's house unescorted	
From where do you get information on health	0	1
0	567	374
1	662	375
Pearson chi2(1) = 2.6918 Pr = 0.101		
Kendall's tau-b = -0.0369 ASE = 0.022		

The test statistic indicated statistically significant (at 1% level of significance) association among the two variables whereas negative Kendall's tau-b signify a very weak (-0.0369 <0.01) relationship among them. Elaboration of such results is that the urban mothers', who visit their relatives' house quite often, face terrible problem with their child feeding and sleeping pattern. As it goes without saying that first two to three years of a child is of extreme importance for the physical growth and cognitive development and throughout this period, a child needs to be in intensive care and monitoring. If a mother opts to visit the relatives' house frequently, it gets difficult for the child to be comfortable with the food choice available as well as the sleeping environment in the relative's house. Consequently, this whole visiting process negatively affects the general feeding and sleeping practice of the child which in turn deters the physical growth and cognitive development of the child. If the frequency of visiting the relative's house by mother continues, then the depressing food and sleeping practice experienced by a child evolves into a deep-rooted malnutrition status which becomes harder to get treated, if attempted ever. Again it was also found that those who visit relative's house more, they are reluctant to visit doctors. One of our FGD respondents (school teacher), who works closely with community, mentioned as:

"In the communities with lower SES, the societal belief is: the elderly women know everything and we should follow them. Their idea is if our mothers and grandmothers could take care of us, why can't take good care of our children? This misconception has left them behind." The combined effect of all these results in miserable feeding behavior may deteriorate child health.

We also measured the association between mother's access to market and her buying pattern from the market for the baby. The test statistic also indicated here a moderate relationship at 1% level of significance as Kendall's tau-b is less than 0.3.

Table 6.11: Association between mobility indicator and buying child food for baby by mother

	Go to the market	
Do you buy food by yourself form the market for your baby	0	1
0	327	55
1	843	753
Pearson chi2(1) = 137.0915 Pr = 0.000		
Kendall's tau-b = 0.2633 ASE = 0.018		

It has been found that although urban mothers' have convenient access to market places; they seldom give prior importance to buying foods which covers child health requirements. Generally, a mother believes that she has knowledge on the kind of nutritious food required for her child to maintain a healthy status for which they hardly go for consultation to the nutritionists, let alone the fact of following the minimum diet diversity for their child. Mostly, they go to market and spend lot of time

for buying products fulfilling their own needs (found in FGD). Hence, due to the lack of attention of the urban mothers' towards buying healthy and nutritious foods for their child results in incidences of severe child malnutrition.

Another association between urban mothers' visit to hospital and her session with doctor about child health is measured and results indicated a significant relationship between them. Kendall's tau-b is less than 0.2, representing a poor relationship between the two variables.

Table 6.12: Association between mobility indicator and mother's consultation with doctor about child health

	Visit to hospital	
Did you have any session with any doctor about child health	0	1
0	725	324
1	550	379
Pearson chi2(1) = 21.1202 Pr = 0.000		
Kendall's tau-b = 0.1033 ASE = 0.022		

The study shows that urban mothers' who have freedom to go to hospital, hardly consult with any doctors or health workers about her child health related topic. Mothers' usually go to the hospital for other purposes like own health problems and health crisis of elderly family members. In case of their own child, mothers don't go for regular child checkup which is recommended by the doctors because they don't consider it as important, as long as the child suffers from any noticeable illness. Some urban mothers don't even take their child to the hospital when the child becomes little sick like 2- or 3-days fever, or diarrhea. In such cases, they opt for home based local treatment without knowing the clinically right treatment. They only consult the doctor when the situation seems out of hand and serious. Such irresponsible behavior turns out to be fatal for the child as it creates a long run deteriorating nutritional effect on child's health.

The final association is between participation in community events and their husband's reaction. With 1% significance level, the statistic showed a strong association between these variables and indicated a significant relationship between them as the value of Kendall's tau-b is greater than 0.3.

Table 6.13: Association between mobility indicator and husband's attitude if mother join in community meetings

	Participation in any community events	
Husband take positively if you participate any community meetings	0	1
0	803	55
1	657	463
Pearson chi2(1) = 306.6352 Pr = 0.000		
Kendall's tau-b = 0.3937 ASE = 0.017		

Firstly, if husband takes the participation of his wife in a community event negatively then serious conflict arises in the family and the direct effect goes to the child caring practices, mostly on child feeding. Due to the ongoing conflict between husband and wife, the wife goes through a terrible phase of mental trauma which fades her own motherly nature which in turn makes her lose interest about

feeding her own child on the regular pattern that she usually used to do earlier on. Secondly, child health is rarely discussed in the community events if it is not nutrition-related. Usually, women follow two forms of network while communicating socially, family and non-family network. Family network usually provides child nutrition related guidance quite handily whereas non-family network like meeting people at community events provides work related suggestions only. Therefore, urban mothers are not actually getting child health related support and guidance from their participation in various community events. Consequently, if a mother remains busy with community events and all that, it will not yield any fruitful outcome with regard to her own child health. On the contrary, it may result in spending more time for community events and less time for own child care. The combined effect of these occurrences builds in a situation where the child gets less time, unfair care and deprived feeding practice from the mother and hence deepens the health crisis of the child.

All these four variables are differently associated and showing different directions and modes of relationship to each other. But when the mobility indicators are combined into one dimension, it results in as a weak contribution from the mother to her own child health matters, which is very much clear from the segregated view. While some studies reported that mobility positively influences children's growth and nutrition, this finding is not consistent with the literature. According to Shroff et al. (2009), access to markets to purchase food, medicines, and other essentials can improve knowledge about nutrition and health, whereas women with limited mobility are likely to have fewer social exchanges. Furthermore, Mainuddin et al (2008) found that women empowered in deciding major household purchases were significant with women's mobility in visiting hospital. It could be mentioned here that mobility increases social networks. Moestue et al. (2007) found more literate social networks to be associated with better nutritional status of children, but wide social networks with a larger share of non-family members were negatively associated with child nutrition. While some studies report that mobility positively influences children's growth and nutrition, this finding is not consistent with the literature. According to Shroff et al. (2011) access to markets to purchase food, medicines, and other essentials can improve knowledge about nutrition and health, whereas women with limited mobility are likely to have fewer social exchanges. Merchant & Udipi (1997), Sethuraman et al. (2006), Shroff et al. (2009) found that women's mobility decreased the likelihood that a child would be stunted. Furthermore, Mainuddin et al (2008) found that women empowered in deciding major household purchases were significant with women's mobility in visiting hospital. It could be mentioned here that mobility increases social networks. Moestue et al. (2007) found that more literate social networks to be associated with better nutritional status of children, but wide social networks with a larger share of non-family members were negatively associated with child nutrition. It may be the reason that non-family members provide less assistance at home which is more important for child nutrition.

Shroff et al. (2011) found mixed results while mobility autonomy interacted with child birthweight: high mobility was associated with lower underweight scores; it was associated with higher stunted scores. Ross-Suits (2010) did not find any significant associations for mobility. Overall, mobility appears to have important implications for child nutrition, but its effect likely varies by situation and context or based on how the variable is defined.

6.8 Access to and control over resources

Access to and control over resources is a vital dimension of empowering women. This important dimension was used in all regression models of this research such as child nutritional status (stunting, wasting, underweight), child and women dietary diversity. Getting access and control over household and community assets like, money, land, etc. leads to utilize her inside potentiality and

give her an opportunity to make strategic life choices. So, access to and control over the resources is a social security that actually makes their life better. Beside this, it also provides a financial security and solvency to the women and by which women can ensure the best use of their potentiality. Thus, the household and the community are getting benefited from them gradually. So, when women start working outside, she gets a platform to access and control over her own resources, though there are many exceptions in Bangladeshi case. First of all, it provides an access to and control over her financial resources as she is being paid for her works and this may upgrade her capacity to access and control other kind of resources like jewelry, land, infrastructure etc. Some of the FGD respondent mentioned her view as:

RHH2 said, "Working mothers can express their own views, can use the money they earn as they want, and involved in important decision making an in the family but housewives cannot."

RHH1 mentioned, *"We have to ask our husbands for money all the time. Most husbands do not want to give money to their wives happily. He thinks, if he is bringing everything for me, then what should I do with the money. Many well-educated people say that we don't have any asset, we get some money from here and there, or from my father's house."*

RHH4 said, "A housewife mother cannot express her opinion as much as a working mother can when it comes to making important family decisions."

RHH3 said, ". I do not have my own freedom to spend. When it comes to spending money, I have to get permission from my husband and then account for it. In all cases, consent has to be made."

Some of RMG workers quoted as:

"I work hard to earn money, but I have no right to my money. I don't do anything for myself; I do it for my husband and children. If this money is not given, the husband tortures me a lot".

"My husband and I have neither his money nor my money. He spends all."

"We have the right, but we can't practice."

Some of the high official mothers mentioned as below:

E4 (a higher educated, high income category mother) said, *"In our social context, I am familiar with mothers whose husbands are waiting for their wives to receive their salaries and hand them over to him. There are many women who steal their own money. I know a well off family, the husband recently wanted to buy a mobile phone, his wife bought it with her own money, but when wife wanted to also buy with her money, he rejected her. Girls still endure a lot of oppression, giving up all their hobbies and pleasures when they want something and they don't get many things. We still cannot accept that female's income is important too, and a girl is capable of running her own family, her husband's family and her parents' family."*

E6 (a high income category mother) said that she met a female colleague in her work place whose husband was working in a private bank and she paid all her own salary to her husband and her mother-in-law used it to manage their family expenses. Even she was prevented from paying her parents because all the meditative ideas of a girl after marriage would be centered on the in-laws. During the Eid, the relatives of the husband, ordered and imposed on her for so many gifts. But she

could not send anything to her parents. When she got the new increment with her salary, she kept it hidden and at one point, she was attempt to divorce because she had to ask for money from her mother-in-law and was accountable for spending money. She became agitated and at the moment, she is living at her father's house.

In Bangladesh context, there may be a relation between access to resources and decisions taken in the household. There are many decisions that are taken by every household regularly like cooking, buying food items, buying other necessary items, health expenditure, investment etc. Though taking decisions by consulting with other members can result better outcomes than decisions made by a single person of a household, most of the households in our country are male headed and these decisions are usually taken by the household head or the person who earn money to support the family. In Bangladeshi reality, the decisions are considered only by those persons who earn money and contribute to the family. Here, women working status play a crucial role. As it is confirming the income of women, they could contribute more or less to their family, and this way their decisions come forward in their family and considered by other family members. Ultimately earning money is a fact in this case and working outside by the women ensures it. Therefore, access to and control over income has emerged as significant correlates of child outcomes. Many of the literature show that mothers with greater control over expenditures are more likely to have children with better long-term nutritional status. Malapit, et al. (2014) found that children have better diets and long-term nutritional status in households where there is greater equality between women and men. Heckert et al. (2019) found that wasting was less prevalent when mothers had more input into purchasing decisions and when aggregate empowerment scores were higher.

Like Mahmud et al., (2012), this study also found that women's engagement in decision making is the lowest in the highest wealth groups potentially as a result of the male having a more dominant role as the breadwinner. Some women mentioned that their increased involvement in decision-making did not translate into more control over the earnings. Though economists define the household as a single economic agent, in which individuals share the same preferences and pool their resources, evidence from this study has shown that family resources are not equally allocated within the households; instead, there exists an unequal distribution of resources which usually takes the form of a bias mainly against females. So, intervention is needed to create an enabling environment in which women may benefit to increase agency.

Though literature (Shroff (2007), Shroff et al. (2011); Dancer and Rammohan (2009)) shows mothers' decisions regarding child care, feeding and immunization has mixed effects on child nutritional status, but in urban Bangladesh, mothers take most of the decisions about this matter, sometimes jointly with fathers or other family members. Rarely fathers take decisions about child care issue alone as society still finds it as the sociocultural responsibility of women (let it be mother or caregiver) to take care and rear the children. Heckert (2019) mentioned that many studies investigated aspects of maternal autonomy over food decisions (mainly who decides what to cook), with no significant results (Basu & Koolwal 2005); Sethuraman et al. (2006); Ross-Suits (2010)). The results from our study are similar. These non-significant results suggest that maternal influence over childcare, and food related decisions may be a poor representation of autonomy. Food preparation is usually considered a woman's responsibility in many cultures including urban Bangladesh. In fact, a question concerning women's control over food to be cooked is included more or less in all the nutrition and health research related questionnaires with the assumption that women's decision making over this aspect would be the norm. Therefore, in this study, decision is less significant than mother's control over household income, resources and her nutrition knowledge. Some women mentioned that their increased involvement in decision-making did not translate into more control over the earnings.

In this study, we have found that in most cases, the other family members think, they need to take care of the child only, but many mothers feel that mothers' physical as well as mental health is very important to keep our children healthy, which is almost neglected. The research shows that mothers can take decision about child health, but not about their own health. Mothers can bring her children to see a doctor without her husband's permission and whether she needed to be accompanied while bringing her children to a medical care. Addai (2017) suggested that raising maternal autonomy is an important goal for improving children's nutritional status, a growing body of literature recognizes that women's autonomy has far-reaching impacts for the health and well-being of the community and the family, and is essential for reducing child malnutrition worldwide. However, some researches show childcare decision-making was associated with better child nutritional status (Mashal et al. (2008); Shroff et al. (2011)), while Shroff *et al*. (2009) found no significant association for general household decision-making with child nutritional status. Some studies also evaluated whether female control over their own health care had a significant association with child nutritional status, and all found significant results. Ross-Suits (2010); Dancer & Rammohan (2009) found maternal autonomy in control over her own health care to be significantly associated with better child's stunting.

Although the relationship between wealth and empowerment is not straightforward, it is reasonable that a certain level of resources is needed for women to act on their agency. For example, women may be empowered to participate in the household decisions, but if the household or community does not have financial or infrastructure resources, then the ability to act on the decisions is limited. Without access to monetary resources, mothers may be unable to purchase appropriate food to meet the special needs of their young children or engage in optimal health seeking behaviour (Bhagowalia et al. 2012). Groot et al. (2015) mentioned that Cash Transfer (CT) can decrease household poverty-related stress, which in turn may improve the caregiver's physical and mental state, and thus increase positive parenting of children. Stress is also believed to be linked to the committing of intimate partner violence (IPV), which in turn affects child health outcomes (Yount, et al. 2011). Examining stress as a pathway for poor health and poverty as a chronic stressor, Groot et al., (2015) hypothesized that individuals of lower SES face more stressful events in their lives and also have fewer social and material resources to deal with stress. The chronic stress of poverty in early childhood can induce significant biological changes with lasting impacts on health, and thus, CTs which may alleviate poverty have the potential for broad, long- term impacts on health. Further, CTs may relieve incentives for pregnant women to engage in poorly paid laborious works, with implications for birth outcomes. Groot et al., (2015) mentioned the positive impacts of CTs on several dimensions of women's empowerment, such as women's control over resources, public speaking, education, mobility, decision- making power and self- esteem in Mexico, though there are evidence which showing small or no impacts or even negative impacts in Ecuador, Kenya, Uganda and Yemen; and they also showed a positive impact on child nutritional status, dietary intake, vaccination coverage reduction in common children's illnesses, such as diarrhea across several countries specially Brazil, Colombia, Mexico, Ecuador, Philippines, South Africa, Zambia and Sri Lanka; no significant impact of CTs on child nutritional status, for example in Kenya, Tanzania, Uganda and Nicaragua, while mixed impact in Malawi and Mozambique. There are also strong evidences that CTs have a positive effect on the resources for food security, resources for health and resources for care. Conditional cash transfer increases the probability of preventive healthcare visits, antenatal care, caregivers' feeding behaviours and practices and psychosocial care. There is promising evidence that CTs may decrease IPV and improve the mental health of beneficiaries, including reducing levels of stress which has implications for improved health among mothers and children.

6.9 Attitude/ support of husband and other family members at home

The support mothers received at home from their husbands and extended family members, is an important factor that affects child nutrition, while domestic violence has essential negative effects on child nutrition, both indirectly and directly through maternal stress, mental health, behavioural risks, physical health and malnutrition as well as through stress experienced by the child, possible impairment of mother's ability to breastfeed and in general compromising the mother's ability to care for the child (Yount et al. 2011). Engle et al. (1997) also mentioned that maternal social support (e.g., child care assistance, providing information or emotional support) may influence childcare practices and in turn child nutrition. When breastfeeding women receive support from their husband or extended family members at home, it allowed them more time for breastfeeding. Gebrekidan et al. (2021) mentioned that the working mothers living in the extended families get the privilege because the social interaction among family members is very close which helps employed mothers to get support at home. Similar findings were obtained in a study conducted in Tanzania (Matare et al., 2019), Kenya (Van Ryneveld et al., 2020) and India (Omer-Salim et al., 2015) reported that family members other than the husband such as grandparents, aunts, siblings and neighbours keep their babies while the mother's work. The authors of the Indian study also reported that the husbands' support varied with some being actively supportive whereas others were passively supportive (upon request); majority of the family members involved in supporting breastfeeding women were females except the husbands, as the developing societies are mainly male-dominant and influenced by religion, traditional and cultural perceptions and values of a society where in-house activities such as food preparation and child rearing are perceived to be the exclusive responsibilities of women. Similar findings were obtained in the studies conducted in Tanzania where husbands consider themselves as superior and reluctant to help their wives by carrying the babies (Bulemela et al., 2019; Matare et al., 2019).

Societal norms also suffer the mothers and affect child nutrition . Like Gittelsohn et al., (1997), we also found that due to societal norms, women have a tendency to eat last and least, which may mean that they have limited agency to advocate for their own needs. They cannot overcome the norms before, during, and after pregnancy, though biologically they have to transfer of nutrition to the child in utero and early infancy contribute to improved nutritional status of the child by establishing the foundations for adequate child growth trajectories (Young et al., 2017).Here partner's positive attitude can play very important role to improve the situation. Hanmer and Klugman highlighted attitudes about IPV as a critical domain of women's sense of empowerment, claiming that IPV minimize women's individual agency and ability to act in their own best interests. Beyond essential agency, exposure to IPV negatively impact on child nutrition and growth. Yount, et al. (2011) hypothesized that IPV directly affects young children via a dysregulated stress response and indirectly via impacts on women's physical, mental, and emotional well-being. R, jones et al., (2019) found domestic violence, on both the individual and community level, significantly increased the likelihood of stunting. In the urban Bangladesh context, wife beating may not be such a problem in the present context (except the slums), rather caring or ignoring tendency, quarreling, extra marital relationships following negative approach towards wife are the main points of attitude of husbands. Our highly educated FGD respondents think that it is only "change of version" with the civilization, but the husbands mostly have not moved from their masculinity point.

Groot et al., (2015) also mentioned that IPV can affect child nutritional outcomes in various ways. Women's exposure to IPV during pregnancy is associated with low-birth weight and pre-mature birth. But Afulani et al. (2017) mentioned that women's empowerment may reduce pregnancy related complicacy; improving women's nutritional status; improving attitude of household members to improve psychological health; and improving access to ANC services during pregnancy and delivery to help prevent prematurity and improve survival of premature babies. In children,

exposure to maternal experience of IPV could be linked to severe acute malnutrition, under two mortality, decreased growth and stunting. Our FGD result mentioned that women who experience negative attitudes from family members during pregnancy are less likely to use ANC services. Yount et al. (2011) theorize that children's exposure to violence in the home may affect early childhood growth and nutrition through biological and behavioural pathways. Devries et al., (2013) mentioned that globally, one in three women aged 15 and over experiences physical or sexual IPV in her lifetime. Based on the above discussion, we may check what are the issues mentioned by our FGD respondents.

RHH5: *"Our male society wants girls always to be inferior to male. Even if a female does a better job than her husband, she has to listen. Even if she doesn't work, she still has to listen to her family. Men always want women to be dependent on them for various family activities. They always want to maintain their authority in all areas of the family."*

RHH3: *"I didn't get much support from my husband when I was pregnant. During this time I became mentally weak"*

E4: *said, "In today's society, girls as well as boys help in household chores. Nowadays the boys help in cooking. She and her husband do the housework by dividing themselves ... According to her, all the boys who have been married in these two or three years have a positive attitude to do the housework than others."*

E5: *Though my husband feels that women do so much of hard housework but still there is no economic assessment, and he also teaches it, but at own house, he often works. I feel tired of cooking. Many times I also think that it would have been better if I had not got a job. In our culture, if the husband sometimes works little, the wives say a lot of work has been done by you today. But the attitude should be that everyone will work. So we need to change our attitude."*

RHH4: "Not all husbands help their wives. Many husbands think that girls stay at home and have nothing to do but housework. They work at office, so why should they help the girls with household chores?"

RHH2: "Men consider girls as their property. They raise their hands on the wives even in small matters. Those who are a little less educated abuse their wives physically, but educated are more likely to abuse emotionally."

RHH6: "The issue of beating wives is a problem in our country and in other countries as well. Less educated girls think that husbands raise their hands against their wives and they generally accept the issue. And there are very few men in our country who do not raise their hands against their wives for any reason."

RHH4: "There are also educated families, where husbands and wives seriously injure each other."

E1: If a girl is beaten, then her family members even think it is very normal. This is not something to complain about. Then they have to hear from the family, "You understand more than your husband(!), you argued with him, therefore you are beaten. Why do you speak with him? If you understand a little less or agree with his points, you may not be beaten."

E6 expressed her displeasure that no girl could be found who was not beaten by her husband. Expressing her own experience, she said that her mother-in-law did not like her because she had fallen in love before married to her husband. She also disliked her because she was shorter and dark skinned. Despite being at a very high level, she was pressurized by the family to give birth a baby boy. The dynasty must be protected. But she prayed to God to give her a healthy baby no matter whether son or daughter she was given.

About decision making in the household, few respondents' views are important as mentioned by T1 as:

"My opinion is very important in my family. My husband has no savings of his own but he gives me full support if I ever want to make savings."

The RMG workers always feel afraid as in the factory, they work with male colleagues, and sometimes, without any reason, anyone can complain about themselves about illegal relationship with other man. Even if it is not true, husbands will torture.Most of the times, they cannot go out of the house in need of work. G6 said as:

"If I disobey his words, he will raise his hand."

Another said, "if a vegetable is burnt or if there is too much salt in the food, I say that I went to bathe the child so it is burnt or too much salt. Sometimes the husband understands it and sometimes doesn't understand."

6.10 Overall Women empowerment

Women Empowerment and Child Nutrition have complex relationship. Different aspects of empowerment may be important for different nutrition outcomes. Kabeer (1999) constructed women's empowerment by using three domains: assets, agency, and achievements. To find the impact of women empowerment on child nutrition, Cunninghum et al. (2015) used three dimensions of women's empowerment: control of resources and autonomy, workload and time, and social support. They also mentioned that different women's empowerment domains may relate differently to child nutritional status. Increased women's self-confidence can make better health-enhancing decisions and thus have a positive impact on their families' nutrition, because gender norms are culture- and context- specific. But it is real that women's empowerment has greater potential to improve households' nutrition outcomes. Malapit and Quisambing (2015) found that in Nepal, engagement in the community, control over income, reduced workload, and the overall empowerment score were positively associated with better maternal nutrition while control over income was associated with less stunting. Sraboni et al., (2014) mentioned that in Bangladesh, the most promising areas for policy intervention were leadership in the community and control of resources.

