



# State of Food Security and Nutrition in Bangladesh 2015



National Nutrition Services (NNS)  
Institute of Public Health Nutrition (IPHN)  
Directorate General of Health Services  
Mohakhali, Dhaka



স্বাস্থ্য ও পরিবার কল্যাণ মন্ত্রণালয়

Implemented by:  
James P. Grant School of Public Health (JPGSPH)  
BRAC University





"National Nutrition Services (NNS)" is one of the Operational Plan of DGHS to strengthen the nutrition services in Bangladesh. The general objective of NNS is to reduce the prevalence of malnutrition among the people of Bangladesh with special emphasis on the children, women, adolescents and under privileged section of the society. NNS focuses to develop and strengthen coordination mechanisms with key relevant sectors to ensure a multi-sectoral collaboration. NNS is working to 'mainstream nutrition' into health and family planning services, with the aim of improving the nutrition situation of the country. Strategies for ensuring nutrition also are being adopted in other sectoral policies outside the health sector. Therefore the National Nutrition Policy reflects the commitment of the State as a whole to improve the nutritional status of the population.

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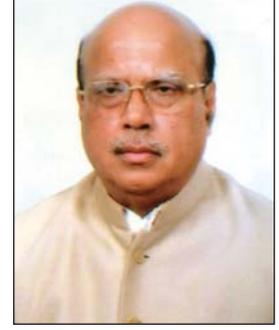
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# Foreword





The State of Food Security and Nutrition in Bangladesh-National Nutritional Service (FSNS-NNS) project by its activity has become a vital source of information in the area of food and nutrition. This venture of James P Grant School of Public Health, BRAC University funded by National Nutritional Service (NNS) has helped to chart the country's health and nutrition situation, and has yielded important findings on the causes of malnutrition. The information derived from this project is disseminating through the report titled 'State of Food Security and Nutrition in Bangladesh 2015' published by this project. The report has highlighted the latest status of food security; water, sanitation and hygiene; nutrition in women and adolescent girls; maternal care and nutrition; child care and feeding; nutritional status of children; food security and nutrition in Dhaka slum of Bangladesh. The Government of the People's Republic of Bangladesh including different ministries e.g. Ministry of Planning, Ministry of Health and Family Welfare, Ministry of Food are allied with different concern of FSNS-NNS surveillance system. The information achieved through this surveillance will enable to create more effective policies and programmes through partnership between private institutions and the government. We also hope that, through utilization of new technology the nutrition surveillance will be institutionalized in NNS to generate more focused data that will help the government to undertake appropriate policy interventions on food security and nutrition. We welcome the release of the report of the surveillance findings, and we look forward to this new knowledge being used both by the government and civil society for their specific purposes.

Joy Bangla Joy Bangabandhu  
Long Live Bangladesh

**Mohammed Nasim, MP**  
Honorable Minister  
Ministry of Health and Family Welfare  
Government of the People's Republic of Bangladesh



The Ministry of Health and Family Welfare seeks to create conditions whereby the people of Bangladesh have the opportunity to reach and maintain the highest attainable level of health. Accomplishing this goal requires timely and reliable information of health and nutrition status of the population. FSNS-NNS, paired with other data sources supported by the government of Bangladesh fills this need. The results of this surveillance system will aid the ministry to improve the health of the whole nation. As part of the approved Health Population and Nutrition Sector Development Programme (HPNSDP), the Ministry of Health and Family Welfare looks forward to taking an active role in the future surveillance in this country through the National Nutrition Service.

Joy Bangla, Joy Bangabandhu  
Long Live Bangladesh

*Zahid Maleque*

**Zahid Maleque, MP**

Honorable State Minister

Ministry of Health and Family Welfare

Government of the People's Republic of Bangladesh



I feel delighted to know that the report "Food Security and Nutritional Status in Bangladesh 2015" is going to be published under the Operational Plan of National Nutrition Services (NNS) implemented by Institute of Public Health Nutrition (IPHN) with the technical support from James P Grant School of Public Health, BRAC University. Impact of nutrition of individual, community and national level is well recognized by all. Food security and nutrition are interwoven and of top priority for every country. More specifically, nutrition has long been one of the main concerns in a developing country like ours. Health and nutrition policy experts are striving how best we can ensure optimum health and nutrition of the population. Though we have commendable achievement in health and nutrition indicators, still we have to go a far way to achieve SDG targets. There is a demand for evidence based results related to nutrition and food security at different level in Bangladesh. This reports an endeavor of the Government to address that demand. I hope that this report will be useful tool for the policy makers, programme officials and researchers in their respective domain to address the malnutrition challenges of the country.