Brunson et al. (2009) similarly found a strong significant association of women's autonomy on children's wasting for children over >3 years of age in Northern Kenya. Bose (2011) found significant positive associations of women's autonomy with child-feeding practices; longer duration of breastfeeding, a higher likelihood that the child received supplemental milk products, and of receiving supplemental meat, fish or eggs. Desai & Johnson (2005) found significant positive associations of women's autonomy with child's height-for-age in India and Mali, but had a significant negative association in Malawi and Haiti, while no association was reported for Benin, Uganda,

Zimbabwe, Egypt, Nepal, Colombia, Nicaragua or Peru. Heaton & Forste (2008) reported a significant negative association of women's autonomy with child's height-for-age in Haiti and no significant associations in Colombia, Peru, Nicaragua and Bolivia. Shroff *et al*. (2011) Bose (2011) found that increased financial autonomy was positively associated with exclusive breast-feeding in India and Bolivia. Smith et al. (2003) is by far the most comprehensive study carried out on the relationship of autonomy and child nutritional status, examining various child nutritional outcomes in 36 countries in Asia, Africa and Latin America. Measuring autonomy across all countries, a significant positive association was found overall on child's weight-for-age. Again, women's autonomy tended to be negatively associated with breastfeeding measures but increased the likelihood of received complementary foods, increased the times per day the child was offered foods and increased the quality of foods the child did receive. Due to the possible differences in maternal autonomy's impact on breastfeeding and complementary feeding, there may be a differential impact of maternal autonomy on children of different ages. One other study, Maffioli *et al*. (2009), found a marginally significant association with child stunting in India, where women's status was measured using the differences between a mother and her partner's education and occupation.

On the other hand, Patel et al. (2007) reported that mothers' power had a negative association with child BMI where they mentioned shared power was associated with higher child BMI and suggested that increasing the mothers' bargaining power does not always improve child nutritional status, and that encouraging cooperation and communication between partners within the household may be preferable. In the study, autonomy was calculated by separating women's autonomy from joint decision-making. Overall, studies using a composite score of women's autonomies support the hypothesis that increasing women's autonomy has a positive effect on children's nutritional status.

However, Mashal *et al*. (2008) Rammohan (2009), Ross-Suits (2010), and Shroff *et al*. (2011) found that lack of maternal autonomy was significantly associated with increased likelihood of child stunting. One possible explanation was that stunting is most likely to occur during the rapid period of growth in the first 2 years of childhood, and young children are also especially vulnerable to disease. These first few years are a sensitive time period when access to health care is important in preventing malnutrition, and children's health care may be improved when mothers have the autonomy to make health care related decisions. However, as Brunson *et al*. (2009) pointed out, one limitation in these measurements is that stunting is a long-term measure of nutritional status, and autonomy measurements taken at the time of the survey may not accurately reflect the mother's autonomy during the period of time in which the stunting occurred. Some studies have noted that in many cultures, women's autonomy tends to increase with age and with the birth of children, especially sons (Hindin 2000; Acharya *et al*. 2010); but in India, Lee-Rife (2010) found that many of the women actually experienced decreased autonomy with age.

There is a significant positive association of women's overall empowerment with women's diet diversity. Our findings suggest that increasing women's empowerment improve the diet quality and diversity. Smith et al. (2003) found that women's lower self-esteem was closely tied to women's own nutritional status and suggested that women with low status may face difficulty in perceiving the need for their own health care, much less garnering the confidence to act on that need. Our study found that women empowerment decreases the likelihood to low dietary diversity which suggests that empowerment can translate to improved nutrition status. Malapit and Quisambing (2015)found that women's empowerment and participation in credit decisions were positively and significantly correlated with women's dietary diversity score but women's participation in production decision was not significantly associated with their nutritional status. Again, women tended to be undernourished when they were spending more time in activities that required high energy. They also mentioned that good hygiene and better sanitary practices have to be adopted to address

nutrition. At the end of the section, we may mention about some quote which are the voices from the field.

A1: *"We are living as slaves of men. We work day and night at home but the husband's idea is that this is the responsibility of the girls. And if we work, the money has to be paid to the husband. Though we work in the garment factory, we can't even go for buying clothes. We can't eat even if we want to. We ask our husband for money like a beggar. We can't give a single penny to our parents if we wish to send. It is also a husband who buys something expensive with his wife's money. But he does not want to buy a good dress for his wife. In this way, we have accepted the slavery of the husbands. We are also slaves in the factory. We do not find any solution".*

A3: *"If we talk about food, we have to follow, as husbands' wish. We have to provide the biggest piece is from the food. If the food is bad, sometimes they beat. It can be seen that sometimes the wife has to eat only with broth because the husband finished the main ingredient. We can't eat before our husband. Women here too neglected."*

Speaking of shopping, **A2** said, *"We are not able to buy as we like with our own money. If we speak with other man and the husband knows, then they even beat us. The reason for us to accept our husband's slavery is: this husband is the father of our daughter and son. If we leave them, the children may lost their father".*

A6 added, *"When a girl tells her mother, "today my husband has quarreled and beaten me", the mother says directly, "Apologize to your husband. You don't see how much your father beats me, but I say 'sorry' to your father. I know, I'm not wrong, but I was born as a girl. Don't tell these things to anyone. On the other hand, if the wife protests against any wrong-doing of the husband, then the father-in-law used to say, you are very bad women, your parents didn't educate you. Why do you argue with your husband? This is the neglected condition of women in the society."*

Those who earn, for them empowerment is not only earn money, but also savings.One of the well off mother mentioned:**"***High class working mothers have income, but it is doubtful whether she is ever being able to save money. It seems that they are doing the job with the mercy of the husband; they have to spend their money for the family. Husbands always want to say that since you are spending for our child, I can save".*

C5 said, *"I have seen in the case of previous generation, the working women were employed, had to give the whole money to their husbands. Now maybe this situation has changed a bit, but not has changed completely yet. I got support from my family."*

In a FGD session, the high official mothers mentioned:

E4: *"Look, what is our life? We don't receive enough respect at in-laws family, in some cases, we are not expected there. And after marriage, the rights in the father's house also decreased. Now, I enjoy more comfort and rights in my own family, as I am a working woman".*

E3: *"I think a girl who is not in a good position in her father-in-law's house, her position is also good in her father's house. And if she is not respected in the in-laws house, she is also not respected at her father's house. Parents and relatives do not treat her well and they feel her as threat. A daughter may be properly evaluated in the father's house before marriage. If she is well-off in terms of prestige, then she is re-evaluated in the current situation without underestimating her as before and in many cases the picture may be different. However, if her own position in the in-laws' house is not good, she may not get the*

same assessment as before in the father's house. In the case of divorces, the position is more miserable. Parents, brothers and sisters blame her for the divorce."

6.11 Maternal Mental Health: Avoided/ Neglected reality

Maternal depression has been found as the hidden factor of mothers' empowerment which might largely affect child nutritional outcome (FGD report). Depressive disorders are by far the most common mental disorder. A large proportion of the mothers who are psychologically treated as 'distressed' because they are neither clinically depressed nor can be considered to be in good mental health. WHO defined maternal mental health as 'a state of wellbeing in which a mother realizes her own abilities, can cope with the normal stresses of life, can work productively and fruitfully and is able to make a contribution to her community'(Herrman et al. 2006). It is also evident that 'good mental health' or 'wellbeing' is not the same as an absence of mental illness. In this study, regardless of socio-economic groups, mothers mentioned about depression. Some of the mothers from upper class expressed that they wanted to kill the children when they were less than a month. So, here socio-cultural factors may interact in determining the effect of maternal mental health on child nutrition. In such an environment, a depressed mother may find it even harder to ensure appropriate nutrition for her child. It could be mentioned here that 20% of our respondent mothers could achieve at least 80% of overall empowerment score. Those distressed mothers could not properly respond to a child's needs for care, and interact with the child through talking, playing and providing a stimulating environment. Furthermore, existing preventive strategies such as breastfeeding, early infant feeding, hygiene promotion, immunization, health education and health seeking behaviours are all directed towards the mother. To what extent, these activities can be followed depend on mothers' knowledge, physical and mental health. We may express some of the examples from the FGD sessions here:

RHH2 mentioned, *"When the husband misbehaves with us, do you think we could feed the baby? We cannot change the cooking menu or what to feed the baby."*

A3 said *"We used to sing or act differently while feeding the baby but is it possible to do these when we are treated badly?"*

E4 expressed, *"We can't treat a child very well when we are distressed. Ultimately it can be seen that the baby is being affected as long as I am upset."*

G4 mentioned as: *"It definitely affects the child's diet and nutrition, if there is a conflict between husband and wife. She cannot feed her child in a messy mood. Children want to listen to music, hear stories and then eat. If a mother is in a bad mood, she will not be able to pay much attention to the child, the child's food and nutrition."*

E6 stated as: *"if I am upset, has some trouble with my husband or other members, what should I feed my baby if I'm in a bad mood? I cannot offer her in a good mood. I don't even eat well myself. It has been seen many times that even if the child wants to say something good, I beat him/ her."*

C4 mentioned that the position of the mother plays a major role in the physical and mental development of the child. For example, in Bangladeshi society, as a daughter in law of a family, even a newly mother has to wake up early in the morning. If a mother wakes up late in the morning, if the spouse or family members starts negative attitude towards her, she starts her day in a bad mood, it interferes feeding the baby and often deprives the baby from getting proper nutrition. Many times the child says, *"I will not eat."* She also said that nowadays mother or caregiver have to spend a lot of

time on feeding children but if there is lack of harmony in the family, that amount of time cannot be given to the child. As a result, the child suffers from malnutrition. Therefore, a healthy and intensive family environment is the main contributor to the child's physical and mental development. So she thinks that the mother's position in the family environment and the child's physical and mental development are inextricably linked.

C3 said that when there is family unrest, it is not possible to look at a child with a smile. If there is a family crisis, the children will get complex emotional development, at this time the child seems to be burdened. Husbands often say, "Everyone can, why can't you?" She added that a mother suffers from a lot of mental turmoil due to irregular sleep at night and lack of sleep, heavy work pressure during the day, rejoining the job after six months, any many other reasons. As a result, the child's physical and mental development is hampered.

Prince et al. (2007) mentioned that in low-income countries, the prevalence of maternal depression is estimated at 15–25%. Studies also show that maternal antenatal depression increases the risk of a low-birth-weight baby and post-natal maternal depression increases infant undernutrition. In developed countries, such depression exists only in low socio-economic groups (Stewart 2007). In developed countries, midwives or health visitors can play an effective role in preventing maternal depression by providing individualized care from pregnancy to the post-natal period of the mother (Ogrodniczuk & Piper 2003). Elements of such care include social support, brief individual or group psychotherapy and extended home visits for vulnerable families. Greater social support and better psychosocial health facilities for antenatally depressed mothers in low-income communities can lead to improved neonatal outcomes (Zimmer-Gembeck & Helfand 1996; Feldman et al. 2000). Engle et al. (2007) found that in developing countries, interventions that focus on strengthening mother-child interactions (e.g., through play) are more effective than nutrition interventions in improving child growth and development; and Walker et al. (2006) showed that children who received psychosocial stimulation in the first year of life continued to show a range of health benefits more than 10 years later.

The role of maternal mental health in less developed countries, which house most of the world's children and shoulder nearly the entire global burden of child undernutrition, has been almost neglected. Stewart (2007) mentioned that infant undernutrition is especially strong in low socio-economic populations where women face greater adversities and less autonomy. In the societies, where such environment exists, the high prevalence of maternal depressive symptoms would have a national level effect on the nutritional status of children. So, the declines in levels of maternal depressive symptoms could lead to national level reduction of undernutrition in children.

While there is little evidence of linking women's empowerment and stress in developing settings, the relationship between maternal psychological health and child nutritional status is very strong (Premji, 2015). To address this complex link, to improve child nutritional status, some suggestions would be a decrease in domestic violence, which may result from increased sociocultural empowerment, achieving economic empowerment by lowering financial strain, and cognitive/psychological empowerment by building women's resilience. In order to address these, we have to work to reduce inequities in determinants of health such as education, income, employment, nutrition, social support, and access to health care. Disempowerment increases inequities in these health determinants. Women's empowerment, conversely, may help mitigate the effects of these factors on the stress experienced by women. A woman's confidence in her ability to act at personal and social levels to improve her condition may also enable her to confront authorities, when necessary, to defend her rights and obtain necessary auxiliary medical and social services, including psychological services, to help her cope with stress— potentially improving her birth outcomes.

6.12 Empowerment at work place

Actually the issue of empowerment may lie wherever any wo/man exists. Though we did not expect at the beginning of our research that work place disempowerment can be a factor in the working mother's life. In this section, we will only include the opinions/quotes from the FGD respondents' view. Many of them said, **though we do not have problem at home but there is so much problems at workplace.**

One of the high class working participants, C5 said that she was found to have misbehaved during the pregnancy by the head of the office and her colleagues. She did not get leave from the head of the office. The climbing of the three-stored office through stairs was the most difficult problem for her. She did not take time off from work on the day her baby was born. She had to spend three more days in the hospital for phototherapy, but her husband did not have time as he was very busy with his office works. According to her, 15 days of paternity leave is needed.

E4: "In my case, if someone says something bad or misbehaves with me, I can't say anything to anyone else, it turns out that my eldest son, who is a little and innocent, so I grabbed him and beat him. . It is seen that the boss of the office made me a little angry, that anger came and poured on the children at home. I get angry with my mother sometimes. In fact, the thing is, we always express our anger to the people around us."

E2: "I think it really has an effect. It is always difficult to keep the mood right. It can be seen that the boss of the office was angry with me, so after coming home and throwing that anger on someone close to me. My child is very little, so that I'm not angry with him like that, but sometimes I lose patience, maybe I would have given him a little more time, it is seen that he is not given that much time. When it came time to eat, I feel disturb."

E5: "In this case, when we become impatient or bring any other worries in our mind, maybe I would try to feed the baby twice or thrice, but when these problems occur, I try once and leave, I scold them and beat them a little. Then it is seen that the child has fallen asleep without eating at night. So I think these things have a bad effect on nutrition.

M3 said that in the family, men understand things in the case of their wives, or sisters, but in the case of jobs, they do not care the case of colleagues. She questioned the society and said that after two years, caring for children is not so difficult, if the child health is good. But why not a mother gets comfortable environment during these two years? Why can't colleagues have patience these two years?

M2 (A banker mother) said that before she came to the office, she had to bring three meals a day but there was no time for her to take the foods including the breakfast. There was no opportunity for pregnant women to take a break from work. Another thing is there was no separate toilet facility for women in the bank, which is crucial for a pregnant woman. She had to use public toilets from time to time, which male colleagues use unconsciously. Pregnant women needs some rest after lunch, but she did not have this opportunity. Sometimes she was lying by putting a few chairs together even other colleagues used to talk about it in different ways.

M3: "There is a rule of transfer after every three years. She thought about it and wondered where she would be transferred, where she would leave the baby? Will she get a home like here? Will there be an opportunity to see the child during break in the office? Such various thoughts kept her in despair. She

added that her child is now four years old and that is why she has forgotten about many incidents but the reality of that time was very difficult. As the baby gets older, mothers forget about the pain."

M4: "She had to stay at office (bank) even if it was 10:00 pm for work, where male officers are working until 11pm. When she came home, she had no chance to sleep."

C1: "There should be another policy as husband and wife can work at nearby station as much as possible."

C5: "I want to say a little bit about this rest, we can see our office from 9 am to 5 pm, but I had to leave the house between 8 am. Last time, I had to climb till 3rd floor and my senior colleagues would sit on the ground floor. It would be very difficult for me to climb the stairs, I would have difficulty breathing."

Attitude of colleagues:

M2 said that even many women officers used to tease her saying that you will go on leave, you will take six months off, so you do your task well now, you don't need leave now. She has such a fear that who will take care of the baby when she gives birth to her child? She was always thinking and used to feel very frustrated when there was work pressure on her.

C3: "It is seen that our male colleagues do not consider any mother or female officer as efficient. So girls always have to prove, they are efficient. Girls have to prove in the family and also in the office that they are efficient.

E4: "I had an ovarian cyst during my first baby, which caused me to go on maternity leave a little ago and I joined the Dhaka office when my baby was four and a half months old. At that time, I asked my boss, "Sir, if you give me all works before lunch hour for two more months, I would finish all of my work, and I would leave after lunch! Many of the colleagues whispered. Even one of my colleagues asked me, "What does your husband do?" I said that he is a banker. Then he said, "Your husband gets good enough salary, why do you need this job?"

E1: "Even in that situation, I had to face the insults of some of the colleagues and the misconduct of the head of the office."

T3: In this case, I would say myself very lucky that I got a very good work place so everyone here was very helpful, otherwise it would not have been possible for me to do so much. From the of the pregnancy period and after the pregnancy, I got a lot of support from everyone.

T4: "Sometimes my child has a fever, but I had to leave my child and go to school. Sometimes it is very difficult to get a half day leave for primary school teachers."

Opinion about office time rearrangement

T2: "It's better for us if the school time is 10 or 9-30 instead of nine. Half-hour time seems very important in our life. If the departure time is 9:30 and the arrival time is 3:30 then it is much better for us."

M2: "If the bank employees work till 4 pm, we could maintain family. But we have to wait at least 8 pm."

E6: "Maybe up to a year, it would be really useful for us to rearrange the office hours a little during this time."

E2: "I also think office hours can be rearranged. If you have to go to the office in the morning without feeding the child, then it is not possible to concentrate on the work, there is a mental turmoil. But if you don't have this thought, then the contribution to office work can be given more.

E5 said that the time from 10 am to 3 pm is suitable so that the baby can be left with someone after feeding in the morning. Boy male colleagues spend time outside for tea-cigarettes or prayers, but female employees spend quality time at office.

E1: A mother can be given option to choose the office time in the morning or afternoon and this choice will largely depend on her work area and type of job. For some mother, it would be good to work from 8 am -2 pm; anyone can set the time from 3 pm - 9 pm. Even though this system is available in the outside world, it is not available in our country.

Another mother mentioned that she doesn't want to quit her job but has a part-time job. And the time would be 9 am - 12 pm, only for 3 hours. This opportunity will help new mothers to overcome post-pregnancy depression and they will become more active in their work, because it will give them enough time to give to themselves and the baby. Because, the working mother is always thinking, 6 months are coming to an end, how will my child be in the next days for eight hours? In this dilemma, many quit their jobs and turned from employees to housewives.

Maternity Leave issue

Speaking about working hours and maternity leave at the time, M2 said it would be better if six more months after maternity leave could be given to new mothers for work. M4 and T2 mentioned that a mother need one year of maternity leave to develop a child. If it is not possible to increase maternity leave, working hours could be reduced. Other officials agreed to reduce or rescheduled working hours compatible with the job nature and maintaining family-work balance, without increasing maternity leave. At the time when a child starts eating complementary food, the working mother has to go out for work. There are fears whether the new untrained care giver is able to take proper care in this regard. When it is the important times for a child, when they start walking, they start talking, the children do not get close to their mother.

C2 mentioned, *"Maternity leave should be at least one year. Leave should be started at least one month before the baby is born. While travelling to workplace, there is shaking and dust of vehicles on the road, which is very harmful. There are many problems that I was facing during pregnancy such as bleeding, water breaks. So, I had to take the leave before 2 weeks."*

E2 mentioned, *"What I think is that in many developed countries, after 6 months of maternity leave, you can take another six months without pay leave if you want. As the child starts complementary feeding and therefore the mother can take care of her baby."*

E1 think that 6 months time of maternity leave is very short. Rearranging the rule of maternity leave is an essential issue. She said, co-operation is needed, both from family and work. At present, husbands are cooperating in many cases, but the working women find more non-cooperation from work place.

Leave for fathers

E4: "I have a recommendation, when a girl becomes a mother, it means that she needs her husband to besides her, and also during delivery. Husband has to take many responsibilities at that time. So I think the husband also has 15 days leave in that period."

6.13 Child care support (caregiver)

Care practices, critically important for optimal child nutrition and development, are behaviours such as feeding practices, hygiene practices and stimulation of children. Maternal care resources are characteristics that may affect how mothers are able to care for their children and include: education and knowledge; physical health; mental health women's autonomy and control of household resources; workload and time availability; social support networks etc. (Sen 2012).

Our study found that still the society thinks that men are the bread winner and the child-care responsibility is to be borne by women, be it the mother or the caregiver. Therefore, women still carry the greater share of the domestic work, including child care and food preparation. On weekdays, all working mothers carry a double work load, fulfilling their workplace responsibility as well as supervising the care of their children. In Bangladesh, domestic tasks in wealthier households are outsourced, for example, by the employment of a domestic paid worker, rather than the workload being shared with fathers. In our study, working mothers who had access to family caregivers (an increasing arrangement in urban households to provide the responsibility to elderly parents) showed an increased concern that they should not depend on their elderly parents or relatives, because it is inhuman to keep them busy with the time consuming and stressful child rearing activities. Some working mothers who do not have family support. They are forced to seek domestic paid caregivers to look after their children. But the paid caregivers in urban Bangladesh have lower levels of education or no education, and some of them are very young to care for the child. In most cases, they work for a very short-term period. The results showed that mothers have low trust in the caregivers' capabilities, because of the unfamiliarity with them and their untrained service may not make them capable in performing child care. The level of trust increased when they work with the mother for a certain period of time, then she becomes capable of doing things unsupervised. In this sense, supervision (training) is seen as a positive factor to ensure that the child receives adequate quality care. In this study, many non-working mothers expressed concerns about a lack of support in performing child care and domestic tasks. Roshita et al., (2012) confirmed that mothers and caregivers need support and adequate resources to perform child-care practices regardless of the child nutritional and maternal working status. However, in another scenario, it is indeed true that the children of working mothers belonging to low socioeconomic status are left unattended.

E2: *"When I was in Dhaka, I had to leave the baby and go to the office. I had to stay out of the home for about 12 hours. Then I forcibly took my mother to Dhaka because I could not rely on a working girl. Later my mother felt ill. In Dhaka, it became very difficult for me to work as a working mother. Later when I moved to Madhupur, there was a lot of training, a lot of pressure. I had to leave at half past six in the morning and came back at eight o'clock at night. Now I am traveling 30 kilometers every day. The main reason of staying at Mymensingh is to keep my children because my father's house and father-in-law's house are very close here. I am getting help from two families, the grandparents of the two children."*

T4: *"My mother and my sister stay with me to take care of my children. Since my mother is older, it would have been better if I could have found someone younger to take care of them. My eldest child wants to eat meat, no vegetables at all. I may manage to feed him, but my mother is old, she can't do that. My sister is a great help for me. She is a college student and she doesn't attend the class regularly to look after my children, I sometimes get worried what will happen to my children when my sister gets married."*

T1: *It is not good for the health of the children because an older person often cannot take care of the child.*

E4 *: "When a child is with grandparents, the mother feels relaxed and gets some time for herself."*

C2: *"We often bring the family members who are at home, like elderly parents, mother-in-law. It is also a burden for them to care for the babies in this age. In the last days of their lives, when they need a little relaxation and comfort, they again sacrifice their lives for the grandchildren. They actually deserve the care from others."*

C5: *"Parents will come to their daughter or son to be relaxed, but we ask them again to take care of our children; we do not serve them."*

T3:*"I have my mother and my younger sister takes care of my baby. My younger sister is in her third year of honors at the National University. My mother cannot actually take care of all the aspects. My mother can't do all the chores in the house, bring my eldest child from school and take care of the youngest child. For my two children, she can't go to the class properly, her studies have been hampered a lot. I have to handle a lot of things in my world alone."*

T1: *"Although my mother is much older, over 75 years old, she takes care of my child. She can't look after alone. A woman comes who looked after the baby from 11pm to 4 pm and then in the afternoon I came from school and take the charge of the baby. That means my mother and that woman takes care of my baby most of the time."*

Highlighting the need for daycare centers, **E5** mentioned that not only the mother has the responsibility for a child, but the father of the child also has the same responsibility. Many times the child may be ill. Working mothers can give less time to the children. Therefore, daycare centers are essential. The center plays a role in socialization. Sometimes a child learns to talk late due to being with a working girl, learns to walk late, and there is also a lack in socialization. A working girl does not talk to the child, may watch Bengali movie songs which are not compatible with her age. There was a viral video that how a maid was torturing a 2 year old child and she did not complain to her parents as she has to stay with that woman also on the next day and the following, for which she was afraid that she may be tortured, even more. But at the daycare center, the child is getting the opportunity to stay and play with the children of the same age. We have to spend money on a working girl, and also on the day care center. We have to see from where we receive the best output. Therefore, day-care centers are very much needed everywhere. We came to know that at the office of 'Bangladesh Bank', there is a day care center.

A high official mother said, *"If child day-care center is established, it will contribute to our country. However, there are some expensive child care centers in Dhaka in which everyone do not get easy access, which are not available and affordable for all. It costs five thousand to ten thousand Taka in a month to keep one worker at home, those who cannot afford, they leave the job. The amount of money we spend on roads, culverts or various buildings; but it doesn't cost that much to set up a day care center. State should take immediate steps to establish day care centers for all children regardless of any socioeconomic category."*

E5: It seems to me that there is no alternative to a day-care center now that the time has come. Parents or mothers-in-law whatever, they can't support. They do not have enough physical strength after retirement. We also need to ensure their comfortable living in this age. We should not expect so much from them. So I think the day-care center should be built very quickly.

Most of the people leave the child with the illiterate maids. How long will we leave the child to this illiterate population? Can't we follow a developed country where a large scale day care center will be set up and a group of educated people will be in charge of running it?

In fact, the working mothers fell into danger after having children since they become mothers, and there is no end to their worries about where the baby will be kept. They only try to survive. In the absence of proper day care centers, they try to survive by inhumanely torturing themselves and their elderly relatives or keeping them with the untrained non-relative workers and mostly they are harming the child development. This is also a point of disempowerment in the mothers' life, as she cannot make her strategic life choices.

7 Conclusion and Recommendations

7.1 Conclusion

Bangladesh has been experiencing faster urbanization than any other time before and the level of urbanization in Bangladesh is now 28% which is projected to become 56% in 2050 (UN, 2014; BBS, 2015). Under this situation, child health becomes a matter of concern. Failure to improve urban population's health specially child health could undermine the overall health gains that Bangladesh has achieved. At the same time, with this urban growth, women's status and role is also changing, which may have an impact on the nutritional status of mothers and their child health. Mothers biologically carry the children, who are then culturally responsible for caring them, at the same time who are also joining in the labour force as their new role, as economy demands. It may have several impacts. Evidence shows that that women's bargaining status could be higher in urban areas than her rural counterparts. Women with higher status tend to have greater control over household resources, more access to information and health services, better mental health, and higher self-esteem. Therefore, they may achieve economic empowerment which may also result of buying a more diverse and nutritious diet for families, especially for themselves and their children. This study attempts to find the relationship among women's socioeconomic status, empowerment and the nutritional status of their children under the situation of rapid urbanization in Bangladesh.

BBS 2015 defined urban area as: It corresponds with area developed around a central place having 5000 population with such amenities as paved roads, improved communication, electricity, gas, water supply, sewerage, sanitation and also having a comparatively higher density of population with the majority of the population in non-agricultural occupations. City, Town, Paurasahva and Cantonment are examples of urban area. The urban population have been distributed by size classes as: i) Towns (T) - Population less than - 100,000; ii) Cities (C) - Population - 100,000 - 49,99,999; and iii) Mega City (M) - Population - 5000,000 and above]. There is one mega city in Bangladesh, Dhaka. Again, as ToR 10 mentioned title as "Women's empowerment, children's diets and nutrition in urban and peri-urban settings", therefore, peri-urban areas were also included in this research. Miah, et al., (2003) stated that urban area can be defined as an area of 2 Km from the town/ city center and then peri-urban starts and it ends at the demarcation of rural and urban. Peri-urban areas are those which are characterized by a mix of rural and urban characteristics. Also, we have selected the peri-urban areas, which are included as towns and cities according to the Urban Area Report of BBS (2015). In this way, we have selected respondents from 5 categories of urban areas, which are: mega city (Dhaka), urban town, urban city, peri urban town and peri urban city. Although we disaggregated our data in descriptive part, but when we included area as a variable in our regression model(s), we did not found area as significant variable and as well it reduced the 'goodness of fit' of the model(s). For which, we excluded the area variable from the regression analyses.

We have selected the respondents as the mothers who have at least 6-59 months of child. It is a well accepted category of addressing child mortality. Article 24 of the United Nations Convention on the Rights of the Child specifically obliges all States to take appropriate measures to reduce the child death rate. The mortality rate of children under 5 is a baseline indicator of how a country is progressing towards assuring children's rights, in particular their rights to life, health-care services, nutrition, water, social security and protection. As infants under 6 months are exclusively breastfed, which is an unequalled way of providing the ideal food for the healthy growth and development of infants (UNICEF, 2010).

The variables included in this research were: socio-demographic, women empowerment indicators, dietary consumption diversity indicators, indicators of anthropometric failure, etc. There were some special issues for working mothers, caregivers and adolescent girls.

Our composite empowerment score showed that only 20% of the studied mothers have achieved the expected empowerment level. This low level of women endeavor capacity affected the insufficient changes in household dietary diversity. For example, most of the mothers (76%) had low dietary diversity and no mother was found with high dietary diversity, while only 22% children showed high dietary diversity. About 36% of children were stunted, 16% were underweight and 10% were wasted.

In the current research, mothers' working status was a significant predictor variable that affected women empowerment. Opportunity to work outside form home enables a woman to take several advantages for improving herself. Working women get attached to the outside world continuously knowing their surroundings, finding more ways to upgrade their quality and standard of life. That means they may realize autonomy in their personal life, participate in household decision, resource use, physical and financial mobility, and achieve a dignity in the community she belonging. This is why mother's working status may be an important factor for empowering women. Obviously then, the question arises, what would be the role of women's work on child nutrition and to what extent? We have the same answer as Cavatorta et al. (2015) mentioned that it depends on the context, what matters and how, and how changes might happen; household social and economic status; prevailing labour market arrangements; and arrangements and capacity of the households and the communities.

The study showed that aged mothers are relatively empowered mothers. Age can play a good role in overall empowerment. Age of the mother and age at first marriage were used in this study to assess overall women empowerment. It is found that, a woman who is older can take better decision a different situation, achieve more bargaining power, aware of mobility and so far, compare to the younger women. Self-esteem is a dimension of measuring empowerment that actually the realization who is she and why is she. The realization is that self-esteem may be logically developed with the increasing age. Experiences in a person's life are a major source of how self-esteem develops. In the married life, a mother can feel lower self esteem, if she is not treated well in the family and the surrounding environment.

Getting married at the early age can be a point of disempowerment in a girl's life. In Bangladeshi culture, marraige brings new types of socio-cultural responsibilities: have a new family, maintain the relationship with new relatives; bear more responsibility than before etc. It is already mentioned above that, older women can better accomplish the responsibilities than younger women. So, age at 1st marriage has a significant effect of women empowerment. The maturity of a girl become more stable and they become more rational with the age, which may result a better self-esteem, more access to and control over resources, getting worthy behavior and attitude from husband and family, influencing decision related to household and mobility, which may also affect overall empowerment.

A wealth index was constructed to capture the socio-economic status of a family. In this study, we found it is significantly related to many dependent variables such as overall women empowerment, along with dimension-specific women empowerment, women and child dietary diversity, and child underweight. Wealth bears the capacity to meet the need and desire of a family. In our study, we found that not all class of wealth is sufficient to influence the dependent variables. A minimum amount of wealth is required to make an influence and it is fourth (rich) and richest category in case of our study. This amount of wealth is positively associated with all the five dimensions we have taken for empowerment measurement and also for the overall empowerment. Because when any mother is living in a wealthy environment, she is living with dignity and better level of living standard. She may have more opportunity to have food security, better education, health and other social convenience. Thus, the result found that wealth index is positively related to women and child dietary diversity as well as weight for age Z score which is an indicator of child nutritional status.

Education is gradual lifelong process. But formal education has a separate base. Education enhances one's capacity of choice among alternatives. It triggers to know oneself, better information about the resources around him, change and modify one's personality, attitude and behavior, expand physical and financial mobility, practical knowledge about food, feeding practice, nutrition, dietary diversity, long term and short-term health outcomes etc. But like wealth index, education has also a requirement; like primary education is the very basic education and women who have completed only primary level may not influence empowerment and nutritional variables. Secondary to higher secondary level education leads a slightly good result and higher education can unlock all the achievements. **The study found mother's higher education as the most influencing variable to achieve women empowerment and child nutrition.** Mothers' nutrition knowledge is another important factor for a child's nutritional status. There is a very general concept that an educated mother will have a better nutritional knowledge but it is always not the case. Different studies found that mothers' nutrition knowledge are more important than formal educational attainment. In this study, we found that mother's need to have a certain level of education to get at least a moderate or highest level of nutritional knowledge. This research found that at least a secondary level of education is important to have moderate level of nutritional knowledge.

Stunting denotes a chronic situation of anthropometric failure. This study found that stunting is related to anti-natal care received by mothers, which includes several checkups during pregnancy, different tests to avoid complicacy, maintain dietary diversity, taking supplements, maintain a healthy life and dietary practice. All of these practices help to develop fetus by avoiding risk, keep mother healthy and finally a healthy child born. During anti-natal care, mothers come to know what need to do for her child like, feeding practice of baby, take care of health of the baby, vaccination etc. and that particular things actually support a mother to keep her baby healthy after birth.

Women dietary diversity is significantly related with child dietary diversity. So it was used as independent variable in only the regression where the child dietary diversity was the outome variable. After giving birth, a mother has to pass very busy schedule. She has to care for her baby along with other household works. After doing all the things, sometime a mother may not get time or sufficient energy to eat her regular meal. Therefore, while receiving ANC services, a mother should be advised to maintain a healthy dietary plan and eating timely, because she might be very stressed due to looking after her baby and unavoidable regular household activities.

While exploring the linkages between urban women's empowerment and child nutrition outcomes, we found mothers' education, nutritional knowledge, control over resources, spousal support influence all three anthropometric indicators, while mother's BMI influences WHZ and WAZ, sanitation sffects HAZ and WAZ, child dietary diversity (CDD) impacts HAZ and WHZ, child care support (caregiver) indicates only WHZ.

The overall women empowerment score has the opposite dimension as we did not expect, which means that if the mother's empowerment status increased from disempowered to empowered, then the child would be almost 40% more likely to be severely stunted and wasted, and almost 30% more likely to be severely underweight. Then we segregated the empowerment into three dimensions such as access to and control over resources, attitude and behaviour of the partner, and mobility then we found with an increase in the first two dimensions child would be less likely stunted and for the later dimension, the child would be more likely to suffer from malnutrition.

The mother is considered as empowered when she could able to enjoy the freedom as an individual or can get proper respect as a human being. When the mother gets full empowerment or support from the family members as well as from the society, she can happily work for the child, other family members and herself as well. It is found in research that children of empowered mothers are more nourished than disempowered mothers. Another thing is, getting respect from other family members

and emotional support from husband is very important for women, especially after a baby born, mothers usually face postpartum depression which badly affects the nutritional status and care of the newborn. When the mother doesn't get family support, she might suffer from mental stress and anxiety, can influence the dietary diversity and care of child as well as mother's own food consumption. So, in this case, mother needs to be taken care of, which normally doesn't happen in our culture, rather many socio-cultural norms make her stressful.

When the mother has sufficient access to and control over resources, she can ensure better nutritional status for her child as well as better dietary diversity by purchasing necessary staff when it is essential. When the woman can earn on her own and spend as well, she can practice economic freedom, which sometimes can be translated into household decision-making ability. It helps to keep the family small and to protect women herself from domestic violence. Besides when the mother has access to and control over resources, she can bring her child to the doctor when it is necessary. As a result, child nutritional status develops significantly. It could be mentioned here about Kabeer's (2005) theory of empowering women, which can have an instrumental value when it enables the use of resources. In this case, women's empowerment, in conjunction with household economic status is linked to lower levels of child malnutrition. Taken together, these findings lend evidence to the broader theory that empowering women operates, in part, through enabling women to take advantage of resources.

We also explored mobility, which was a composite score of 4 indicators: unescorted visit to relative's house, going to market, going to hospital and participating in community events. We found, as it goes without saying that first two to three years of a child is of extreme importance for the physical growth and cognitive development and throughout this period, a child needs to be in intensive care and monitoring all the time, if the urban mothers', who visit their relatives house quite often, face terrible problem with their child feeding and sleeping pattern. And again, most of the cases, mothers get no or improper health information from her relatives, and therefore they wouldn't visit health workers and doctors. Mothers, who have convenient access to market places, go to market and spend a lot of time for buying products fulfilling their own needs, they seldom give prior importance to buying foods which covers child health requirements. Hence, due to the lack of attention of the urban mothers' towards buying healthy and nutritious foods for their child results in incidences of severe child malnutrition. Again, mothers' usually go to the hospital for their own health problems and health crisis of elderly family members. In case of their own child, mothers rarely go for regular child checkup recommended by the doctors. Finally, child health is rarely discussed in the community events, therefore urban mothers are not actually getting child health related support and guidance from their participation in various community events. Consequently, if a mother remains busy with community events, it will not yield any fruitful outcome with regard to her own child health.

Sanitation was another important factor for child nutritional status, for example, a toilet facility that was developed by following all the hygiene guideline and considered as an 'improved sanitation' had an impact on child nutrition status. Only a better and healthy food habit cannot alone ensure better child nutritional status, unless the sanitation facility is improved, because diarrheal disease can affect the child nutritional attainment badly for longer duration. We have found that a certain level of education (at least primary) and household wealth status (at least upper middle class) was necessary for a better sanitation facility.

The finding of the research on the relationship between women empowerment and child nutrition is complex. How we measured women empowerment following different theoretical favour may not truly represent the empowerment issues of the urban women in the context of child nutritional ourcome. The composite structure of women empowerment dimensions as a whole did not impacted significantly on food and nutrition security of their children. Therefore we started to decompose different dimensions of empowerment and checked the inter-relationship with different dimensions,

for example decision making at household and self-esteem had the multi-collinearity with control over resources. In the case of our data collected in urban Bangladesh, three dimensions were found that can represent women empowerment: family support, access to and control over resources and freedom of mobility.

Based on the access to resources, we have categorized our data into two categories: housewife and working mothers (who received cash payment or not). Now it is a question of whether access to income truly translates into control over income. Among all mothers, about 60% do not have access to husbands' money and about 50% cases husbands alone make decisions on how much money to be spent on food. It shows the real situation of urban women's involvement in access to family income.

Quantitative results show that the attitude and behaviour of the husband was positive. More than 81% of husbands take care of their wife as mothers of their children. This finding doesn't match with the information that >40% mothers didn't receive sufficient ANC services, which is a basic need for a mother. We found that most of the urban mothers are not beaten but the majority of the mother's face the anger of their husbands – what we found in quantitative data has less similarity with in-depth qualitative data, which may mean that only quantitative analysis may not be sufficient to explore the real situation.

In the case of working mothers, empowerment or disempowerment does not only happen in their household or community; it also happens in the workplace at a large scale. We found many mothers, who made a good score in composite empowerment and in its' each dimension but while conducting FGD, they were found to be non-cooperated in the workplace, sometimes they are most unhappy. The women also pass there at least 8 hours time for work, so it matters a lot. When we are trying to recommend employment to achieve empowerment to get rid from household and community level disempowerment, but women are disempowered in the workplace, which may mean that the existing women empowerment calculation may not appropriate for measuring empowerment of working mothers. There may be different dimensions remain untouched, for which working women suffers. Besides, workings mothers have mostly expressed their disappointment through the FGD, which were not covered in data collection.

Time is an important factor in a mother's life; most of the women are time-burdened. Also it is very difficult to measure how they use their time in an efficient way. We could not even explore how much time the mothers spent in social media, telephone calling, gossiping, staying at market transportation etc. - which may also reduce mothers' time and energy. Also where these times should be included is not clear: either as productive or reproductive works.

The National Health Service should seriously think about dietary diversity for all. It is true that urban areas lack the production of crops, fruits and vegetables but availability is higher in urban markets. Again availability does not lead to consumption. Due to lack of time, resources and nutrition knowledge, in the very early stage of the child's life they are given him/her rice based diet, processed carb based foods, formula milk etc., rather than properly cooked vegetables, fresh fruits and vegetables, fresh milk - for which dietary diversity is lower, which may have a longer impact on their cognitive and mental development, disease resistance and many others. We have found that 65% households have high dietary diversity, but 51% children have lower diversity and 76% women are in lower dietary diversity, which may indicate an uneven distribution of household resources. It was also found that the mother health is the most neglected issue in a household. We also didn't find any of the mothers did achieve diversity at least on the day when our enumerators did collect data from more than 2000 mothers, which is surprising. It seems, who cares, either a mother eats or not.

Child care seems to be the most unmanaged sector in urban Bangladesh. When we think about human resource development, caring the child might be the starting point. The child is a member of the family but due to cultural reasons and low infrastructural facility, the mother has given the most

responsibility who are ill treated almost everywhere, in the family, community, inside or outside the households. Urban women are increasingly joining in the labour force, where they have to spend at least 8 hours or more time. It is not yet settled where the children will be cared for, who will care, how they will be socialized and many issues. The urban children grow up either with the disempower mothers or elderly relatives or an educated non relative maids, where they do not get the environment as they should be given. So the state needs to think about it seriously.

Overall, this study contributes to examine women's empowerment as a pathway to achieve impacts on child nutritional status. Thus, empowering women improves women's lives and in turn, conveys tangible benefits for their children's nutrition. Women's empowerment may also be a pathway to reduce child nutritional outcomes in, and may improve other nutritional status indicators that suggest us to consider the factors carefully while implement in any nutrition-sensitive programs.

7.2 Recommendations

Nutrition policy needs to consider the rapid urbanization. The problems of urban working women that are emerging include triple burden of responsibilities living in a nuclear structure of family which need greatest importance to be given for the family and young children as women are also responsible for child care and all other household works in the structural rearrangement of urban and peri-urban settings. Therefore, nutrition and child health policy responses are needed to address the requirements for an increased choice of quality child-care arrangements for Bangladeshi mothers in the urban context. With this background, after sufficient investigation, this study recommends the following way forwards:

a. Introducing Day Care Centers

Bangladesh is in transition in agriculture, industry, and service - in all sectors. Women are increasingly joining to the labour force regardless of class and income category. It has become a great concern for the working mothers where to keep the child during day time when they are at their workplace, who will take care, how will the nutritional status be maintained etc. Some of the mothers unfairly depend on elderly female relatives, or unprofessional maids. It is also a burden for the elderly people to care for the children in this age. A child's childhood may help in shaping up the future of a child under the points of where and how it raises, food and nutrition provided, loved, cared, nurtured etc. Early child care is equally an important and often overlooked component of child development in Bangladesh. A daycare center offers a more affordable and reliable option, with trained and certified staff and a social environment for the child. Care facilitated by similar-aged children covers a variety of mental development which has psychological effects. There are many examples that high-quality child care has positive long-term impacts on the children and the economy, also provides important benefits to parents. Public child care makes it possible for low income parents to take advantage of opportunities for advancement. The research would recommend that daycare center is a national necessity, which could be thought under the welfare and anti -poverty effort by the government.

b. Antenatal care services, its quality and extent

We need to give proper attention to antenatal care services, its quality and extent. ANC services should be made available for all mothers. In Bangladesh, antenatal care only includes some tests and medicine but in this cultural context, antenatal care also includes mental health issues and counseling for parents and if possible grandmother who make the mother at home. The pregnancy and post-

pregnancy periods are very different from a normal girl's life. So many physical and mental changes happen; and the mothers need special care. So, mother needs to be given adequate family especially spousal support. Poor maternal mental health plays a critical role in poor child care and their physical and mental development. From the Focus Group discussion, we found that our medical system is not friendly to the people who belong to lower socio-economic status. It should be addressed. Moreover postpartum depression, nutrition education, caring for a child for two years, regular check up may also need to be included in antenatal care services. But the patriarchal background doesn't mostly allow the husbands and his family members to think about their wife's mental health. Therefore, counseling needs to be introduced where husbands and the elderly family members may be motivated to join. Improvement in the ANC services may reduce the burden of child malnutrition. This is actually happening in many countries.

c. Attention needs to be given to increase dietary diversity

Dietary diversity is one of the few requirements for children to get all essential nutrients which has the potential of reducing undernutrition, which would lead child physical as well as mental development. Promoting dietary diversification through nutrient dense foods, both in quality and quantity, will lead to better nutritional status of children. A great concern is: urban children seldom drink fresh milk or occasionally eat any kind of seasonal fruits, rather the busy life schedule of family members including mothers stimulate them to get habituated with snacks or fast foods and carb-based diets. So, small serving size foods, mixed cut locally available fresh fruits and mix of different nuts and seeds can be made available in hygienic packets which will ensure the fruit and nuts consumption for all socioeconomic categories especially lower and lower-middle income class people. Moreover, nutrition education and awareness programs should be adapted through counselling of pregnant and lactating mothers. A short and comprehensive baby-rearing book can be distributed where the scientific process of child-rearing will be visually illustrated along with baby food processing and feeding practice. The book may be provided to the mothers as the material of ante-natal services. Interventions favoring food accessibility for disadvantaged households should be strengthened by a social safety net programme.

d. Workplace environment

In the case of working mothers, empowerment or disempowerment does not only happen in their household or community; it also happens in the workplace at a large scale. We found many mothers, who made a good score in measuring composite empowerment and in its' each dimension but while conducting FGD, they were found to be non-cooperated it in the workplace, sometimes they are most unhappy. The women also pass there 8 to 12 hours or even more time for work, so it matters a lot. When we are trying to connect between employment and empowerment, to escape from household level disempowerment, but women are more disempowered in the workplace. Integration and implementation of gender policies is very important. Therefore, organizations and institutions needs to reformulate their policies regarding safeguarding mother-friendly workplace environment like establishing infrastructural facilities (female toile, child daycare option, breastfeeding room, lactation breaks in the work), consider context-specific flexible working time, introduce gender-sensitive language, ensuring respective attitude towards pregnant and breastfeeding mothers, 15 days of paternity leave etc.