**Syed Monjurul Islam**

Secretary

Ministry of Health and Family Welfare

Government of the People's Republic of Bangladesh



I am delighted that Food Security Nutrition Surveillance - National Nutrition Service (FSNS-NNS) is publishing their report on food security and nutrition situation of Bangladesh titled 'Food security and nutritional status in Bangladesh 2015.' FSNS is the only surveillance system in Bangladesh that provides credible, routine and timely evidence to inform advocacy efforts, policy making and planning, early warning, and monitoring and evaluation. An effort by James P. Grant School of Public Health, BRAC University funded by National Nutritional Service will provide platform for policy makers from diverse sectors. I hope that FSNS-NNS continues its good work in tracking trends in food insecurity and nutrition in Bangladesh.

**Prof. Dr. Deen Mohd. Noorul Huq**  
Director General  
Directorate General of Health Services  
Ministry of Health and Family Welfare  
Government of the People's Republic of Bangladesh



The Food Security Nutritional Surveillance - National Nutrition Services (FSNS-NNS) provides timely and accurate monitoring of the nutrition situation in Bangladesh. Building on 23 years of the Nutrition Surveillance Programme, FSNS-NNS offers data and information about the level of food insecurity and malnutrition in Bangladesh for policy makers, development partners, and implementing agencies. It is the only source of seasonal data on food security and nutrition in Bangladesh. The project aimed to measure the nutritional status and health care and its changes over time, especially for children, women, and geographically vulnerable groups, through nationally representative sample surveys.

It is a great pleasure and pride that the James P Grant School of Public Health at BRAC University, in partnership with the National Nutrition Services, is publishing the report 'State of Food Security and Nutrition in Bangladesh 2015'. Significantly, Bangladesh, in 2015, has maintained an impressive track record for continued progress in nutrition and food security. The country is moving towards a new comprehensive development framework by adopting more nutrition friendly approaches through a number of nutrition sensitive and nutrition specific targets and programmes, to be implemented by both state and non-state sectors. The James P Grant School of Public Health has been working with the Government of Bangladesh in this fight against hunger and malnutrition. I hope that this report would be of value to policy makers and other stakeholders.

**Ahmed Mushtaque Raza Chowdhury, PhD**

Adviser to James P Grant School of Public Health, BRAC University  
and Vice-Chair, BRAC



# Executive Summary



Bangladesh has made significant progress in achieving the Millennium Development Goals (MDG) and eventually moving towards a new comprehensive development frame work by more nutrition-friendly connotation through several nutrition sensitive and nutrition specific targets. The major challenges to improve the nutrition situation of Bangladesh deserve intense monitoring to track progress for critical planning and effective investment in appropriate interventions by integrating both direct and indirect means. The Food Security Nutritional Surveillance-National Nutrition Services (FSNS-NNS), as a continuation of FSNSP, aimed to measure nationally representative nutritional status and health care specifically among children and women to reduce prevalence of malnutrition among them. In 2015, Bangladesh has maintained an impressive track record for continued progress in nutrition and food security although some disappointing results have been seen among some key indicators of food consumption and also showed a static feature in the trend of child nutrition.

FSNS-NNS surveyed 5,856 households in 244 village/mohallas from 146 rural communities/villages while 98 of these were in urban areas. In randomly selected households, 4,623 women aged 19-49 years, 1,009 adolescent girls aged 10-18 years, and 291 pregnant women were interviewed. Additionally, 2,710 children were measured and 2,304 caregivers were interviewed about care and feeding practices for the youngest child in the household.