One probable recommendation could be specifically mentioned here. After completing maternity leave, mothers can adjust their office time like first 2 months for 3 hours, then for 2 months 4 hours and when the child is 1 year old, they mothers may start to work for 8 hours. In this way, the mothers would be able to provide breast milk and start complementary feeding in a more convenient way.

e. Ensure access to resources for the mothers of lower socioeconomic status

Access to and control over resources is a crucial dimension of empowering women. Getting access and control over household and community assets provide the mothers an opportunity to make her strategic life choices (education, self-esteem, control over resources, decision-making power, mobility, public speaking, etc.). If there is lack of resources at household level, women's increased involvement in decision-making do not translate into improved child nutritional status. Although the relationship between wealth and empowerment is not straightforward, it is reasonable that a certain level of resources is needed for women to act on their agency. For example, women may be empowered to participate in the household decisions, and she has freedom of access to market but if the household or community does not have financial or infrastructure resources, then the ability to act on the decisions is limited. Without access to monetary resources, mothers may be unable to purchase appropriate food to meet the special needs of their young children and to provide health care facilities. Groot et al. (2015) mentioned that Cash Transfer (CT) can decrease household poverty-related stress, which in turn may improve the caregiver's physical and mental state, and thus increase positive parenting of children. Stress is also believed to be linked to the committing of intimate partner violence (IPV), which in turn affects child health. Further, CTs may relieve incentives for pregnant women to engage in poorly paid laborious works. Moreover, there is a need to strengthen the access to the home and kitchen appliances needed for routine housekeeping tasks to reduce household workloads, and save the time and energy burdens of household work including food processing and preparation, even for low status households. To this effect, improved methods to measure empowerment are needed so that linkages between increasing resources controlled by women and nutrition as well as linkages between women's empowerment and nutrition are established empirically.

f. Need to work for improved sanitation

Only a better and healthy food habit cannot alone ensure better child nutritional status unless the sanitation facility is improved, because a 7 day-long diarrheal disease can affect the child nutritional attainment badly. We have found that in the urban and peri-urban areas, more than 40% people do not have access to improved sanitation, therefore, the local government need to work on this matter.

g. Nutrition intervention is also needed for the adolescent girls

Adolescent girls are the future mothers. The family as well as the nutrition policy rarely gives attention on adolescent girls as they are being considered as low risk of poor health and they often receive little health care resource. They themselves also seem unconscious regardless of socioeconomic category, takes carb based foods and unsafe fast foods, and leads unhealthy living styles. Attention needs to be given to their dietary diversity as they need energy and nutrient-dense foods to grow physically and mentally and to live a healthy life. Some nutritional problems remaining in child life can potentially be improved by consolidating healthy eating and lifestyle behaviors during adolescence. Though girls' level of education is increasing and the syllabus of all high school classes have content on nutrition chapters, the adolescents memorize and pass their exams, but our data shows their knowledge is very limited, which is surprising. So, it needs to be explored, how their knowledge and practice could be increased. In the lower socio-economic category, most of the time, the women may enter pregnancy with micronutrient deficiencies which adversely affect their health and that of the fetus. Improving the nutritional status of adolescent girls might have a positive effect on the future generation by giving birth to children with better nutritional status, and thus promoting nutritional status to future generations.

The above mentioned interventions are needed to support not only urban mothers, where particular concerns have been raised regarding competing time commitments, mothers' workload and availability of quality child-care providers, but also all mothers who are faced with limited and relatively unskilled child-care support.

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Annex

1. Detailed Information of Training:

1.1 Preparing enumerators for the training

Before starting the data collection, a 4-day preparatory training program was arranged to achieve their ability to collect good quality data from the respondents. Before that, a well-structured questionnaire was prepared (completed in June). Before the formal training, since 1st July 2020, meetings were arranged each night for approximately 2 hours (mostly from 9-00 – 11.00 pm) by the principal investigator Dr. Sadika Haque, where enumerators gathered knowledge about the objectives of the project, questionnaire, project proposal and; some literatures were provided to the enumerators before the training program. To make the communications easier, a messenger group was created with the enumerators and team members, which is very popular to the young generation and useful platform to share information quickly. The list of literature which was provided has been mentioned in the below:

- The Role of Women's Empowerment on Child Nutrition in India: A Longitudinal Analysis
- What Dimensions of Women's Empowerment Matter Most for Child Nutrition?
- Women's empowerment and domestic violence: The role of sociocultural determinants in maternal and child undernutrition in tribal and rural communities in South India
- What dimensions of women's empowerment in agriculture matter for nutrition in Ghana?
- Women's Empowerment and Prevalence of Stunted and Underweight Children in Rural India
- Women's Empowerment in Agriculture, Production Diversity, and Nutrition (Nepal)
- Measurement of Women's Empowerment in Rural Bangladesh.

After reading the literature through group study, the groups were assigned for presentation through virtual meetings. A presentation on the literature helped them to understand the topic of the projects like women empowerment, children's nutrition and care. Enumerators get clear knowledge about these topics from this former meeting. They said that the lessons learnt of those reading are: 'Women empowerment is not only that women involve in paid jobs' rather it has different dimensions'; 'in case of child nutrition, health care and interaction with the child at the time of feeding is necessary which is related to the children's mental health'. So they found the formal training easier to understand.

1.2 Formal Training:

A 4-day long training – with a fifth day of reflections – was arranged by the Interdisciplinary Institute of Food Security (IIFS), Bangladesh Agricultural University, Mymensingh on 13th July to 16th July on **"Linkages between Women's Empowerment, Children's Diet and Nutrition under Rapid Urbanization in Bangladesh"** and there had been a group discussion on day five. Due to COVID 19 pandemic, it was not possible to arrange a training program on face to face interaction. For this reason, the training was conducted via zoom app. It could be mentioned here that this is one of the earliest formal virtual training programme in Bangladesh in the pandemic time. This training aimed to provide enumerators as much guidance as possible for quality data collection and to implement the goals of the project. About 40 potential enumerators participated in this online training.The trainers also gave them a proper guideline about how to collect data from the respondents and how to keep themselves safe from Covid 19 during collecting data. The training was given by the form of Microsoft power point presentation, lecture, discussion and question answering session. It was expected that at the end of the training, enumerators should be able to

- Explain the necessity of this project to the respondent and why it is conducted.
- Inform others about the purpose of this project.
- Recall the questions and sections of the questionnaire.
- Effectively asked the sensitive questions to the respondent.
- Develop the knowledge about mother and child nutrition, women empowerment, and the goal of the research.
- Develop their skills for collecting quality data.
- Conduct field interview, explain the items of questionnaire to the respondent.

1.3 Opening ceremony of the training:

The opening ceremony was held on 13th July, 2020. The vice chancellor Professor Dr. Lutful Hasan of Bangladesh Agricultural University was present in the inauguration session. He said that women empowerment is an important and providing child nutrition depends on the mother whether she is empowered or not. The training was organized by the Interdisciplinary Institute for Food Security, Bangladesh Agricultural University, Mymensingh. The Director of the IIFS (Interdisciplinary Institute for Food Security) Professor AS Mahfuzul Bari presided over the opening ceremony. At this training program, PI (Dr Sadika Haque) and all co-PIs of the project (Abu Torab Md Abdur Rahim Professor of Institutie of Nutrition and Food Science, Dhaka University, Hasmat Ali, Mohammad Kamruzzaman Bhuiyan, M Nahid Sattar Nazmul Haque Shapon and Md. Mahbubul ALam from ICDDRB). Dr. Nahid Sattar was the hosting this training program. At the beginning of this training, he welcomed all enumerators and the training facilitators. Then he introduced principle investigator, co-investigators and other project related members. After introduction the principal investigator introduced the research team and enumerators and then explained the purpose of the training and the project to enumerators (The training schedule is attached in Appendix).

During the training, each day there were two to three sessions. The facilitators explained the sessions through power point presentation and after finishing a slide or portion, there was a question answering part, where the enumerators asked questions which they did not understand and the facilitators explained that to them. Each session included a question answering part where enumerators asked question to the training facilitators and the facilitators provided them the answer.

On Day 1, Facilitators discussed on objectives and the purpose of the project, about urban and peri- urban areas and shared their experience of collecting data from these areas. On that day, enumerators received knowledge about how to collect 'general particulars and general cleanliness' data. This session included power point presentation, lectures and question answering session. Enumerators made clear their confusion on some topic by asking question to the facilitators.

On Day 2, facilitators discussed on care for mothers during pregnancy and after the birth of a child. For collecting good quality data on this topic, the enumerators should have clear knowledge about the ante-natal care for a mother, danger sign of pregnancy and many other issues. From this session, they received knowledge on all these issues. Facilitators also discussed on how to measure accurate height, weight and MUAC of mother and child. The 2nd session of Day 2 is about women empowerment. Facilitators discussed what is women empowerment and the present condition of women in Bangladesh with the help of power point presentation, lectures and question answering session.

On Day 3, Facilitators discussed about different dimensions women empowerment, dietary diversity, children's nutrition and mother knowledge on children's care and nutrition. In the first session, Dr. Hasmot gave instruction to the enumerators how to ask the sensitive questions to the respondents. Facilitators also said that feeding child is not enough, it is important to close interaction with the child while feed the baby. This improves child mental growth. Facilitators also gave instruction how to collect data about this topic.

On Day 4, Facilitators gave lecture on how to collect the caregiver information and information from adolescent girls. On the last day, the session facilitators also discussed about the analytical issues which have to remember by the enumerators while they collect data. Finally a motivational video was shown to the enumerators which inspire them to work carefully

Table 14 Topics covered and learning outcomes of the training

Lesson	Topic	Learning outcome	Resources
1	Objectives of the study	Enumerators get a clear idea about the project and the purpose of the project	Power point presentation, lecture, general discussion and literature
2	How to collect information about general household characteristics	Enumerators are able to collect correct and qualityful information	
3	How to collect data about general cleanliness	Enumerators are able to collect correct information of general cleanliness	

Lesson	Topic	Learning outcome	Resources
4	Ante-natal care and child health	Enumerators get knowledge which type of ante natal care is necessary for pregnant women and after pregnancy, explain these cares to the respondent and able to collect information from mothers.	review discussion.
5	Women empowerment	Enumerators learn different dimension about women empowerment and are able to effectively ask the sensitive questions to the respondent.	
6	Nutrition knowledge of mother and nutritional status of mother and child	Enumerators get basic nutrition knowledge which are necessary for mother, child and other household members and learn how to collect information about daily food consumption with its measurement.	
7	Roles of caregiver and adolescent girls	Enumerators get idea about how to collect data from the adolescent girls.	
8	Remembering analytical issues while collecting data, & Using google doc form in entering data	Enumerators get idea about how to collect data and what should keep their mind while collecting data. And how to enter data in google doc form.	
9.	How to keep safe oneself from corona virus	Enumerators get knowledge about healthy practice to protect themselves from corona virus when they collect data.	

Note: Each session includes a question answering part where enumerators ask question to the training facilitators and the facilitators provided them the answer.

1.4 Feedback by Enumerators

A feedback session was arranged after the end of training. They were asked to talk about the advantages and the limitations of the training. Enumerators said that the training was very helpful for them and it helps them not only in that project but also in future when they will go for job or start their professional career. They also said, they accumulated much new knowledge from that training, some new topic and got better guidelines for collecting data. They mentioned some limitations, as the training provided virtually due to Covid-19 situation, sometimes it was difficult for them when the network was weak. They also said if the training could be conducted by face to face, the interaction would be easier. After the end of the training, we also opened a close group Facebook page, to use it as a notice board.

2. Data collection

2.1 Monitoring the work of Enumerators

During data collection there was a big problem on collecting data about amount of meal consumption. It was difficult to get the exact amount of meal by asking them questions. The respondents did not know the amount (gm, ml) of meal. For clearing this confusion, we conducted a training session on dietary diversity and the appropriate amount of food consumption. Then it was advised to use measurement cups and spoons to get the nearly accurate amount. After several discussion sessions, it became clear to the enumerators. After training program and 2 days pretesting, data collection was started from 23 July 2020.

On the 24th July, the enumerators shared some problems and field insights, like;

- It was difficult to calculate the working hours for them. “How much time they used on what purpose?” It was the most common problem faced by the enumerators. Most of the respondents started their work in the early morning. And they used to do more than one task at a time. For this reason, it was difficult for them to say the exact amount of working hours per task.
- The respondents, who did their delivery at home in normal process, did not know the exact birth weight of child, because they did not measure the weight of the child after giving birth.

- Some mother did not know the exact date of birth of the child.
- Some of the respondent got married at early age and did not have enough knowledge about child health and nutrition.
- One of the enumerators found a respondent, who was beaten by her husband just before she met her. Though she is well educated, she did not have the permission to go out for doing job. Her husband was very dominating.

The next meeting was held on 25th July 2020. Some of the insights of the enumerators from the field were:

- There were many respondents who did not have enough money to buy food. For this reason, their nutritious condition was very poor. But it was said that, if they had money to buy food, they would feed their children balanced food.
- The respondents, who worked in bank, usually they did not cook food. The family members helped them in household work.
- Most of the respondents had no idea about child nutrition specially who got married in early age.
- Some of them knew the negative affect of fast food. But for the child's insistence, they had to give them fast food. Some of the respondents did not know exact age of the child specially the low-income people.
- Some of the working mothers, specially the RMG workers gave some money to the children before going to the work place. But they had no idea what they ate, on which purpose they used the money. Most of them used to eat fast food or street food.
- In many cases, the enumerators had to take permission from the husbands of the respondents. If the husband did not allow them to do it, they could not talk to the women.

In this way, the meeting had been continuing everyday. A 4-members team were regularly monitoring the data entry in Google doc form and they immediately noticed the mistake of entry to the respective enumerators and solved the mistakes. Enumerators were trying to input data regularly in the same day, they had collected.

3 Anthropometric measurements

Anthropometry is a very significant indicator of human body which generally indicates the nutritional status of a person. Height and weight measurements are the main indicator of anthropometry. In this research, the enumerators were measuring very carefully in a way that they can get accurate measurements about the nutritional status of mothers and their children. The enumerators used to paste photos taken in the field in the messenger group. In everyday' meeting at night, they were asked about the ways how they had measured the height, weight and MUAC; and how were they maintaining their health safety measurement during Corona pandemic, just to remember that those are very important part of their work. Each enumerator was asked to take picture daily and post in the messenger group, so that the monitoring team can check, whether their measurement is acceptable.

Height measurement: To accomplish the research objectives, mothers and their respective child's height have been measured. First of all, a wooden scale was kept along the perpendicular to the floor and then respondents stand on a flat floor with barefooted and their heels touch the corner where floor and wall were attached and also, they had stand adjacent to a flat wall in a way that their head, shoulder, buttock, and cuff muscle touched the wall. The eyes were looked straightforward so that their sights and chins are parallel to the floor. Then a scale was used to point out the top part of the head and obviously the scale was hold parallel to the floor. After that, the top most part was marked in the wall taking another smaller scale 90 degree with the wall with a marker pen and the marked point was measured. For the child, less than two years, length was measured by laying down the baby.

Weight: The enumerators measured the weight of the respondents and their children using the Digital weight scale. At first weight scale was kept on level smooth and hard surface. Every time they calibrated the machine to get the exact measure (the scale was checked whether its reading was showing zero or not before the respondents get on). When it was zero, the respondents got on but if it is not then it is customized to zero by

pressing the scale slightly. Heavy clothes and materials were removed from the respondents so that the measurement got accurate. The respondents got on the weight scale without touching any object and their feet were kept parallel with each other. The respondents didn't move before the scale fixing the value and after fixing the reading, the value was noted down. In case of child under 2 years of age, at first, mother by lapping her child stand on the weight scale and the measure was taken and after that only the mother's weight is taken. Then the value of child's weight was found by subtracting the mother's weight from the weight of child and mother together.

MUAC: MUAC is another anthropometry to assess the nutritional status of a child. It is measured by UNICEF approved MUAC tape. It was measured in the midpoint between the edge of the shoulder and the edge of the elbow with the tape. Then at the midpoint the arm was wrapped around with the tape and penetrates the narrow end of the tape through the smaller split of the broader end. After coming up the narrow end from below the tape, the both ends were pulled until the tape fits closely round the child's arm. It was carefully pulled so that the tape around the arm became neither too tight nor too loose. Then the value shown along the two arrows in the window on the broader end was noted down.

Table 15 Categorization of Data for FGD

Sl.	Category/ Profession	Virtual/ face to face	Responsible persons	Comment	Report
1.	Housewives				
	Well-off	Virtual	Shumona, Manik, Any, Easmin		Shumona, Kulsum
	Middle Class	Virtual	Easmin, Lotif		Lotif
	Poor (2)	Face to face	Mrinmoyee and Prithi		Mrinmoyee and Prithi
2.	**School** Teachers				
	Group 1	Virtual	Hira, Riha, Kulsum, Afrin, Easmin, Any		
	Group 2	Face to face	Mrinmoyee and Prithi		
3.	Housemaid	Face to face	Mrinmoyee and Prithi		Prithi
4.	Banker	Virtual	Anil		Labanya
5.	**Civil service** officer/ Lecturer/ Assistant professor/ Police/ Doctor/ **Dentist**				
	Group 1	Virtual	Nafisa, Rafi and Salman		Kulsum, Labanya
	Group 2	Virtual			
6.	Lower class work: Sweeper/ Restaurant maid/ Cleaner/ **Day Labourer/ Street hawker**				
	Group 1	Face to face	Mrinmoyee and Prithi		
	Group 2	Face to face			
7.	Garment Workers	Face to face	Mehedi	Mehedi	
8.	**Wives of RMG workers**	Face to face	Mehedi	Mehedi	
9.	Student mother	Virtual	Riha, Nafisa	Riha	
10.	Self employed	Virtual	Easmin, Mrinmoyee, Labanya	Prithi	
11.	Class-3 employee: lab technician, SAAO, accountant, Health worker, Microbiologist, Librarian, Private Teacher, Handicraft worker, Field Assistant, Nurse				
	Group 1	Face to face	Sony, Kulsum, Labanya	Sony, Labanya, Kulsum	
	Group 2				
12.	Landlord	Face to face	Easmin, Riha	Mehedi	
13.	**Adolescent girls**				
	Rich	Virtual	Chandrima, Kulsum, Nafisa	Chandrima	
	Middle class	Virtual	Nusrat, Hira, Nafisa	Nusrat	
	poor Educated	Face to face	Mrinmoyee and Prithi	Prithi	
	poor uneducated	Face to face			

Sl.	Category/ Profession	Virtual/ face to face	Responsible persons	Comment	Report
15.	Slum area residents	Face to face	Hira, Riha	Hira	

Table 16 The variable-indicator-method matrix (VIM) prepared for the study

Variable Domain	Indicator	Measurement Method	Validation/Reference
1. Sociodemographic	Age, sex, education, ethnicity, religious affiliation, household, occupation, etc.	Questionnaire	Pilot Study
2. Socioeconomic	Education, occupation, income, expenditure on food, housing conditions, etc.	Questionnaire	Pilot Study
3. Child characteristics	Child anthropometry, disease affected, birth weight, vaccination	Questionnaire	Pilot Study
4. Maternal characteristics	Health status started since pregnency, anti natal care, during birth, post natal care, etc.	Questionnaire	Pilot Study
3. Women Empowerment	Women empowerment Index (WEI) domains: 1) Decision making, 2) Access to and control over resources, 4) Mobility, 5) Workload and leisure, 6) mobility, 7) prevalence of domestic violence, 8) self-esteem, 9) Intra-household relationship with other members of the household	Questionnaire	Pilot Study
4. Basic Nutritional Knowledge	Optimal health (Obesity, underweight, and short stature), calorie intake, balanced diet, cooking loss of nutrient, etc.	Questionnaire	§
5. Hygiene	Hand washing with soap, cleanness, food quality, etc.	Questionnaire	FAO (16) & §
6. Food Safety	Physical contaminants, food organoleptic characters, food morphology etc.	Questionnaire	FAO (16) & §
7. Dietary Practices	Eating habits, meal frequency, feeding time, eating out, etc.	*FGDI measure	FAO (16)
8. Healthy food behavior	Procure habitual foods, fast food intake, prepare cultural food, low carbohydrate diet, etc.	FGDI, **FCS, ***DDS	FAO (16) & §
9. Habitual food consumption	24-h dietary recall of the target group (applicable to subsection only)	Questionnaire	Pilot Study
10. Nutritional status	WAZ, HAZ, WHZ, MUAC, BMI, etc.	Anthropometry	¶

*FGDI, food group diversity indicators, viz., HDDS (household dietary diversity score), IYCF MDD (minimum dietary diversity indicator for young child feeding practices), WDDS (women's dietary diversity score), MDD-W (minimum dietary diversity for women of reproductive age)
**FCS, food consumption score (where applicable).
***DDS, dietary diversity score.
§UCL Institute of Epidemiology and Health Care Research Department of Behavioural Science and Health; https://www.ucl.ac.uk/iehc/research/behavioural-science-health/resources/questionnaires/eating-behaviour-questionnaires
¶ Use and interpretation of anthropometric indicators of nutritional status, Bulletin of the WHO, 64(6): 929-941 (1986)

4. Different descriptive and statistical tables

Exploratory Factor Analysis foe women empowerment

Table 17 Availability of electricity connection of the respondents of different regions

Region	Does the house have electricity?

	Not Applicable	Yes	No	Total
Peri urban city	0 (0)	326 (100)	0 (0)	326 (100)
Peri urban town	0 (0)	312 (100)	1 (0.32)	313 (100)
Urban city	0 (0)	487 (100)	0 (0)	487 (100)
Mega city	10 (2)	558 (89)	57 (9)	625 (100)
Urban town	0 (0)	207 (91)	20 (9)	227 (100)
Total	10 (1)	1890 (**96**)	78 (4)	1978 (100)

**Figures in parenthesis represent percentage*

From Table 12, it can be explained that

Table 18 Water source tested for arsenic or not according to different regions

Region	Is the water source tested for arsenic?			
	No	Yes	Don't know	Total
Peri-urban city	45 (14)	211 (65)	70 (21)	326 (100)
Peri-urban town	76 (24	177 (57)	60 (19)	313 (100)
Urban city	53 (11)	272 (56)	162 (33)	487 (100)
Mega city	46 (7)	401 (64)	178 (28)	625 (100)
Urban town	39 (17)	114 (50)	74 (33)	227 (100)
Total	259 (13)	1175 (**59**)	544 (28)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 19 Treat drinking water or not according to region of the respondents

Region	Do You Normally Treat Drinking Water?		
	No	Yes	Total
Peri-urban city	260 (**80**)	66 (20)	326 (100)
Peri-urban town	210 (**67**)	103 (33)	313 (100)
Urban city	396 (**81**)	91 (**19**)	487 (100)
Mega city	310 (50)	315 **(50)**	625 (100)
Urban town	138 (**61**)	89 (39)	227 (100)
Total	1314 (**66**)	664 (34)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 20 Ways of treating drinking water according to different regions

Way of water Treatment	Combo	Boil	Add chlorine bleach	Add Fitkiri	Use ceramic filter	Bio-sand filter	Chlorine filter	Reverse Osmosis filter	Total
Peri-urban city	6 (17)	19 (6)	0 (0)	0 (0)	11 (7)	5 (18)	18 (18)	7 (37)	66 (10)
Peri-urban town	5 (14)	30 (10)	1 (14)	1 (33)	48 (29)	8 (29)	10 (10)	0 (0)	103 (16)
Urban city	2 (6)	18 (6)	1 (14)	0 (0)	37 (23)	0 (0)	29 (29)	4 (21)	91 (14)
Mega city	14 (40)	215 (70)	4 (57)	1 (33)	33 (20)	5 (18)	36 (36)	7 (37)	315 (47)
Urban town	8 (23)	26 (8)	1 (14)	1 (33)	35 (21)	10 (36)	7 (7)	1 (5)	89 (13)
Total	35 (100)	308 (100)	7 (100)	3 (100)	164 (100)	28 (100)	100 (100)	19 (100)	664 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 21 Cleaning water storage container

Region	How Often Do You Clean the Water Storage Container?					
	Everyday	Every alternate day	Twice in a week	Once in a week	Don't know	Total

Peri-urban city	256 (79)	40 (12)	18 (6)	12 (4)	0 (0)	326 (100)
Peri-urban town	189 (60)	59 (19)	28 (9)	33 (11)	4 (1)	313 (100)
Urban city	278 (57)	40 (8)	59 (12)	75 (15)	35 (7)	487 (100)
Mega city	283 (45)	155 (25)	101 (16)	58 (9)	28 (4)	625 (100)
Urban town	144 (63)	24 (11)	27 (12)	27 (12)	5 (2)	227 (100)
Total	1150 (**58**)	318 (16)	233 (12)	205 (10)	72 (4)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 22 What is needed to wash our hands?

Region	What Do We Need To Wash Our Hands?		
	Water and Soap	Water	Total
Peri-urban city	314 (96)	12 (4)	326 (100)
Peri-urban town	306 (98)	7 (2)	313 (100)
Urban city	460 (94)	27 (6)	487 (100)
Mega city	548 (88)	77 (12)	625 (100)
Urban town	200 (88)	27 (12)	227 (100)
Total	1828 (**92**)	150 (8)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 23 Washing hand with soap is always necessary or not

Region	Do You Think Washing Hand With Soap Is Always Necessary?		
	No	Yes	Total
Peri-urban city	31 (10)	295 (90)	326 (100)
Peri-urban town	6 (2)	307 (98)	313 (100)
Urban city	71 (15)	416 (85)	487 (100)
Mega city	115 (18)	510 (81)	625 (100)
Urban town	18 (8)	209 (92)	227 (100)
Total	241 (12)	1737 (**88**)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 24 Water availability inside/ just outside the toilet

Region	Is Water Available Inside/ Just Outside The Toilet?			
	Not Applicable	Inside Toilet	Outside toilet	Total
Peri-urban city	0 (0)	208 (64)	118 (36)	326 (100)
Peri-urban town	0 (0)	160 (51)	153 (**49)**	313 (100)
Urban city	0 (0)	398 (**82**)	89 (18)	487 (100)
Mega city	5 (1)	383 (61)	237 (38)	625 (100)
Urban town	0 (0)	132 (58)	95 (42)	227 (100)
Total	5 (.25)	1281 (**65)**	692 (35)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 25 Answers of what would happen if they do not wash their hands

Do You Know What Would Happen if We Do Not Wash	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	Total

Our Hands?						
1	229 (18)	206 (17)	288 (23)	366 (29)	152 (12)	1241 (100)
1,2	32 (8)	33 (8)	170 (40)	140 (**33**)	50 (12)	425 (100)
2	50 (23)	60 (28)	22 (10)	67 (31)	19 (9)	218 (100)
9	15 (16)	14 (15)	7 (7)	52 (**55**)	6 (6)	94 (100)
Total	326 (16)	313 (16)	487 (25)	625 (32)	227 (11)	1978 (100)

**Figures in parenthesis represent percentage*

Table 4.25: The place where child defecate

Where Does The Child Defecate?	**Peri-urban City**	**Peri-urban Town**	**Urban City**	**Mega City**	**Urban Town**	**Total**
1. POTTY	87 (12)	93 (12)	241 (32)	278 (**37)**	56 (7)	**755 (**100)
2. IN THE DWELLING	33 (9)	93 (27)	51 (15)	98 (28)	73 (21)	348 (100)
3. DIAPER	29 (23)	41 (33)	10 (8)	28 (22)	18 (14)	126 (100)
4. CHILD'S CLOTHES	10 (22)	12 (26)	3 (7)	13 (28)	8 (17)	46 (100)
5. TOILET	165 (24)	74 (11)	180 (26)	205 (**29)**	72 (10)	**696 (**100)
6. OTHERS	2 (29)	0 (0)	2 (29)	3 (43)	0 (0)	7 (100)
Total	326 (16)	313 (16)	487 (25)	625 (32)	227 (11)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 26 Disposal of the stool of the child according to different regions

	Child used toilet	**Put/rinsed into toilet or latrine**	**Put/rinsed into drain or ditch**	**Thrown into garbage**	**Buried**	**Left in the open**	**Other**	**Total**
Peri-urban city	166 (23)	138 (14)	9 (8)	4 (3)	3 (60)	6 (18)	0 (0)	326 (16)
Peri-urban town	76 (11)	158 (16)	26 (23)	49 (33)	0 (0)	4 (12)	0 (0)	313 (16)
Urban city	181 (26)	251 (26)	22 (19)	33 (22)	0 (0)	0 (0)	0 (0)	487 (25)
Mega city	212 (30)	324 (**34**)	28 (25)	34 (23)	0 (0)	24 (71)	3 (75)	625 (32)
Urban town	73 (10)	93 (10)	28 (25)	30 (20)	2 (40)	0 (0)	1 (25)	227 (11)
Total	708 (100)	964 (100)	113 (100)	150 (100)	5 (100)	34 (100)	4 (100)	1978

Source: author's calculation; Figures in parentheses represent percentages.

Table 27 : How often do you dispose solid waste?

Region	How Often Do You Dispose Solid Waste?		
	Not Daily	Daily	Total
Peri-urban city	10 (3)	316 (97)	326 (100)
Peri-urban town	8 (3)	305 (97)	313 (100)
Urban city	66 (14)	421 (86)	487 (100)
Mega city	97 (16)	528 (84)	625 (100)
Urban town	30 (13)	197 (87)	227 (100)
Total	211 (11)	1767 (**89**)	1978 (100)

Table 28 See flies in the area where the food is kept/ stored

Region	Do You Sometimes See Flies In The Area			
	Not Applicable	Yes	No	Total
Peri-urban city	0 (0)	146 (45)	180 (55)	326 (100)
Peri-urban town	0 (0)	202 (65)	111 (35)	313 (100)

Urban city	0 (0)	217 (45)	270 (55)	487 (100)
Mega city	5 (1)	336 (54)	284 (45)	625 (100)
Urban town	0 (0)	108 (48)	119 (52)	227 (100)
Total	5 (.25)	1009 (51)	964 (49)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 29 Trim fingernails

According to different regions			
Region	How Often Do You Trim Fingernails?		
	More than a week	Once in a week	Total
Peri-urban city	88 (0)	238 (0)	326 (0)
Peri-urban town	68 (0)	245 (0)	313 (0)
Urban city	106 (0)	381 (0)	487 (0)
Mega city	147 (0)	478 (0)	625 (0)
Urban town	71 (0)	156 (0)	227 (0)
Total	480 (24)	1498 (**76)**	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 30 Times of receiving antenatal care

How Many Times Did You Receive Antenatal Care?	Region					
	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	Total
Not Applicable	19 (13)	11 (7)	22 (15)	81 (54)	17 (11)	152 (100)
Only One time	10 (7)	30 (22)	34 (25)	46 (34)	14 (10)	134 (100)
Two Times	65 (**36**)	38 (21)	26 (14)	36 (20)	16 (9)	181 (100)
Three times	103 (29)	85 (**24**)	69 (20)	70 (20)	26 (7)	353 (100)
Four Times	36 (13)	44 (16)	88 (**32**)	79 (29)	27 (10)	274 (100)
Five times or more	88 (10)	104 (12)	246 (29)	306 (36)	115 (13)	859 (100)
Don't Know	5 (19)	1 (4)	2 (7)	7 (26)	12 (44)	27 (100)
Total	326 (16)	313 (16)	487 (25)	625 (32)	227 (11)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 31 Ante-Natal Care of the respondents from different regions

Indicators	**Region**	**Peri-urban city**	**Peri-urban town**	**Urban city**	**Mega city**	**Urban town**	**Total**
Weight	No	44 (14)	17 (5)	42 (9)	93 (15)	19 (8)	215 (11)
	Yes	282 (87)	296 (95)	444 (91)	530 (85)	208 (92)	1760 (89)
	Don't Know	0 (0)	0 (0)	1 (0.21)	2 (0.32)	0 (0)	3 (0.15)
	Total	326 (100)	313 (100)	487(100)	625 (100)	227 (100)	1978 (100)
Blood Pressure	No	44 (14)	18 (6)	48 (10)	96 (15)	18 (8)	224 (11)
	Yes	280 (86)	293 (94)	431 (89)	527 (84)	209 (92)	1740 (88)
	Don't Know	2 (1)	2 (1)	8 (2)	2 (0.32)	0 (0)	14 (0.71)
	Total	326 (100)	313 (100)	487(100)	625 (100)	227 (100)	1978 (100)
Fundal height	No	125 (38)	134 (43)	158 (32)	166 (27)	121 (53)	704 (36)
	Yes	117 (36)	78 (25)	223 (46)	272 **(44)**	55 (24)	745 (38)
	Don't Know	84 (26)	101 (32)	106 (22)	187 (30)	51 (22)	529 (27)
	Total	326 (100)	313 (100)	487(100)	625 (100)	227 (100)	1978 (100)
Fetal heart Beat	No	185 (57)	175 (56)	283 (58)	344 (55)	143 (63)	1130 (57)
	Yes	73 (22)	44 (14)	176 (36)	223 (36)	72 (32)	588 (30)
	Don't Know	68 (21)	94 (30)	28 (6)	58 (9)	12 (5)	260 (13)
	Total	326 (100)	313 (100)	487(100)	625 (100)	227 (100)	1978 (100)
Urine test	No	51 (16)	58 (19)	74 (15)	122 (20)	36 (16)	341 (17)

Indicators	Region	Peri-urban city	Peri-urban town	Urban city	Mega city	Urban town	Total
	Yes	272 (83)	230 (73)	405 (83)	500 (80)	186 (82)	1593 (81)
	Don't Know	3 (0.92)	25 (8)	8 (2)	3 (0.48)	5 (2)	44 (2)
	Total	326 (100)	313 (100)	487(100)	625 (100)	227 (100)	1978 (100)
Blood test	No	64 (20)	59 (19)	72 (15)	127 (20)	37 (16)	359 (18)
	Yes	261 (80)	248 (79)	411 (84)	498 (80)	189 (83)	1607 (81)
	Don't Know	1 (0.31)	6 (2)	4 (1)	0 (0)	1 (0.44)	12 (1)
	Total	326 (100)	313 (100)	487(100)	625 (100)	227 (100)	1978 (100)
Ultrasonography	No	30 (9)	32 (10)	31 (6)	121 (19)	34 (15)	248 (13)
	Yes	296 (90)	279 (89)	455 (93)	504 (81)	193 (85)	1727 (87)
	Don't Know	0 (0)	2 (1)	1 (0.21)	0 (0)	0 (0)	3 (0.15)
	Total	326 (100)	313 (100)	487(100)	625 (100)	227 (100)	1978 (100)
TT vaccine	No	61 (19)	123 (39)	174 (36)	141 (23)	122 (54)	621 (31)
	Yes	246 (75)	180 (58)	306 (63)	479 (77)	101 (44)	1312 (66)
	Don't Know	19 (6)	10 (3)	7 (1)	5 (0.8)	4 (2)	45 (2)
	Total	326 (100)	313 (100)	487(100)	625 (100)	227 (100)	1978 (100)
Nutrition counseling	No	58 (18)	32 (10)	86 (18)	127 (20)	40 (18)	343 (17)
	Yes	259 (79)	265 (85)	400 (82)	497 (80)	184 (81)	1605 (81)
	Don't Know	9 (3)	16 (5)	1 (0.21)	1 (0.16)	3 (1)	30 (2)
	Total	326 (100)	313 (100)	487(100)	625 (100)	227 (100)	1978 (100)
Danger sign	No	109 (33)	56 (18)	109 (22)	139 (22)	50 (22)	463 (23)
	Yes	180 (55)	212 (68)	370 (76)	475 (76)	174 (77)	1411 (71)
	Don't Know	37 (11)	45 (14)	8 (2)	11 (2)	3 (1)	104 (5)
	Total	326 (100)	313 (100)	487(100)	625 (100)	227 (100)	1978 (100)
Colostrum counseling	No	48 (15)	30 (10)	95 (20)	130 (21)	33 (15)	336 (17)
	Yes	275 (84)	280 (89)	392 (80)	493 (79)	192 (85)	1632 (83)
	Don't Know	3 (1)	3 (1)	0 (0)	2 (0.32)	2 (1)	10 (1)
	Total	326 (100)	313 (100)	487(100)	625 (100)	227 (100)	1978 (100)
Iron pills	No	50 (15)	29 (9)	80 (16)	146 (23)	14 (6)	319 (16)
	Yes	274 (84)	284 (91)	404 (83)	474 (76)	209 (92)	1645 (83)
	Don't Know	2 (1)	0 (0)	3 (1)	5 (1)	4 (2)	14 (1)
	Total	326 (100)	313 (100)	487(100)	625 (100)	227 (100)	1978 (100)

Source: author's calculation; Figures in parentheses represent percentages.

In case of fundal height and fetal heartbeat measurement most of the respondents replied negatively or they didn't know. Other than these, most of the respondents replied positively in case of receiving other antenatal care services.

Table 32 Consumption amount of Iron pills during this pregnancy

No of iron pills received during pregnancy	**Peri-urban city**	**Peri-urban town**	**Urban city**	**Mega city**	**Urban town**	Total
0	52 (16)	29 (9)	83 (25)	**151 (45**)	18 (5)	333 (100)
1 to 30	25 (26)	16 (16)	21 (22)	24 (25)	11 (11)	97 (100)
31 to 60	18 (20)	9 (10)	19 (21)	23 (26)	20 (22)	89 (100)
61 to 90	33 (19)	25 (14)	45 (26)	31 (18)	41 (23)	175 (100)
91 to 120	61 (26)	34 (15)	39 (17)	79 (34)	20 (9)	233 (100)
121 to 150	42 (20)	33 (16)	50 (24)	65 (31)	17 (8)	207 (100)
151 to 180	62 (18)	102 (29)	93 (27)	70 (20)	24 (7)	351 (100)
181 to 210	18 (9)	44 (23)	50 (26)	60 (31)	19 (10)	191 (100)
211 to 240	8 (13)	5 (8)	24 (38)	5 (8)	21 (33)	63 (100)
241 to 270	5 (5)	10 (10)	42 (42)	28 (28)	14 (14)	99 (100)
271 to 300	2 (1)	6 (4)	21 (15)	**89 (64)**	22 (16)	140 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 33 Consumption of all Iron pills that received during pregnancy

Region	Did You Consume All Iron Pills You Received?						
	None	Yes, all of them	Yes, more than half of them	Yes, half of them	Yes, less than half of them	Don't know	Total
Peri-urban city	57 (17)	195 (**60**)	49 (15)	9 (3)	14 (4)	2 (1)	326 (100)
Peri-urban town	35 (11)	179 (**57)**	58 (19)	9 (3)	23 (7)	9 (3)	313 (100)
Urban city	95 (20)	257 (53)	84 (17)	21 (4)	28 (6)	2 (0.41)	487 (100)
Mega city	157 (25)	208 (**33**)	79 (13)	68 (11)	111 (18)	2 (0.32)	625 (100)
Urban town	23 (10)	125 (55)	43 (19)	17 (7)	18 (8)	1 (0.44)	227 (100)
Total	367	964	313	124	194	16	1978

Source: author's calculation; Figures in parentheses represent percentages.

Table 34 Months of pregnancy of the respondents

Regions	How Many Months Pregnant Were You When (Name of Index Child) Born?				
	7	8	9	10	Total
Peri-urban city	2 (1)	23 (7)	227 (70)	74 (23)	326 (100)
Peri-urban town	2 (1)	9 (3)	252 (81)	50 (16)	313 (100)
Urban city	3 (1)	51 (10)	295 (61)	138 (28)	487 (100)
Mega city	4 (1)	52 (8)	387 (62)	182 (29)	625 (100)
Urban town	3 (1)	36 (16)	133 (59)	55 (24)	227 (100)

Source: author's calculation; Figures in parentheses represent percentages.

Table 35 Comparison among different types of mothers of different regions on their average hours per day spent in different activities

Regional category	**Mega city**			**Urban city**			**Urban town**			**Peri-Urban City**			**Peri-Urban Town**		
Types of mothers	H	S	W	H	S	W	H	S	W	H	S	W	H	S	W
Activities															
Care of children	**6**	2	3	6	4	4	6	4	4	45	3	2	4	3	3
Care of elder	0.393	0.156	0.14	1	0.342	0.233	0.294	0.278	0.099	0.304	0.075	0.058	0.4	0.16	0.118
Cooking	4.	3	3	4	4	3	4	3	3	4	3	2	**5**	4	3
Cleaning	1	0.392	0.401	1	1	1	1	1	0.475	1	1	0.346	1	1	1
Washing	1	1	0.412	1	1	1	1	1	0.417	1	1	0.347	1	1	0.445
Cultivating land	0.028	0.005	0.003	0.031	0.033	0	0.011	0	0.035	0.011	0.013	0.003	0.057	0.021	0
Trending farm animals	0.104	0.018	0	0.074	0.033	0.029	0.1	0.236	0.045	0.094	0.075	0	0.174	0.16	0.029
Tutoring their own children	1	0.179	0.165	1	0.333	0.289	1	0.229	0.384	0.417	0.338	0.126	0.44	0.34	0.269
Formal labor	0	0.349	8.	0	1	6	0	2	7	0	0.3	10	0	0.415	8
Other business activities	0.109	8	0.296	0.1	3	0.083	0.4	4	0.361	1	5	0.126	0.349	4	0.137
Leisure time (e.g. socializing, watching tv)	2	1	1	2	1	1	3	1	1	3	1	1	2	2	1
Sleeping at night	7	**7**	7	7	6	7	7	7	6	7	7	7	7	7	7
Personal care and rest	1	1	0.448	1	1	1	1	16	1	1	1	1	1	1	1
Religious activities	1	0.309	0.424	1	1	1	1	0.463	1	1	1	0.357	1	1	1

H=House wife, S=Self Employed, W=Working Source: author's calculation.

Table 36 Comparing health status of adolescent girls of different regions, different areas and educational level of their HH head

Comparing health status of adolescent girls of different regions				
Background Characteristics	**Adolescent BMI**			
	Underweight	**Increasing but acceptable risk**	**Increased Risk**	**High Risk**
Peri-urban city	3 (2)	13 (9)	7 (5)	4 (3)
Peri-urban town	15 (10)	17 (12)	5 (3)	0 (0)
Urban city	9 (6)	18 (12)	7 (5)	1 (1)
Mega city	10 (7)	13 (9)	4 (3)	1 (1)
Urban town	2 (1)	9 (6)	5 (3)	2 (1)
Comparing health status of adolescent girls of different area				
Any other type (Ultra poor)	9 (6)	21 (14)	6 (4)	3 (2)
Middle class	16 (11)	32 (22)	10 (7)	1 (1)
High class	6 (4)	11 8)	8 (6)	2 (1)
Slum	8 (6)	6 (4)	4 (3)	2 (1)
Comparing health status of adolescent girls on the basis of educational level of HH head				
No Institutional Education	9 (6)	11 (8)	8 (6)	2 (1)
Incomplete Primary Education	3 (2)	2 (1)	0 (0)	0 (0)
Complete Primary Education	5 (3)	11 (8)	5 (3)	0 (0)
Incomplete Secondary Education	10 (7)	8 (6)	0 (0)	1 (1)
Complete Secondary or Higher Education	12 (8)	38 (26)	15 (10)	5 (3)

Source: author's calculation; Figures in parentheses represent percentages.

Table 37 Answers about the questions on general health features of adolescent girls

Questions	**correct answer**	**Incorrect answer**
Have You Heard About Dietary Diversity?	78 (54)	67 (46)
Please Mention Some Names of Iron Rich Foods?	58 (40)	87 (60)
Do You Take Soft Drinks Regularly?	65 (45)	80 (55)
Do You Like Sugary Foods?	84 (58)	61 (42)
Do You Take Fast Foods Frequently?	55 (38)	90 (62)
Did You Participate in Physical Activity	52 (36)	93 (64)
Do You Have Trouble in Sleeping?	21 (14)	124 (86)
How long after birth should a baby start breastfeeding?	52 (36)	93 (64)
What should a mother do with the first milk or colostrum?	2 (1)	143 (99)
If mother thinks her baby is not getting enough breast milk, what should she do?	7 (5)	138 (95)
How often should a baby breastfeed?	1 (1)	144 (99)
Do you think infants under 6 months should be given water if the weather is hot?	62 (43)	83 (57)
At what age should a baby first start to receive liquids other than breastmilk?	5 (3)	140 (97)
At what age should a baby first start to receive foods in addition to breastmilk?	6 (4)	139 (96)
Name one thing that can happen to children if they do not get enough iron?	38 (26)	107 (74)
What seasoning (food item) is often fortified with iodine?	1 (1)	144 (99)
For how many days do children need extra meal per day after they have been sick?	0	145 (100)
What needs to be done when the child has diarrhea?	1 (1)	144 (99)
When should you wash your hands?	1 (1)	144 (99)
What are some of the things we can do to encourage children to eat?	0	145 (100)
What Foods Does A Young Child Need in Order?	1 (1)	144 (99)

Source: author's calculation; Figures in parentheses represent percentages.