### ***Food security***

During 2015, these verity of food insecurity became almost rare (4%) in Bangladesh. The proportion of households reported to eat only rice and running out of food stock decreased substantially (11 and 13% in 2015) than the previous years (45 and 51% in 2011). However, to minimize the in-house food insecurity, sacrifices are mostly made by women, even the adolescent girls of the households to cope up with the situation. In addition, consumption of sub-optimal food increased (26%) from the previous year (23%) which is found to be highest in Sylhet division (37%) followed by Rangpur (36%).

### ***Water, sanitation and hygiene***

In Bangladesh, almost all (98%) of the households have access to safe drinking water although less than half (41%) have the facility of an improved toilet. Khulna and Rangpur have highest (46%) rates of access to an improved toilet facility while Barisal has the lowest (33%) among all other divisions. Therefore, extended effort is needed to foster appropriate hygiene practice and hand washing behaviour. Low proportion (14%) of mothers/caregivers of under-five children in Bangladesh showed compliance to appropriate hand washing, although comprising of extremely low performance during key moments such as before feeding children (2%), before and during meal preparation (4%), and after cleaning child (8%). Caregivers from rural areas, less affluent households, and households with food insecurity and less educated mothers have comparatively low level of appropriate hand washing behaviour.

### ***Women nutrition and care***

One in every three women and adolescent girls of Bangladesh aged 10-49 years consumed diets with inadequate diversity which was found to be highest in Sylhet and Rangpur divisions (72%) and

in rural areas of the country. Sylhet and Dhaka divisions have the highest proportion (32 and 15%) of stunted adolescents and women with almost same degree across rural and urban areas. Women's appropriate height attainment is relatively low in poorer households and among women who are habituated to consume less diverse diet. Nutritional status (underweight and overweight) among adult women is associated with household's wealth, dietary diversity in women's diet, and food security status where lower wealth quintiles have higher proportion of underweight and less overweight while highest quintile group shows the opposite scenario. In 2015, the proportion of women reported to go for any antenatal checkup decreased (80%) in 2015 from 2014 (85%), where a sample reduction (29%) has been seen among adequate (four or more) ANC visits from the last two years. Across divisions, Chittagong stood highest (96%) and lowest (11%) for the rates of any ANC and adequate ANC. Iron and folic acid (IFA) consumption during pregnancy remain static (34%) in 2015 compared to the previous year of the surveillance system among whom the proportion of taking at least 100 IFA tablet is very minimal (18%). Khulna (22%) and Barisal (30%) have the lowest coverage for IFA consumption among pregnant and lactating women respectively.

### ***Child care and feeding***

Although Bangladesh has made significant achievements in child nutrition and health care such as infant mortality, vitamin A supplementation, immunization, and so on, child malnutrition still remains substantially high that require devoted action to improve nutritional care through special emphasis on infant and young child feeding (IYCF) and care as a vital component of 1,000 days window. The proportion of early initiation of breast feeding and exclusively breastfed children increased from 53 to 62% and 41 to 47% between 2014 and 2015. Nationally, exclusive breastfeeding in the first month of life increased from around 60% to around 80% from the previous year, and consequently use of breast milk substitute decreased substantially. But unfortunately, quality indicators of complementary food, e.g., minimum meal frequency, minimum dietary diversity and minimum adequate diet have decreased from 2012. Divisionally Khulna, Sylhet and Barisal remain the most vulnerable for these indicators while working mothers tended to practice exclusive breastfeeding and maintain the quality of complementary food for their children than non-working mother. A little less than three quarter (69%) of caregivers provided oral rehydration therapy and 17% were reported to give zinc supplementation to children suffered from diarrhoea. In addition, vitamin A coverage for under-five children has alarmingly decreased from 90% in 2010 to 67% in 2015 while Barisal stood lowest (33%) for vitamin A capsule coverage.

### ***Nutritional status of children***

The level of stunting and underweight among under-five children in Bangladesh has now partially met the Health Population and Nutrition Sector Development Programme (HPNSDP) target of 30% and 33% respectively in 2016. However, the prevalence of stunting (35%), wasting (11%) and underweight (31%) remains unchanged till 2013. Sylhet (45%) and Rajshahi (16%) were found to be highly prevalent for stunting and wasting respectively. Childhood overweight and obesity has been found to be getting prevalent in urban (2.3%) areas than rural (1.4%), while across different divisions, Rangpur had the highest (2.9%) rate in 2015. Children of poor households, have less educated mothers and suffering from food insecurity are more vulnerable for under nutrition

than others. On the other hand, in the line with past results, childhood stunting was found to be associated with pregnancy among young women and mothers of short stature.