Table 38 : Knowledge of adolescent girls about infant and young child nutrition

Questions	Any other type		Middle class		High class		Slum	
	W	**R**	**W**	**R**	**W**	**R**	**W**	**R**
How long after birth should a baby start breastfeeding?	29 (20)	10 (7)	36 (25)	23 (16)	13 (9)	14 (10)	15 (10)	5 (3)
What should a mother do with the first milk or colostrum?	39 (27)	0 (0)	57 (39)	2 (1)	27 (19)	0 (0)	20 (14)	0 (0)
How often should a baby breastfeed?	39 (27)	0 (0)	58 (40)	1 (1)	27 (19)	0 (0)	20 (14)	0 (0)
If mother thinks her baby is not getting enough breast milk, what should she do?	38 (26)	1 (1)	55 (38)	4 (3)	27 (19)	0 (0)	18 (12)	2 (1)
Do you think infants under 6 months should be given water if the weather is hot	26 (18)	13 (9)	31 (21)	28 (19)	11 (8)	16 (11)	15 (10)	5 (3)
At what age should a baby first start to receive liquids other than breastmilk?	39 (27)	0 (0)	57 (39)	2 (1)	27 (19)	0 (0)	17 (12)	3 (2)
At what age should a baby first start to receive foods in addition to breastmilk?	38 (26)	1 (1)	56 (39)	3 (2)	27 (19)	0 (0)	18 (12)	2 (1)
Name one thing that can happen to children if they do not get enough iron?	34 (23)	5 (3)	38 (26)	21 (14)	16 (11)	11 (8)	19 (13)	1 (1)
What seasoning (food item) is often fortified with iodine?	39 (27)	0 (0)	59 (41)	0 (0)	26 (18)	1 (1)	20 (14)	0 (0)
For how many days do children need extra meal per day after they have been sick?	39 (27)	0 (0)	59 (41)	0 (0)	27 (19)	0 (0)	20 (14)	0 (0)
What needs to be done when the child has diarrhea?	39 (27)	0 (0)	59 (41)	0 (0)	27 (19)	0 (0)	20 (14)	0 (0)
When should you wash your hands?	39 (27)	0 (0)	59 (41)	0 (0)	26 (18)	1 (1)	20 (14)	0 (0)
What are some of the things we can do to encourage young children to eat?	39 (27)	0 (0)	59 (41)	0 (0)	27 (19)	0 (0)	20 (14)	0 (0)
What Foods Does A Young Child Need in Order?	39 (27)	0 (0)	59 (41)	0 (0)	26 (18)	1 (1)	20 (14)	0 (0)

Source: author's calculation; Figures in parentheses represent percentages*; **R = Right answer, W = Wrong answer***

Table 39 : Knowledge of adolescent girls of different region related to infant and young child nutrition

Questions	Peri-urban city		Peri-urban town		Urban city		Mega city		Urban town	
	W	R	W	R	W	R	W	R	W	R
How long after birth should a baby start breastfeeding?	22 (15)	5 (3)	21 (14)	16 (11)	21 (1)	14 (10)	18 (12)	10 (7)	11 (8)	7 (4.83)
What should a mother do with the first milk or colostrum?	26 (18)	1 (1)	37 (26)	0 (0)	34 (23)	1 (1)	28 (19)	0 (0)	18 (12)	0 (0)
How often should a baby breastfeed?	26 (18)	1 (1)	37 (26)	0 (0)	35 (24)	0 (0)	28 (19)	0 (0)	18 (12)	0 (0)
If mother thinks her baby is not getting enough breast milk, what should she do	26 (18)	1 (1)	37 (26)	0 (0)	29 (20)	6 (4)	28 (19)	0 (0)	18 (12)	0 (0)
Do you think infants under 6 months should be given water if the weather is hot	17 (12)	10 (7)	21 (14)	16 (11)	19 (13)	16 (11)	13 (9)	15 (10)	13 (9)	5 (3)
At what age should a baby first start to receive liquids other than breastmilk	26 (18)	1 (1)	37 (26)	0 (0)	32 (22)	3 (2)	27 (19)	1 (1)	18 (12)	0 (0)
At what age should a baby first start to receive foods in addition to breastmilk	26 (18)	1 (1)	37 (26)	0 (0)	31 (21)	4 (3)	27 (19)	1 (1)	18 (12)	0 (0)
Name one thing that can happen to children if they do not get enough iron	22 (16)	5 (3)	23 (16)	14 (10)	26 (18)	9 (6)	19 (13)	9 (6)	17 (11)	1 (1)
What seasoning (food item) is often fortified with iodine?	27 (19)	0 (0)	36 (25)	1 (1)	35 (24)	0 (0)	28 (19)	0 (0)	18 (12)	0 (0)
For how many days do children need extra meal per day after they have been sick?	27 (19)	0 (0)	37 (26)	0 (0)	35 (24)	0 (0)	28 (19)	0 (0)	18 (12)	0 (0)
What needs to be done when the child has diarrhea?	27 (19)	0 (0)	36 (25)	1 (1)	35 (24)	0 (0)	28 (19)	0 (0)	18 (12)	0 (0)
When should you wash your hands?	27 (19)	0 (0)	37 (26)	0 (0)	35 (24)	0 (0)	28 (19)	0 (0)	18 (12)	0 (0)
What are some of the things we can do to encourage young children to eat	27 (19)	0 (0)	37 (26)	0 (0)	35 (24)	0 (0)	28 (19)	0 (0)	18 (12)	0 (0)
What Foods Does A Young Child Need in Order	27 (19)	0 (0)	36 (25)	1 (1)	35 (24)	0 (0)	28 (19)	0 (0)	18 (12)	0 (0)
Source: author's calculation; Figures in parentheses represent percentages; ***W = Wrong Answer, R = Right Answer***										

Table 40 Factor analysis

Factor analysis/correlation	Number of obs = 1,978
Method: principal-component factors	Retained factors = 5
Rotation: (unrotated)	Number of params = 105

Table 41 Factor & eigenvalue

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	6.02836	3.61489	0.2621	0.2621
Factor2	2.41347	0.89312	0.1049	0.367
Factor3	1.52035	0.03525	0.0661	0.4331
Factor4	1.4851	0.37314	0.0646	0.4977
Factor5	1.11196	0.19432	0.0483	0.5461
Factor6	0.91764	0.043	0.0399	0.586
Factor7	0.87464	0.05538	0.038	0.624
Factor8	0.81926	0.0586	0.0356	0.6596
Factor9	0.76065	0.07571	0.0331	0.6927
Factor10	0.68494	0.02262	0.0298	0.7225
Factor11	0.66232	0.05706	0.0288	0.7512
Factor12	0.60526	0.01777	0.0263	0.7776
Factor13	0.58749	0.00718	0.0255	0.8031
Factor14	0.58031	0.04451	0.0252	0.8283
Factor15	0.53581	0.04873	0.0233	0.8516
Factor16	0.48708	0.01627	0.0212	0.8728
Factor17	0.47081	0.00616	0.0205	0.8933
Factor18	0.46465	0.00488	0.0202	0.9135
Factor19	0.45977	0.03127	0.02	0.9335
Factor20	0.4285	0.03261	0.0186	0.9521
Factor21	0.39589	0.02448	0.0172	0.9693
Factor22	0.37141	0.03708	0.0161	0.9855
Factor23	0.33433	.	0.0145	1

LR test: independent vs. saturated: chi2(253) = 1.4e+04 Prob>chi2 = 0.0000

Table 42 Factor loadings (pattern matrix) and unique variances

	Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Uniqueness
1	do anything better than others	0.4733		0.4039	-0.4581		0.3069
2	improve in future	0.485			-0.4335		0.4079
3	your opinions are always considered	0.6086					0.4761
4	speak in front of many people	0.5725					0.5291
5	have own assets	0.473	0.4971				0.3527
6	have saving account	0.4344					0.5676
7	have your mobile phone	0.4766	0.5047				0.5129

8	access to easy cooking stove like gas	0.4625	0.5411				0.4488
9	access to kitchen equipment	0.5255	0.5339				0.3469
10	husband take care of you as mother	0.4543					0.4492
11	husband help you in household work	0.4261				-0.6278	0.3562
12	husband read your phone message					0.4107	0.6764
13	decide to work outside	0.5121			0.4005		0.5619
14	decide to spent on food	0.591			0.4025		0.4248
15	decide what cook for the family	0.4397					0.5636
16	decide to buy items for personal use	0.5405					0.5328
17	decide on buying expensive things	0.6334					0.4625
18	decide to health expenditures	0.6092			0.4087		0.4372
19	decide to family planning						0.6634
20	unescorted go to relative's house	0.5215	-0.4398				0.3543
21	go to the market	0.5808	-0.4599				0.3263
22	go to hospital/clinic	0.6136					0.3063
23	participate in community events	0.5827					0.3771

(blanks represent abs(loading)<.4)

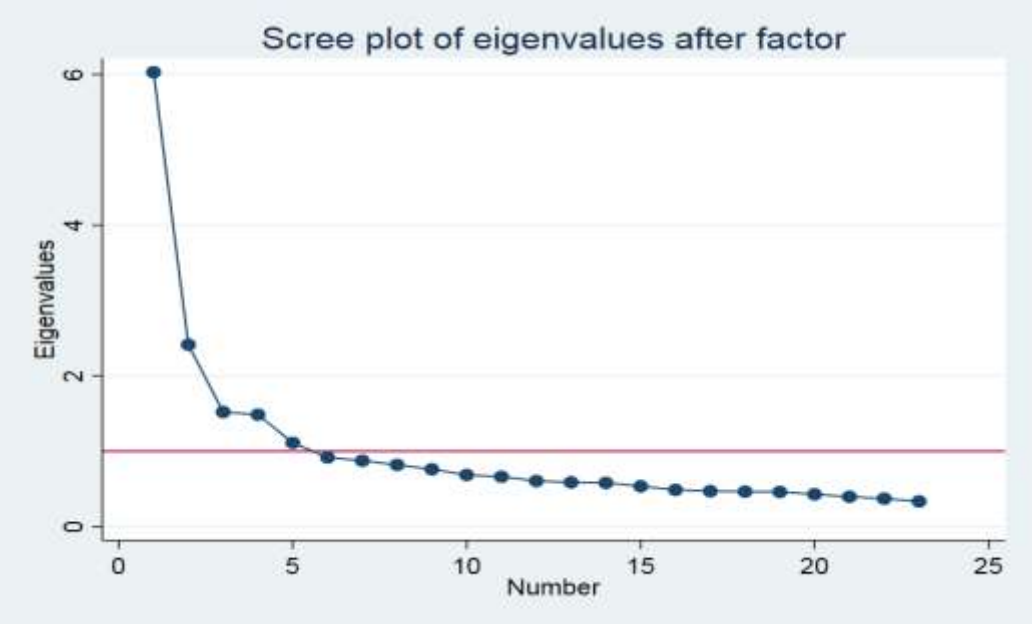

Figure 16 Scree plot of eigenvalues after factor

Table 43 Factor rotation

Factor analysis/correlation	Number of obs = 1,978
Method: principal-component factors	Retained factors = 5
Rotation: orthogonal varimax (Kaiser off)	Number of params = 105

Table 44 rotate factor and variance

Factor	Variance	Difference	Proportion	Cumulative
Factor1	3.02836	0.13373	0.1317	0.1317
Factor2	2.89463	0.09416	0.1259	0.2575
Factor3	2.80046	0.52457	0.1218	0.3793
Factor4	2.27589	0.71599	0.099	0.4782
Factor5	1.55991	.	0.0678	0.5461

LR test: independent vs. saturated: chi2(253) = 1.4e+04 Prob>chi2 = 0.0000

Table 45 Rotated factor loadings (pattern matrix) and unique variances

	Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Uniqueness
1	do anything better than others				0.819		0.3069
2	improve in future				0.7423		0.4079
3	your opinions are always considered				0.5694		0.4761
4	speak in front of many people				0.5718		0.5291
5	have own assets		0.7898				0.3527
6	have saving account		0.632				0.5676
7	have your mobile phone		0.6173				0.5129
8	access to easy cooking stove like gas		0.7012				0.4488
9	access to kitchen equipment		0.7775				0.3469
10	husband take care of you as mother					0.6364	0.4492
11	husband help you in household work					0.7627	0.3562
12	husband read your phone message					-0.4947	0.6764
13	decide to work outside			0.6226			0.5619
14	decide to spent on food			0.6761			0.4248
15	decide what cook for the family			0.56			0.5636
16	decide to buy items for personal use			0.5601			0.5328
17	decide on buying expensive things			0.5901			0.4625
18	decide to health expenditures			0.6918			0.4372
19	decide to family planning			0.4717			0.6634
20	unescorted go to relative's house	0.7896					0.3543
21	go to the market	0.7898					0.3263
22	go to hospital/clinic	0.7957					0.3063

23	participate in community events	0.7546					0.3771

Table 46 Factor analysis of ANC

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	2.62693	1.90789	0.9453	0.9453
Factor2	0.71904	0.48792	0.2587	1.2041
Factor3	0.23112	0.14499	0.0832	1.2872
Factor4	0.08612	0.04831	0.031	1.3182
Factor5	0.03781	0.05389	0.0136	1.3318
Factor6	-0.01608	0.05222	-0.0058	1.326
Factor7	-0.06829	0.04444	-0.0246	1.3015
Factor8	-0.11273	0.00769	-0.0406	1.2609
Factor9	-0.12042	0.0412	-0.0433	1.2176
Factor10	-0.16162	0.04238	-0.0582	1.1594
Factor11	-0.204	0.03496	-0.0734	1.086
Factor12	-0.23896	.	-0.086	1

Table 47 factor loading for ANC

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Uniqueness
ANC_weight	0.3987	0.3244	-0.0571	0.0893	0.04	0.723
ANC_bp	0.3513	0.3216	0.1088	0.036	0.0185	0.7597
ANC_fundal~t	0.3823	-0.0619	0.2379	0.0831	-0.0278	0.7858
ANC_fetal_hb	0.5274	-0.3142	0.1622	0.0009	0.0035	0.5968
ANC_urin	0.5319	-0.0372	0.089	-0.1783	0.0162	0.6757
ANC_blood_~t	0.4622	0.2809	0.0916	-0.103	-0.0141	0.6883
ANC_ultrsono	0.4395	0.3674	0.0366	0.055	-0.0127	0.6673
ANC_TT	0.5219	-0.2674	-0.0337	0.1292	0.0541	0.6354
ANC_nutri_~g	0.5847	-0.1043	-0.2132	0.0413	-0.0496	0.5977
ANC_danger~n	0.6516	-0.2935	-0.0692	-0.046	-0.0112	0.4823
ANC_colous~m	0.4325	0.1551	-0.2452	-0.0488	-0.0313	0.7254
ANC_iron_p~s	0.0682	0.0032	-0.0632	-0.0405	0.1673	0.9617

Table 48 Varimax rotation for ANC

Factor	Variance	Difference	Proportion	Cumulative
Factor1	1.99865	0.6706	0.7192	0.7192
Factor2	1.32805	1.09737	0.4779	1.1971
Factor3	0.23068	0.12747	0.083	1.2801
Factor4	0.10321	0.0628	0.0371	1.3173
Factor5	0.04042	.	0.0145	1.3318

Table 49 Factors after rotation for ANC

Variable	Factor1	Factor2	Factor3	Factor4	Factor5	Uniqueness
ANC_weight	0.1456	0.4915	0.0838	-0.0739	0.0418	0.723
ANC_bp	0.0998	0.4757	-0.0606	0.0189	0.0061	0.7597
ANC_fundal~t	0.339	0.1996	-0.2365	0.0016	-0.0593	0.7858
ANC_fetal_hb	0.604	0.0633	-0.1741	0.0614	-0.0151	0.5968

ANC_urin	0.4497	0.2684	-0.0268	0.2212	0.0199	0.6757
ANC_blood_~t	0.2122	0.4925	-0.0067	0.1545	-0.0143	0.6883
ANC_ultrsono	0.1496	0.5564	0.0165	-0.0112	-0.0178	0.6673
ANC_TT	0.5841	0.0877	-0.0199	-0.1143	0.0475	0.6354
ANC_nutri_~g	0.5494	0.228	0.2085	-0.065	-0.0283	0.5977
ANC_danger~n	0.7039	0.1219	0.0669	0.054	-0.0007	0.4823
ANC_colous~m	0.2764	0.3412	0.2857	0.0108	0.0009	0.7254
ANC_iron_p~s	0.0559	0.0335	0.0524	0.0193	0.1758	0.9617

Table 50 Factor rotation matrix for ANC

	Factor1	Factor2	Factor3	Factor4	Factor5
Factor1	0.8194	0.5695	0.0389	0.0525	0.0017
Factor2	-0.5711	0.8108	0.126	0.0236	0.0052
Factor3	-0.0466	0.1083	-0.952	0.2602	-0.1097
Factor4	0.0182	0.0797	-0.2467	-0.9629	-0.0721
Factor5	-0.0022	0.0125	-0.124	-0.0414	0.9913

Table 51 Correlation between important variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Mothers Education	1.000									
(2) Nutrition knowledge score	**0.562**	1.000								
(3) women empowerment score	0.081	0.065	1.000							
(4) Wealth index score	0.393	0.305	**0.546**	1.000						
(5) Self esteem	0.341	0.355	0.263	0.279	1.000					
(6) Access to and control over resources	0.633	0.368	0.099	0.608	**0.619**	1.000				
(7) Attitude & behavior of Husband	0.329	0.445	0.058	0.393	0.316	0.396	1.000			
(8) Decision related to HH	0.213	0.379	0.255	0.215	0.454	**0.780**	0.284	1.000		
(9) Mobility	0.175	0.189	0.954	0.156	0.417	0.225	0.152	0.454	1.000	
(10) Reproductive work hour	0.205	0.186	-0.060	0.247	0.156	0.075	0.112	-0.027	-0.009	1.000

Table 52 Bivariate associations between child nutritional status and respondent age

Variables	Weight for Height (WHZ)				Weight for Age (WAZ)				Height for Age Z-score (HAZ)			
Respondent age	Severe Wasting	Moderate Wasting	Not Wasted	Total	Severe Underweight	Moderate Underweight	Not Underweight	Total	Severe Stunting	Moderate Stunting	Not Stunted	Total
less than 15 years	0 (0)	0 (0)	2 (0.11)	2 (0.1)	0 (0)	0 (0)	2 (0.12)	2 (0.1)	0 (0)	1 (0.31)	1 (0.08)	2 (0.1)
15 to 19	7 (8.64)	11 (9.57)	75 (4.2)	93 (4.7)	6 (6.3)	21 (9.5)	66 (3.97)	93 (4.7)	19 (4.74)	25 (7.86)	49 (3.89)	93 (4.7)
20 to 24	20 (24.6)	38 (33.1)	453 (25)	511 (25)	32(33.7)	70 (31.7)	409 (24.6)	511 (25.8)	125 (31.2)	73 (23)	313 (24.9)	511 (25.8)
25 to 29	29 (35.8)	38 (33.04)	597 (33.5)	664 (33.57)	34 (35.79)	66 (29.86)	564 (33.94)	664 (33.57)	126 (31.42)	115 (36.16)	423 (33.6)	664 (33.57)
30 to 34	17 (20.99)	15 (13.04)	460 (25.81)	492 (24.87)	18 (18.95)	49 (22.17)	425 (25.57)	492 (24.87)	99 (24.69)	71 (22.33)	322 (25.58)	492 (24.87)
35 to 39	7 (8.64)	10 (8.7)	164 (9.2)	181 (9.15)	4 (4.21)	12 (5.43)	165 (9.93)	181 (9.15)	30 (7.48)	26 (8.18)	125 (9.93)	181 (9.15)
40 to above	1 (1.23)	3 (2.61)	31 (1.74)	35 (1.77)	1 (1.05)	3 (1.36)	31 (1.87)	35 (1.77)	2 (0.5)	7 (2.2)	26 (2.07)	35 (1.77)
Total	81 (100)	115 (100)	1782 (100)	1978 (100)	95 (100)	221 (100)	1662 (100)	1978 (100)	401 (100)	318 (100)	1259 (100)	1978 (100)
Chi-square values	20.45**				30.75***				25.58**			
p-value	0.059				0				0.012			

Table 53 Bivariate associations between child, nutritional status and respondent education (Years of Schooling of Respondent)

No institutional	21 (25.93)	25 (21.74)	188 (10.55)	234 (11.83)	27 (28.42)	54 (24.43)	153 (9.21)	234 (11.83)	71 (17.71)	53 (16.67)	110 (8.74)	234 (11.83)
Incomplete Primary	3 (3.7)	10 (8.7)	66 (3.7)	79 (3.99)	8 (8.42)	9 (4.07)	62 (3.73)	79 (3.99)	20 (4.99)	14 (4.4)	45 (3.57)	79 (3.99)
Complete Primary	12 (14.81)	16 (13.91)	209 (11.73)	237 (11.98)	15 (15.79)	33 (14.93)	189 (11.37)	237 (11.98)	57 (14.21)	30 (9.43)	150 (11.91)	237 (11.98)
Incomplete Secondary	14 (17.28)	28 (24.35)	364 (20.43)	406 (20.53)	14 (14.74)	55 (24.89)	337 (20.28)	406 (20.53)	66 (16.46)	77 (24.21)	263 (20.89)	406 (20.53)
Complete Secondary or Higher	31 (38.27)	36 (31.3)	955 (53.59)	1022 (51.67)	31 (32.63)	70 (31.67)	921 (55.42)	1022 (51.67)	187 (46.63)	144 (45.28)	691 (54.88)	1022 (51.67)
Total	81 (100)	115 (100)	1782 (100)	1978 (100)	95 (100)	221 (100)	1662 (100)	1978 (100)	401 (100)	318 (100)	1259 (100)	1978 (100)
Chi-square values	47.93***				101.61***				45.66***			
p-value	0				0				0			

Table 54 Bivariate associations between child, nutritional status and respondent living area

Variables	Weight for Height (WHZ)				Weight for Age (WAZ)				Height for Age Z-score (HAZ)			
Living Area	Severe Wasting	Moderate Wasting	Not Wasted	Total	Severe Underweight	Moderate Underweight	Not Underweight	Total	Severe Stunting	Moderate Stunting	Not Stunted	Total
Any other type	26 (32.1)	52 (45.22)	435 (24.41)	513 (25.94)	33 (34.74)	92 (41.63)	388 (23.35)	513 (25.94)	110 (27.43)	101 (31.76)	302 (23.99)	513 (25.94)
Middle class	30 (37.04)	40 (34.78)	903 (50.67)	973 (49.19)	26 (27.37)	71 (32.13)	876 (52.71)	973 (49.19)	160 (39.9)	127 (39.94)	686 (54.49)	973 (49.19)
Upper class	4 (4.94)	7 (6.09)	176 (9.88)	187 (9.45)	7 (7.37)	7 (3.17)	173 (10.41)	187 (9.45)	41 (10.22)	28 (8.81)	118 (9.37)	187 (9.45)
Slum	21 (25.93)	16 (13.91)	268 (15.04)	305 (15.42)	29 (30.53)	51 (23.08)	225 (13.54)	305 (15.42)	90 (22.44)	62 (19.5)	153 (12.15)	305 (15.42)

Variables	Weight for Height (WHZ)				Weight for Age (WAZ)				Height for Age Z-score (HAZ)			
Living Area	Severe Wasting	Moderate Wasting	Not Wasted	Total	Severe Underweight	Moderate Underweight	Not Underweight	Total	Severe Stunting	Moderate Stunting	Not Stunted	Total
Total	81 (100)	115 (100)	1782 (100)	1978 (100)	95 (100)	221 (100)	1662 (100)	1978 (100)	401 (100)	318 (100)	1259 (100)	1978 (100)
Chi-square values	36.95***				92.14***				51.48***			
p-value	0				0				0			

Table 55 Bivariate associations between child, nutritional status and House ownership

Variables	Weight for Height (WHZ)				Weight for Age (WAZ)				Height for Age Z-score (HAZ)			
Respondent housing status	Severe Wasting	Moderate Wasting	Not Wasted	Total	Severe Underweight	Moderate Underweight	Not Underweight	Total	Severe Stunting	Moderate Stunting	Not Stunted	Total
Owned	31 (38.27)	41 (35.65)	696 (39.06)	768 (38.8)	32 (33.68)	70 (31.67)	666 (40.07)	768 (38.83)	151 (37.66)	123 (38.68)	494 (39.24)	768 (38.83)
Rented	50 (61.73)	74 (64.35)	1086 (60.94)	1210 (61.2)	63 (66.32)	151 (68.33)	996 (59.93)	1210 (61.17)	250 (62.34)	195 (61.32)	765 (60.76)	1210 (61.17)
Total	81 (100)	115 (100)	1782 (100)	1978 (100)	95 (100)	221 (100)	1662 (100)	1978 (100)	401 (100)	318 (100)	1259 (100)	1978 (100)
Chi-square	19.12***				28.06***				5.02			
p-value	0.001				0				0.286			

Table 56 Bivariate associations between child, nutritional status and age of getting married

Variables	Weight for Height (WHZ)				Weight for Age (WAZ)				Height for Age Z-score (HAZ)			
Respondent age	Severe Wasting	Moderate Wasting	Not Wasted	Total	Severe Underweight	Moderate Underweight	Not Underweight	Total	Severe Stunting	Moderate Stunting	Not Stunted	Total
less than 15 years	15 (18.52)	25 (21.74)	192 (10.77)	232 (11.7)	16 (16.84)	43 (19.46)	173 (10.41)	232 (11.7)	51 (12.72)	53 (16.67)	128 (10.17)	232 (11.7)
15 to 19	44 (54.32)	63 (54.78)	948 (53.2)	1055 (53.34)	60 (63.16)	129 (58.37)	866 (52.11)	1055 (53.3)	213 (53.12)	168 (52.83)	674 (53.53)	1055 (53.3)
20 to 24	16 (19.75)	17 (14.78)	464 (26.04)	497 (25.13)	15 (15.79)	37 (16.74)	445 (26.77)	497 (25.13)	101 (25.19)	67 (21.07)	329 (26.13)	497 (25.1)
25 to 29	6 (7.41)	10 (8.7)	167 (9.37)	183 (9.25)	4 (4.21)	12 (5.43)	167 (10.05)	183 (9.25)	34 (8.48)	29 (9.12)	120 (9.53)	183 (9.25)
30 to 34	0 (0)	0 (0)	11 (0.62)	11 (0.56)	0 (0)	0 (0)	11 (0.66)	11 (0.56)	2 (0.5)	1 (0.31)	8 (0.64)	11 (0.56)
Total	81 (100)	115 (100)	1782 (100)	1978 (100)	95 (100)	221 (100)	1662 (100)	1978 (100)	401 (100)	318 (100)	1259 (100)	1978 (100)
Chi-square	22.45***				39.69***				13.05			
p-value	0				0.004				0.11			

Table 57 Bivariate associations between child, nutritional status and age first baby born

Variables	Weight for Height (WHZ)				Weight for Age (WAZ)				Height for Age Z-score (HAZ)			
Respondent age	Severe Wasting	Moderate Wasting	Not Wasted	Total	Severe Underweight	Moderate Underweight	Not Underweight	Total	Severe Stunting	Moderate Stunting	Not Stunted	Total
less than 15 years	4 (4.94)	5 (4.35)	43 (2.41)	52 (2.63)	4 (4.21)	10 (4.52)	38 (2.29)	52 (2.63)	15 (3.74)	12 (3.77)	25 (1.99)	52 (2.63)
15 to 19	45 (55.56)	60 (52.17)	706 (39.62)	811 (41)	57 (60)	121 (54.75)	633 (38.09)	811 (41)	174 (43.39)	152 (47.8)	485 (38.52)	811 (41)

20 to 24	21 (25.93)	34 (29.57)	648 (36.36)	703 (35.54)	21 (22.11)	64 (28.96)	618 (37.18)	703 (35.54)	135 (33.67)	87 (27.36)	481 (38.2)	703 (35.54)
25 to 29	9 (11.11)	12 (10.43)	332 (18.63)	353 (17.85)	11 (11.58)	20 (9.05)	322 (19.37)	353 (17.85)	63 (15.71)	57 (17.92)	233 (18.51)	353 (17.85)
30 to 34	2 (2.47)	4 (3.48)	50 (2.81)	56 (2.83)	2 (2.11)	6 (2.71)	48 (2.89)	56 (2.83)	14 (3.49)	8 (2.52)	34 (2.7)	56 (2.83)
35 or higher	0 (0)	0 (0)	3 (0.17)	3 (0.15)	0 (0)	0 (0)	3 (0.18)	3 (0.15)	0 (0)	2 (0.63)	1 (0.08)	3 (0.15)
Total	81 (100)	115 (100)	1782 (100)	1978 (100)	95 (100)	221 (100)	1662 (100)	1978 (100)	401 (100)	318 (100)	1259 (100)	1978 (100)
Chi-square	22.13**				50.07***				28.34***			
p-value	0.014				0				0.002			

Table 58 Bivariate associations between child, nutritional status and child sex

Variables	Weight for Height (WHZ)				Weight for Age (WAZ)				Height for Age Z-score (HAZ)			
Respondent age	Severe Wasting	Moderate Wasting	Not Wasted	Total	Severe Underweight	Moderate Underweight	Not Underweight	Total	Severe Stunting	Moderate Stunting	Not Stunted	Total
Male	51 (62.96)	58 (50.43)	934 (52.41)	1043 (52.73)	49 (51.58)	126 (57.01)	868 (52.23)	1043 (52.73)	204 (50.87)	173 (54.4)	666 (52.9)	1043 (52.73)
Female	30 (37.04)	57 (49.57)	848 (47.59)	935 (47.27)	46 (48.42)	95 (42.99)	794 (47.77)	935 (47.27)	197 (49.13)	145 (45.6)	593 (47.1)	935 (47.27)
Total	81 (100)	115 (100)	1782 (100)	1978 (100)	95 (100)	221 (100)	1662 (100)	1978 (100)	401 (100)	318 (100)	1259 (100)	1978 (100)
Chi-square	3.72				1.85				0.93			
p-value	0.156				0.397				0.629			

Table 59 Bivariate associations between child, nutritional status and child dietary diversity

Variables	Weight for Height (WHZ)	Weight for Age (WAZ)	Height for Age Z-score (HAZ)

Respondent age	Severe Wasting	Moderate Wasting	Not Wasted	Total	Severe Underweight	Moderate Underweight	Not Underweight	Total	Severe Stunting	Moderate Stunting	Not Stunted	Total
Low	54 (66.67)	71 (61.74)	886 (49.72)	1011 (51.11)	63 (66.32)	132 (59.73)	816 (49.1)	1011 (51.11)	250 (62.34)	163 (51.26)	598 (47.5)	1011 (51.11)
Moderate	16 (19.75)	25 (21.74)	484 (27.16)	525 (26.54)	15 (15.79)	54 (24.43)	456 (27.44)	525 (26.54)	81 (20.2)	80 (25.16)	364 (28.91)	525 (26.54)
High	11 (13.58)	19 (16.52)	412 (23.12)	442 (22.35)	17 (17.89)	35 (15.84)	390 (23.47)	442 (22.35)	70 (17.46)	75 (23.58)	297 (23.59)	442 (22.35)
Total	81 (100)	115 (100)	1782 (100)	1978 (100)	95 (100)	221 (100)	1662 (100)	1978 (100)	401 (100)	318 (100)	1259 (100)	1978 (100)
Chi-square	19.80***				14.72***				27.47***			
p-value	0.001				0.005				0			

Table 60 : Bivariate associations between child, nutritional status and women dietary diversity

Variables	Weight for Height (WHZ)				Weight for Age (WAZ)				Height for Age Z-score (HAZ)			
Respondent age	Severe Wasting	Moderate Wasting	Not Wasted	Total	Severe Underweight	Moderate Underweight	Not Underweight	Total	Severe Stunting	Moderate Stunting	Not Stunted	Total
Low	71 (87.65)	98 (85.22)	1335 (74.92)	1504 (76.0)	80 (84.21)	194 (87.78)	1230 (74.01)	1504 (76.04)	312 (77.81)	258 (81.13)	934 (74.19)	1504 (76.04)
Moderate	10 (12.35)	17 (14.78)	447 (25.08)	474 (23.9)	15 (15.79)	27 (12.22)	432 (25.99)	474 (23.96)	89 (22.19)	60 (18.87)	325 (25.81)	474 (23.96)
Total	81 (100)	115 (100)	1782 (100)	1978 (100)	95 (100)	221 (100)	1662 (100)	1978 (100)	401 (100)	318 (100)	1259 (100)	1978 (100)
Chi-square	12.55***				23.97***				7.59**			
p-value	0.002				0				0.023			

Table 61 Bivariate associations between child, nutritional status and household dietary diversity

Variables	Weight for Height (WHZ)				Weight for Age (WAZ)				Height for Age Z-score (HAZ)			
Respondent age	Severe Wasting	Moderate Wasting	Not Wasted	Total	Severe Underweight	Moderate Underweight	Not Underweight	Total	Severe Stunting	Moderate Stunting	Not Stunted	Total
Low	5 (6.17)	10 (8.7)	65 (3.65)	80 (4.04)	8 (8.42)	13 (5.88)	59 (3.55)	80 (4.04)	23 (5.74)	17 (5.35)	40 (3.18)	80 (4.04)
Moderate	29 (35.8)	44 (38.26)	530 (29.74)	603 (30.49)	31 (32.63)	97 (43.89)	475 (28.58)	603 (30.49)	139 (34.66)	105 (33.02)	359 (28.51)	603 (30.49)
High	47 (58.02)	61 (53.04)	1187 (66.61)	1295 (65.47)	56 (58.95)	111 (50.23)	1128 (67.87)	1295 (65.47)	239 (59.6)	196 (61.64)	860 (68.31)	1295 (65.47)
Total	81 (100)	115 (100)	1782 (100)	1978 (100)	95 (100)	221 (100)	1662 (100)	1978 (100)	401 (100)	318 (100)	1259 (100)	1978 (100)
Chi-square	14.86*** (0.005)				32.42*** (0)				15.45** (0.004)			

Table 62 : Bivariate associations between child, nutritional status and mother's BMI

Variables	Weight for Height (WHZ)				Weight for Age (WAZ)				Height for Age Z-score (HAZ)			
Respondent age	Severe Wasting	Moderate Wasting	Not Wasted	Total	Severe Underweight	Moderate Underweight	Not Underweight	Total	Severe Stunting	Moderate Stunting	Not Stunted	Total
Underweight	16 (19.75)	25 (21.74)	126 (7.07)	167 (8.44)	19 (20)	39 (17.65)	109 (6.56)	167 (8.44)	41 (10.22)	39 (12.26)	87 (6.91)	167 (8.44)
Increang but acceptable	32 (39.51)	43 (37.39)	563 (31.59)	638 (32.25)	39 (41.05)	99 (44.8)	500 (30.08)	638 (32.25)	134 (33.42)	118 (37.11)	386 (30.66)	638 (32.25)
Increased risk	19 (23.46)	30 (26.09)	701 (39.34)	750 (37.92)	27 (28.42)	59 (26.7)	664 (39.95)	750 (37.92)	152 (37.91)	93 (29.25)	505 (40.11)	750 (37.92)
High risk	14 (17.28)	17 (14.78)	392 (22)	423 (21.39)	10 (10.53)	24 (10.86)	389 (23.41)	423 (21.39)	74 (18.45)	68 (21.38)	281 (22.32)	423 (21.39)
Total	81 (100)	115 (100)	1782 (100)	1978 (100)	95 (100)	221 (100)	1662 (100)	1978 (100)	401 (100)	318 (100)	1259 (100)	1978 (100)
Chi-square	55.78***(0)				90.95*** (0)				24.02*** (0.001)			

Table 63 Bivariate associations between child, nutritional status and mothers' nutrition knowledge

Variables	Weight for Height (WHZ)				Weight for Age (WAZ)				Height for Age Z-score (HAZ)			
Respondent age	Severe Wasting	Moderate Wasting	Not Wasted	Total	Severe Underweight	Moderate Underweight	Not Underweight	Total	Severe Stunting	Moderate Stunting	Not Stunted	Total
Poor	58 (71.6)	82 (71.3)	1061 (59.54)	1201 (60.72)	72 (75.79)	162 (73.3)	967 (58.18)	1201 (60.72)	256 (63.84)	210 (66.04)	735 (58.38)	1201 (60.72)
Moderate	17 (20.99)	18 (15.65)	335 (18.8)	370 (18.71)	11 (11.58)	36 (16.29)	323 (19.43)	370 (18.71)	69 (17.21)	49 (15.41)	252 (20.02)	370 (18.71)
Good	6 (7.41)	15 (13.04)	386 (21.66)	407 (20.58)	12 (12.63)	23 (10.41)	372 (22.38)	407 (20.58)	76 (18.95)	59 (18.55)	272 (21.6)	407 (20.58)
Total	81 (100)	115 (100)	1782 (100)	1978 (100)	95 (100)	221 (100)	1662 (100)	1978 (100)	401 (100)	318 (100)	1259 (100)	1978 (100)
Chi-square	15.94*** (0.003 ()				31.48*** (0)				8.54** (0.074)			

Table 64 Bivariate associations between child nutritional status and wealth index

Lowest	34 (41.98)	41 (35.65)	338 (18.97)	413 (20.88)	48 (50.53)	86 (38.91)	279 (16.79)	413 (20.88)	113 (28.18)	82 (25.79)	218 (17.32)	413 (20.88)
Second	13 (16.05)	36 (31.3)	331 (18.57)	380 (19.21)	20 (21.05)	56 (25.34)	304 (18.29)	380 (19.21)	85 (21.2)	69 (21.7)	226 (17.95)	380 (19.21)
Middle	12 (14.81)	12 (10.43)	379 (21.27)	403 (20.37)	8 (8.42)	27 (12.22)	368 (22.14)	403 (20.37)	59 (14.71)	52 (16.35)	292 (23.19)	403 (20.37)
Fourth	16 (19.75)	15 (13.04)	432 (24.24)	463 (23.41)	10 (10.53)	32 (14.48)	421 (25.33)	463 (23.41)	86 (21.45)	68 (21.38)	309 (24.54)	463 (23.41)
Highest	6 (7.41)	11 (9.57)	302 (16.95)	319 (16.13)	9 (9.47)	20 (9.05)	290 (17.45)	319 (16.13)	58 (14.46)	47 (14.78)	214 (17)	319 (16.13)
Total	81 (100)	115 (100)	1782 (100)	1978 (100)	95 (100)	221 (100)	1662 (100)	1978 (100)	401 (100)	318 (100)	1259 (100)	1978 (100)
Chi-square	63.36***				137.55***				41.74***			

Table 65 Bivariate associations between empowerment and respondent age

Age	less than 15 years	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to above	Chi-square values	p-value
Dis-emp.	1(0.06)	81(5.12)	439(27.77)	524(33.14)	370(23.4)	140(8.86)	26(1.64)	24.20***	0
Empowered	1(0.25)	12(3.02)	72(18.14)	140(35.26)	122(30.73)	41(10.33)	9(2.27)		
Total	2(0.1)	93(4.7)	511(25.83)	664(33.57)	492(24.87)	181(9.15)	35(1.77)		

Table 66 Bivariate associations between empowerment and respondent education

Education	No institutional Education	Incomplete Primary Education	Complete Primary Education	Incomplete Secondary Education	Complete Secondary or Higher Education	Total	Chi-square values	p-value
Dis-emp.	190(12.02)	68(4.3)	200(12.6)	352(22.26)	771(48.77)	1581(100)	29.47***	0
Empowered	44(11.08)	11(2.77)	37(9.32)	54(13.6)	251(63.22)	397(100)		
Total	234(11.83)	79(3.99)	237(11.9)	406(20.53)	1022(51.6)	1978(100)		

Table 67 Bivariate associations between empowerment and household ownership

Household ownership	Owned	Rented	Total	3.28	0.194
Dis-emp.	621(39.28)	960(60.72)	1581(100)		
Empowered	147(37.03)	250(62.97)	397(100)		
Total	768(38.83)	1210(61.17)	1978(100)		

Table 68 Bivariate associations between empowerment and age of 1st getting married

Age of getting married	less than 15 years	15 to 19	20 to 24	25 to 29	30 to 34	Total	Chi-square values	p-value
Dis-emp.	190(12.0)	904(57.18)	362(22.9)	120(7.5)	5(0.32)	1581(100)	69.60***	0
Empowered	42(10.58)	151(38.04)	135(34.0)	63(15.8)	6(1.51)	397(100)		
Total	232(11.7)	1055(53.3)	497(25.1)	183(9.2)	11(0.5)	1978(100)		

Table 69 Bivariate associations between empowerment and age of 1st baby born

Age of First baby born	< 15 years	15 to 19	20 to 24	25 to 29	30 to 34	35 or higher	Total	Chi-square 67.10*** p-value 0
Dis-emp.	41(2.59)	687(43.45)	581(36.75)	236(14.93)	35(2.21)	1(0.06)	1581(100)	
Empowered	11(2.77)	124(31.23)	122(30.73)	117(29.47)	21(5.29)	2(0.5)	397(100)	
Total	52(2.63)	811(41)	703(35.54)	353(17.85)	56(2.83)	3(0.15)	1978(100)	

Table 70 : Bivariate associations between empowerment and child sex

Sex	Male	Female	Total	Chi-square values	p-value
Dis-emp.	837(52.94)	744(47.06)	1581(100)	0.14	0.707
Empowered	206(51.89)	191(48.11)	397(100)		
Total	1043(52.73)	935(47.27)	1978(100)		

Table 71 Bivariate associations between empowerment and child dietary diversity

Child Dietary Diversity	Low Dietary Diversity	Moderate Dietary Diversity	High Dietary Diversity	Total	Chi-square values	p-value
Dis-emp.	814(51.49)	427(27.01)	340(21.51)	1581(100)	3.35NS	0.187
Empowered	197(49.62)	98(24.69)	102(25.69)	397(100)		
Total	1011(51.11)	525(26.54)	442(22.35)	1978(100)		

Table 72 Bivariate associations between empowerment and women dietary diversity

Women Dietary Diversity	Low Dietary Diversity	Moderate Dietary Diversity	Total	Chi-square values	p-value
Dis-emp.	1226(77.55)	355(22.45)	1581(100)	9.85***	0.002
Empowered	278(70.03)	119(29.97)	397(100)		
Total	1504(76.04)	474(23.96)	1978(100)		

Table 73 Bivariate associations between empowerment and household dietary diversity

Household Dietary Diversity	Low Dietary Diversity	Moderate Dietary Diversity	High Dietary Diversity	Total	Chi-square values	p-value
Dis-emp.	71(4.49)	493(31.18)	1017(64.33)	1581(100)	6.71**	0.035
Empowered	9(2.27)	110(27.71)	278(70.03)	397(100)		
Total	80(4.04)	603(30.49)	1295(65.47)	1978(100)		

Table 74 Bivariate associations between empowerment and Mother's BMI

Mother's BMI	Underweight	Increasing but acceptable	Increased risk	High risk	Total	Chi-square values	p-value
Dis-emp.	137(8.67)	542(34.28)	588(37.19)	314(19.86)	1581(100)	20.15***	0
Empowered	30(7.56)	96(24.18)	162(40.81)	109(27.46)	397(100)		
Total	167(8.44)	638(32.25)	750(37.92)	423(21.39)	1978(100)		

Table 75 Bivariate associations between empowerment and mother's nutrition knowledge

Mothers Nutrition Knowledge	Poor	Moderate	Good	Total	Chi-square values	p-value
Dis-emp.	1046(66.16)	275(17.39)	260(16.45)	1581(100)	111.00***	0
Empowered	155(39.04)	95(23.93)	147(37.03)	397(100)		
Total	1201(60.72)	370(18.71)	407(20.58)	1978(100)		

Table 76 : Bivariate associations between empowerment and wealth index

Wealth Index	Lowest	Second	Middle	Fourth	Highest	Total	Chi-square	p-value
Dis-emp.	357(22.5)	333(21.0)	331(20.9)	340(21.5)	220(13.9)	1581(100)	62.26***	0
Empowered	56(14.11)	47(11.84)	72(18.14)	123(30.98)	99(24.94)	397(100)		

Total	413(20.8)	380(19.2)	403(20.3)	463(23.4)	319(16.1)	1978(100)		

Table 77 : Bivariate associations between empowerment and child nutritional status

Women Empowerment	Height for Age				Weight for Age				Weight for Height			
	Severe Stunting	Moderate Stunting	Not Stunted	Total	Severe Underweight	Moderate Underweight	Not Underweight	Total	Severe Wasting	Moderate Wasting	Not Wasted	Total
Disempowered	305	245	1031	1581	78	189	1314	1581	66	99	1416	1581
	76.06	77.04	81.89	79.93	82.11	85.52	79.06	79.93	81.48	86.09	79.46	79.93
Empowered	96	73	228	397	17	32	348	397	15	16	366	397
	23.94	22.96	18.11	20.07	17.89	14.48	20.94	20.07	18.52	13.91	20.54	20.07
Total	401	318	1259	1978	95	221	1662	1978	81	115	1782	1978
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Chi^2	8.411**				5.37**				3.08^{NS}			
p-value	0.015				0.086				0.214			

Table 78 : Bivariate associations between child, maternal and household dietary diversity with household and respondent age

Variables	CDD				WDD			HDD			
Respondents Age	Low Dietary Diversity	Moderate Diversity	High Dietary Diversity	Total	Low Dietary Diversity	Moderate Diversity	Total	Low Dietary Diversity	Moderate Diversity	High Dietary Diversity	Total
< 15 years	1(0.1)	0(0)	1(0.23)	2(0.1)	1(0.07)	1(0.21)	2(0.1)	0(0)	0(0)	2(0.15)	2(0.1)
15 to 19	70(6.92)	14(2.67)	9(2.04)	93(4.7)	79(5.25)	14(2.95)	93(4.7)	6(7.5)	43(7.13)	44(3.4)	93(4.7)
20 to 24	295(29.18)	140(26.67)	76(17.19)	511(25.83)	418(27.79)	93(19.62)	511(25.83)	25(31.25)	172(28.52)	314(24.25)	511(25.83)
25 to 29	339(33.53)	170(32.38)	155(35.07)	664(33.57)	494(32.85)	170(35.86)	664(33.57)	27(33.75)	195(32.34)	442(34.13)	664(33.57)
30 to 34	218(21.56)	134(25.52)	140(31.67)	492(24.87)	359(23.87)	133(28.06)	492(24.87)	20(25)	124(20.56)	348(26.87)	492(24.87)
35 to 39	72(7.12)	54(10.29)	55(12.44)	181(9.15)	124(8.24)	57(12.03)	181(9.15)	2(2.5)	52(8.62)	127(9.81)	181(9.15)
40 to above	16(1.58)	13(2.48)	6(1.36)	35(1.77)	29(1.93)	6(1.27)	35(1.77)	0(0)	17(2.82)	18(1.39)	35(1.77)
Total	1011(100)	525(100)	442(100)	1978(100)	1504(100)	474(100)	1978(100)	80(100)	603(100)	1295(100)	1978(100)
P value	0				0			0			