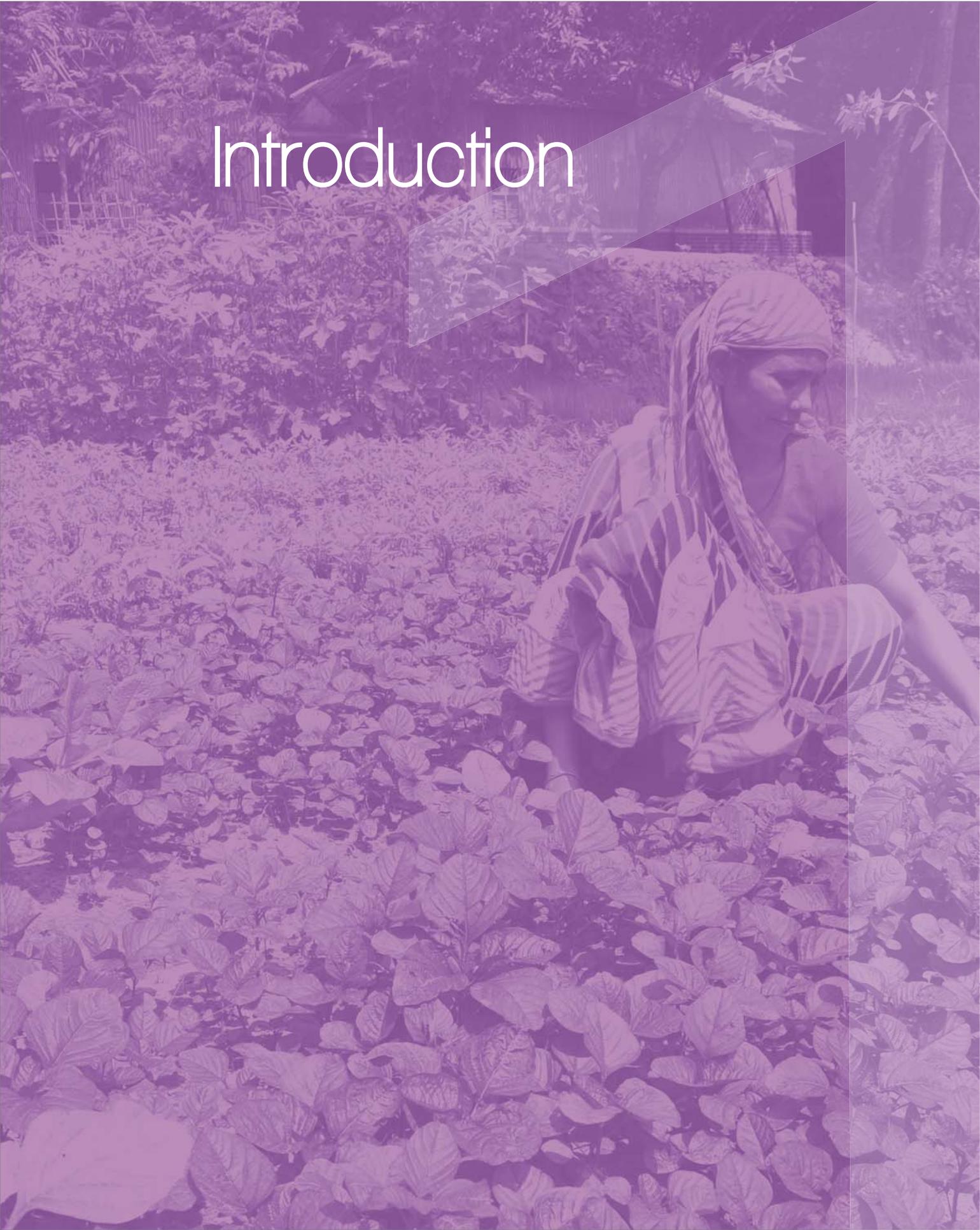
### ***Dhaka slum***

From different slums of Dhaka city, 300 households were listed to take a snapshot on the nutritional condition of these under-privileged people. For Dhaka slum, 211 women, 77 adolescent girls, and 15 pregnant women were interviewed while 150 children were measured and 132 caregivers of the youngest child were interviewed regarding feeding and care.