Table 79 : Bivariate associations between child, maternal and household dietary diversity with household and education

Variables	CDD				WDD			HDD			
No Education	178(17.61)	44(8.38)	12(2.71)	234(11.83)	213(14.16)	21(4.43)	234(11.83)	30(37.5)	117(19.4)	87(6.72)	234(11.83)
Incomplete Primary	55(5.44)	18(3.43)	6(1.36)	79(3.99)	66(4.39)	13(2.74)	79(3.99)	6(7.5)	31(5.14)	42(3.24)	79(3.99)
Complete Primary	144(14.24)	59(11.24)	34(7.69)	237(11.98)	200(13.3)	37(7.81)	237(11.98)	16(20)	102(16.92)	119(9.19)	237(11.98)
Incomplete Seconda	216(21.36)	134(25.52)	56(12.67)	406(20.53)	328(21.81)	78(16.46)	406(20.53)	16(20)	150(24.88)	240(18.53)	406(20.53)
Complete Secondary	418(41.35)	270(51.43)	334(75.57)	1022(51.67)	697(46.34)	325(68.57)	1022(51.67)	12(15)	203(33.67)	807(62.32)	1022(51.67)
Total	1011(100)	525(100)	442(100)	1978(100)	1504(100)	474(100)	1978(100)	80(100)	603(100)	1295(100)	1978(100)
P-value	0				0			0			

Table 80 : Bivariate associations between child, maternal and household dietary diversity with living area

Variables	CDD				WDD			HDD			
Slum	220(21.76)	64(12.19)	21(4.75)	305(15.42)	275(18.28)	30(6.33)	305(15.42)	28(35)	147(24.38)	130(10.04)	305(15.42)
Middle Class	437(43.22)	269(51.24)	267(60.41)	973(49.19)	667(44.35)	306(64.56)	973(49.19)	23(28.75)	211(34.99)	739(57.07)	973(49.19)
Upper Class	58(5.74)	63(12)	66(14.93)	187(9.45)	111(7.38)	76(16.03)	187(9.45)	0(0)	21(3.48)	166(12.82)	187(9.45)
Any other	296(29.28)	129(24.57)	88(19.91)	513(25.94)	451(29.99)	62(13.08)	513(25.94)	29(36.25)	224(37.15)	260(20.08)	513(25.94)
Total	1011(100)	525(100)	442(100)	1978(100)	1504(100)	474(100)	1978(100)	80(100)	603(100)	1295(100)	1978(100)
P-value	0				0			0			

Table 81 : Bivariate associations between child, maternal and household dietary diversity with house ownership

Variables	CDD				WDD			HDD			
OWNED	355(35.11)	200(38.1)	213(48.19)	768(38.83)	576(38.3)	192(40.51)	768(38.83)	24(30)	214(35.49)	530(40.93)	768(38.83)
RENTED	656(64.89)	325(61.9)	229(51.81)	1210(61.17)	928(61.7)	282(59.49)	1210(61.17)	56(70)	389(64.51)	765(59.07)	1210(61.17)
Total	1011(100)	525(100)	442(100)	1978(100)	1504(100)	474(100)	1978(100)	80(100)	603(100)	1295(100)	1978(100)
p value	0				0.39			0.02			

Table 82 Bivariate associations between child, maternal and household dietary diversity with age of getting married

Variables	CDD				WDD			HDD			
< 15 yrs	154(15.23)	53(10.1)	25(5.66)	232(11.73)	218(14.49)	14(2.95)	232(11.73)	23(28.75)	104(17.25)	105(8.11)	232(11.73)
15 to 19	576(56.97)	305(58.1)	174(39.37)	1055(53.34)	819(54.45)	236(49.79)	1055(53.34)	46(57.5)	358(59.37)	651(50.27)	1055(53.34)
20 to 24	213(21.07)	114(21.71)	170(38.46)	497(25.13)	337(22.41)	160(33.76)	497(25.13)	8(10)	111(18.41)	378(29.19)	497(25.13)
25 to 29	65(6.43)	52(9.9)	66(14.93)	183(9.25)	123(8.18)	60(12.66)	183(9.25)	2(2.5)	28(4.64)	153(11.81)	183(9.25)
30 to 34	3(0.3)	1(0.19)	7(1.58)	11(0.56)	7(0.47)	4(0.84)	11(0.56)	1(1.25)	2(0.33)	8(0.62)	11(0.56)
Total	1011(100)	525(100)	442(100)	1978(100)	1504(100)	474(100)	1978(100)	80(100)	603(100)	1295(100)	1978(100)
P value	0				0			0			

Table 83 Bivariate associations between child, maternal and household dietary diversity with age of first baby born

Variables	CDD				WDD			HDD			
< 15 years	37(3.66)	14(2.67)	1(0.23)	52(2.63)	50(3.32)	2(0.42)	52(2.63)	7(8.75)	24(3.98)	21(1.62)	52(2.63)
15 to 19	480(47.48)	216(41.14)	115(26.02)	811(41)	687(45.68)	124(26.16)	811(41)	49(61.25)	322(53.4)	440(33.98)	811(41)
20 to 24	339(33.53)	196(37.33)	168(38.01)	703(35.54)	501(33.31)	202(42.62)	703(35.54)	17(21.25)	183(30.35)	503(38.84)	703(35.54)
25 to 29	130(12.86)	89(16.95)	134(30.32)	353(17.85)	226(15.03)	127(26.79)	353(17.85)	5(6.25)	62(10.28)	286(22.08)	353(17.85)
30 to 34	25(2.47)	9(1.71)	22(4.98)	56(2.83)	39(2.59)	17(3.59)	56(2.83)	2(2.5)	12(1.99)	42(3.24)	56(2.83)
=>35	0(0)	1(0.19)	2(0.45)	3(0.15)	1(0.07)	2(0.42)	3(0.15)	0(0)	0(0)	3(0.23)	3(0.15)
Total	1011(100)	525(100)	442(100)	1978(100)	1504(100)	474(100)	1978(100)	80(100)	603(100)	1295(100)	1978(100)
P value	0				0			0			

Table 84 Bivariate associations between child, maternal and household dietary diversity with child sex

Variables	CDD				WDD			HDD			
Male	523(51.73)	288(54.86)	232(52.49)	1043(52.73)	788(52.39)	255(53.8)	1043(52.73)	33(41.25)	324(53.73)	686(52.97)	1043(52.73)
Female	488(48.27)	237(45.14)	210(47.51)	935(47.27)	716(47.61)	219(46.2)	935(47.27)	47(58.75)	279(46.27)	609(47.03)	935(47.27)
Total	1011(100)	525(100)	442(100)	1978(100)	1504(100)	474(100)	1978(100)	80(100)	603(100)	1295(100)	1978(100)
P value	0.505				0.593			0.105			

Table 85 Bivariate associations between child, maternal and household dietary diversity with child dietary diversity

CDD	WDD				HDD				
LDD	1011(100)	0(0)	831(55.25)	180(37.97)	1011(51.11)	80(100)	445(73.8)	486(37.53)	1011(51.11)
MDD	0(0)	525(100)	414(27.53)	111(23.42)	525(26.54)	0(0)	142(23.55)	383(29.58)	525(26.54)
HDD	0(0)	0(0)	259(17.22)	183(38.61)	442(22.35)	0(0)	16(2.65)	426(32.9)	442(22.35)
Total	1011(100)	525(100)	1504(100)	474(100)	1978(100)	80(100)	603(100)	1295(100)	1978(100)
P value	0				0				

Table 86 Bivariate associations between child, maternal and household dietary diversity with mother's BMI

Mother's BMI	CDD				WDD			HDD			
Underweight	114(11.28)	35(6.67)	18(4.07)	167(8.44)	146(9.71)	21(4.43)	167(8.44)	17(21.25)	74(12.27)	76(5.87)	167(8.44)
Increasing but acceptable	360(35.61)	167(31.81)	111(25.11)	638(32.25)	509(33.84)	129(27.22)	638(32.25)	26(32.5)	210(34.83)	402(31.04)	638(32.25)
Increased risk	339(33.53)	206(39.24)	205(46.38)	750(37.92)	527(35.04)	223(47.05)	750(37.92)	26(32.5)	192(31.84)	532(41.08)	750(37.92)
High risk	198(19.58)	117(22.29)	108(24.43)	423(21.39)	322(21.41)	101(21.31)	423(21.39)	11(13.75)	127(21.06)	285(22.01)	423(21.39)
Total	1011(100)	525(100)	442(100)	1978(100)	1504(100)	474(100)	1978(100)	80(100)	603(100)	1295(100)	1978(100)
P value	0				0			0			

Table 87 Bivariate associations between child, maternal and household dietary diversity with mother's nutritional knowledge

nutritional knowledge	CDD				WDD			HDD			
Poor	680(67.26)	321(61.14)	200(45.25)	1201(60.72)	1011(67.22)	190(40.08)	1201(60.72)	73(91.25)	456(75.62)	672(51.89)	1201(60.72)
Moderate	173(17.11)	104(19.81)	93(21.04)	370(18.71)	269(17.89)	101(21.31)	370(18.71)	5(6.25)	97(16.09)	268(20.69)	370(18.71)
Good	158(15.63)	100(19.05)	149(33.71)	407(20.58)	224(14.89)	183(38.61)	407(20.58)	2(2.5)	50(8.29)	355(27.41)	407(20.58)
Total	1011(100)	525(100)	442(100)	1978(100)	1504(100)	474(100)	1978(100)	80(100)	603(100)	1295(100)	1978(100)
P value	0				0			0			

Table 88 Bivariate associations between child, maternal and household dietary diversity with socio-economic status

Socio-economic status	CDD				WDD			HDD			
Lowest	310(30.66)	78(14.86)	25(5.66)	413(20.88)	382(25.4)	31(6.54)	413(20.88)	49(61.25)	204(33.83)	160(12.36)	413(20.88)
Second	222(21.96)	110(20.95)	48(10.86)	380(19.21)	331(22.01)	49(10.34)	380(19.21)	17(21.25)	163(27.03)	200(15.44)	380(19.21)
Middle	187(18.5)	126(24)	90(20.36)	403(20.37)	281(18.68)	122(25.74)	403(20.37)	8(10)	90(14.93)	305(23.55)	403(20.37)
Fourth	181(17.9)	129(24.57)	153(34.62)	463(23.41)	304(20.21)	159(33.54)	463(23.41)	2(2.5)	90(14.93)	371(28.65)	463(23.41)
Highest	111(10.98)	82(15.62)	126(28.51)	319(16.13)	206(13.7)	113(23.84)	319(16.13)	4(5)	56(9.29)	259(20)	319(16.13)
Total	1011(100)	525(100)	442(100)	1978(100)	1504(100)	474(100)	1978(100)	80(100)	603(100)	1295(100)	1978(100)
P value	0				0			0			

Table 89 Bivariate associations between child, maternal and household dietary diversity with stunting

Stunting	CDD				WDD			HDD			
Severe Stunting	250(24.73)	81(15.43)	70(15.84)	401(20.27)	312(20.74)	89(18.78)	401(20.27)	23(28.75)	139(23.05)	239(18.46)	401(20.27)
Mod Stunting	163(16.12)	80(15.24)	75(16.97)	318(16.08)	258(17.15)	60(12.66)	318(16.08)	17(21.25)	105(17.41)	196(15.14)	318(16.08)
Not Stunted	598(59.15)	364(69.33)	297(67.19)	1259(63.65)	934(62.1)	325(68.57)	1259(63.65)	40(50)	359(59.54)	860(66.41)	1259(63.65)
Total	1011(100)	525(100)	442(100)	1978(100)	1504(100)	474(100)	1978(100)	80(100)	603(100)	1295(100)	1978(100)
P value	0				0.023			0.004			

Table 90 Bivariate associations between child, maternal and household dietary diversity with underweight

Underweight	CDD				WDD			HDD			
Severe	63(6.23)	15(2.86)	17(3.85)	95(4.8)	80(5.32)	15(3.16)	95(4.8)	8(10)	31(5.14)	56(4.32)	95(4.8)
Moderate	132(13.06)	54(10.29)	35(7.92)	221(11.17)	194(12.9)	27(5.7)	221(11.17)	13(16.25)	97(16.09)	111(8.57)	221(11.17)
Not Underweight	816(80.71)	456(86.86)	390(88.24)	1662(84.02)	1230(81.78)	432(91.14)	1662(84.02)	59(73.75)	475(78.77)	1128(87.1)	1662(84.02)
Total	1011(100)	525(100)	442(100)	1978(100)	1504(100)	474(100)	1978(100)	80(100)	603(100)	1295(100)	1978(100)
P value	0.001				0			0			

Table 91 Bivariate associations between child, maternal and household dietary diversity with wasting

Wasting	CDD				WDD			HDD			
Severe Wasting	54(5.34)	16(3.05)	11(2.49)	81(4.1)	71(4.72)	10(2.11)	81(4.1)	5(6.25)	29(4.81)	47(3.63)	81(4.1)
Moderate	71(7.02)	25(4.76)	19(4.3)	115(5.81)	98(6.52)	17(3.59)	115(5.81)	10(12.5)	44(7.3)	61(4.71)	115(5.81)
Not Wasted	886(87.64)	484(92.19)	412(93.21)	1782(90.09)	1335(88.76)	447(94.3)	1782(90.09)	65(81.25)	530(87.89)	1187(91.66)	1782(90.09)
Total	1011(100)	525(100)	442(100)	1978(100)	1504(100)	474(100)	1978(100)	80(100)	603(100)	1295(100)	1978(100)
P value	0.005				0.002			0.005			

Table 92 Bivariate associations between wealth index and family religion

Religion	Lowest	Second	Middle	Fourth	Highest	Total
No religion	1(0.24)	1(0.26)	0(0)	2(0.43)	0(0)	4(0.2)
Muslim	378(91.53)	342(90)	378(93.8)	418(90.28)	290(90.91)	1806(91.3)
Hindu	33(7.99)	34(8.95)	22(5.46)	40(8.64)	28(8.78)	157(7.94)
Christian	1(0.24)	1(0.26)	0(0)	1(0.22)	1(0.31)	4(0.2)
Buddhist	0(0)	1(0.26)	3(0.74)	2(0.43)	0(0)	6(0.3)
Others	0(0)	1(0.26)	0(0)	0(0)	0(0)	1(0.05)
Total	413(100)	380(100)	403(100)	463(100)	319(100)	1978(100)
P-value	0.603					

Table 93 Bivariate associations between wealth index and respondent's age

respondent's age	Lowest	Second	Middle	Fourth	Highest	Total
less than 15 years	0(0)	0(0)	0(0)	1(0.22)	1(0.31)	2(0.1)
15 to 19	52(12.59)	16(4.21)	13(3.23)	9(1.94)	3(0.94)	93(4.7)
20 to 24	146(35.35)	135(35.53)	97(24.07)	80(17.28)	53(16.61)	511(25.83)
25 to 29	123(29.78)	109(28.68)	135(33.5)	172(37.15)	125(39.18)	664(33.57)
30 to 34	62(15.01)	77(20.26)	123(30.52)	132(28.51)	98(30.72)	492(24.87)
35 to 39	23(5.57)	36(9.47)	30(7.44)	61(13.17)	31(9.72)	181(9.15)
40 to above	7(1.69)	7(1.84)	5(1.24)	8(1.73)	8(2.51)	35(1.77)
Total	413(100)	380(100)	403(100)	463(100)	319(100)	1978(100)
P-value	0					

Table 94 Bivariate associations between wealth index and respondent education

respondent's education	Lowest	Second	Middle	Fourth	Highest	Total
No Education	176(42.62)	42(11.05)	7(1.74)	6(1.3)	3(0.94)	234(11.83)
Incomplete Primary	43(10.41)	19(5)	11(2.73)	3(0.65)	3(0.94)	79(3.99)
Complete Primary	87(21.07)	84(22.11)	49(12.16)	10(2.16)	7(2.19)	237(11.98)
Incomplete Secondary	76(18.4)	123(32.37)	116(28.78)	63(13.61)	28(8.78)	406(20.53)
Complete Sec or Hig	31(7.51)	112(29.47)	220(54.59)	381(82.29)	278(87.15)	1022(51.67)
Total	413(100)	380(100)	403(100)	463(100)	319(100)	1978(100)
P-value	0					

Table 95 Bivariate associations between wealth index and mother's BMI

mother's BMI	Lowest	Second	Middle	Fourth	Highest	Total
Underweight	95(23)	43(11.32)	13(3.23)	12(2.59)	4(1.25)	167(8.44)
Increasing but acceptable risk	188(45.52)	130(34.21)	124(30.77)	111(23.97)	85(26.65)	638(32.25)
Increased risk	88(21.31)	131(34.47)	179(44.42)	204(44.06)	148(46.39)	750(37.92)
High risk	42(10.17)	76(20)	87(21.59)	136(29.37)	82(25.71)	423(21.39)
Total	413(100)	380(100)	403(100)	463(100)	319(100)	1978(100)

Table 96 Bivariate associations between wealth index and age of 1st marriage

age of 1st marriage	Lowest	Second	Middle	Fourth	Highest	Total
Lowest	306(74.09)	177(46.58)	99(24.57)	53(11.45)	27(8.46)	662(33.47)
Medium	85(20.58)	138(36.32)	149(36.97)	181(39.09)	117(36.68)	670(33.87)
Highest	22(5.33)	65(17.11)	155(38.46)	229(49.46)	175(54.86)	646(32.66)
Total	413(100)	380(100)	403(100)	463(100)	319(100)	1978(100)
P-value	0					

Table 97 Bivariate associations between wealth index and age of 1st marriage

age of 1st marriage	Lowest	Second	Middle	Fourth	Highest	Total
less than 15 years	110(26.63)	67(17.63)	28(6.95)	16(3.46)	11(3.45)	232(11.73)
15 to 19	255(61.74)	249(65.53)	240(59.55)	195(42.12)	116(36.36)	1055(53.34)
20 to 24	42(10.17)	56(14.74)	103(25.56)	161(34.77)	135(42.32)	497(25.13)
25 to 29	6(1.45)	7(1.84)	30(7.44)	85(18.36)	55(17.24)	183(9.25)
30 to 34	0(0)	1(0.26)	2(0.5)	6(1.3)	2(0.63)	11(0.56)
Total	413(100)	380(100)	403(100)	463(100)	319(100)	1978(100)
P-value	0					

Table 98 Bivariate associations between wealth index and age at first baby born

Age at first baby was born						
Variables	Lowest	Second	Middle	Fourth	Highest	Total
less than 15 years	32(7.75)	14(3.68)	3(0.74)	2(0.43)	1(0.31)	52(2.63)
15 to 19	276(66.83)	215(56.58)	159(39.45)	107(23.11)	54(16.93)	811(41)
20 to 24	84(20.34)	124(32.63)	176(43.67)	188(40.6)	131(41.07)	703(35.54)
25 to 29	17(4.12)	23(6.05)	54(13.4)	145(31.32)	114(35.74)	353(17.85)
30 to 34	4(0.97)	4(1.05)	10(2.48)	20(4.32)	18(5.64)	56(2.83)
35 or higher	0(0)	0(0)	1(0.25)	1(0.22)	1(0.31)	3(0.15)
Total	413(100)	380(100)	403(100)	463(100)	319(100)	1978(100)
P-value	0					

Table 99 Bivariate associations between wealth index and mother's reproductive work

mother's reproductive work	Lowest	Second	Middle	Fourth	Highest	Total
0	5(1.21)	0(0)	0(0)	0(0)	0(0)	5(0.25)
1 hour	5(1.21)	1(0.26)	0(0)	0(0)	1(0.31)	7(0.35)
1.5 hours	1(0.24)	0(0)	0(0)	0(0)	0(0)	1(0.05)
2 hours	1(0.24)	0(0)	0(0)	1(0.22)	0(0)	2(0.1)
2.5 hours	1(0.24)	9(2.37)	15(3.72)	0(0)	0(0)	25(1.26)
Total	413(100)	380(100)	403(100)	463(100)	319(100)	1978(100)

Table 100 Bivariate associations between wealth index and mother's working hours

mother's working hours	Lowest	Second	Middle	Fourth	Highest	Total
0	159(38.5)	227(59.74)	241(59.8)	296(63.93)	189(59.25)	1112(56.22)
1 to 4 hours	18(4.36)	30(7.89)	24(5.96)	33(7.13)	17(5.33)	122(6.17)
4.1 to 8 hours	125(30.27)	81(21.32)	75(18.61)	73(15.77)	70(21.94)	424(21.44)
8.1 to 12 hours	90(21.79)	37(9.74)	44(10.92)	45(9.72)	32(10.03)	248(12.54)
More than 12 hours	21(5.08)	5(1.32)	19(4.71)	16(3.46)	11(3.45)	72(3.64)
Total	413(100)	380(100)	403(100)	463(100)	319(100)	1978(100)

Table 101 Bivariate associations between wealth index and women dietary diversity

Women dietary diversity	Lowest	Second	Middle	Fourth	Highest	Total
Low Dietary Diversity	382(92.49)	331(87.11)	281(69.73)	304(65.66)	206(64.58)	1504(76.04)
Moderate Dietary Diversity	31(7.51)	49(12.89)	122(30.27)	159(34.34)	113(35.42)	474(23.96)
Total	413(100)	380(100)	403(100)	463(100)	319(100)	1978(100)
P-value	0					

Table 102 Bivariate associations between wealth index and child dietary diversity

Child Dietary Diversity						
Variables	Lowest	Second	Middle	Fourth	Highest	Total
LDD	310(75.06)	222(58.42)	187(46.4)	181(39.09)	111(34.8)	1011(51.11)
MDD	78(18.89)	110(28.95)	126(31.27)	129(27.86)	82(25.71)	525(26.54)
HDD	25(6.05)	48(12.63)	90(22.33)	153(33.05)	126(39.5)	442(22.35)
Total	413(100)	380(100)	403(100)	463(100)	319(100)	1978(100)
P-value	0					

Table 103 Bivariate associations between wealth index and ANC care status

ANC clinical care status						
Variables	Lowest	Second	Middle	Fourth	Highest	Total
Lowest	236(57.14)	149(39.21)	148(36.72)	87(18.79)	42(13.17)	662(33.47)
Medium	90(21.79)	110(28.95)	130(32.26)	233(50.32)	199(62.38)	762(38.52)
Highest	87(21.07)	121(31.84)	125(31.02)	143(30.89)	78(24.45)	554(28.01)
Total	413(100)	380(100)	403(100)	463(100)	319(100)	1978(100)
p-value	0					

Table 104 Bivariate associations between wealth index and ANC information status

ANC information status						
Variables	Lowest	Second	Middle	Fourth	Highest	Total
Lowest	406(98.31)	363(95.53)	347(86.1)	440(95.03)	309(96.87)	1865(94.29)
Highest	7(1.69)	17(4.47)	56(13.9)	23(4.97)	10(3.13)	113(5.71)
Total	413(100)	380(100)	403(100)	463(100)	319(100)	1978(100)