The average household size of Dhaka slum was 4.4 - slightly lower than the national figure. Transport (e.g, rickshaw pulling) (28%) was the principal source of income of Dhaka slum dwellers. Almost all the households had access to safe drinking water. On the other hand, 3% households had access to improved toilet facilities. Very small proportion of caregivers used soap for washing hands before feeding child (1%), before eating (1%) and for washing children's hands (2%). The proportion of caregivers without appropriate hand washing behaviour was more than three times the proportion of caregivers with appropriate hand washing behaviour. In Dhaka slum, 47% women are over-nourished (obese and overweight) and 80% women gained 5kg weight during their last pregnancy. Less than one-third lactating women took IFA in Dhaka slum. Households of Dhaka slum are mostly (97%) free of hunger and also have minimal level of poor and borderline food consumption. The proportion of exclusive breastfeeding is comparatively low (25%) in Dhaka slum than other areas of Bangladesh while educated mothers tend to provide exclusive breastfeeding to their children more than the uneducated mothers. For complementary feeding, the proportion of children in Dhaka slum fed with minimum meal frequency was 83% and the rate of acceptable diet was found to be higher among educated mothers. The prevalence of stunting among the under-five children of Dhaka slum was much higher (45%) compared to other areas of Bangladesh and not varied with proper IYCF practice across different assessment indicators.



# Introduction



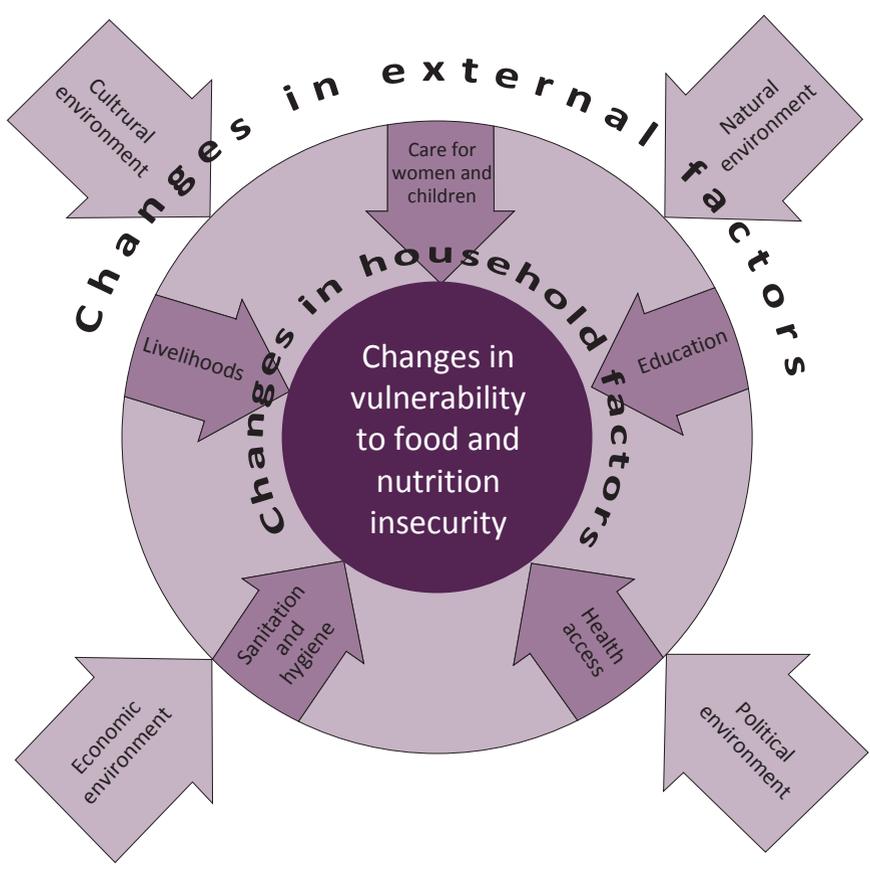


## State of Food Security and Nutrition in Bangladesh 2015

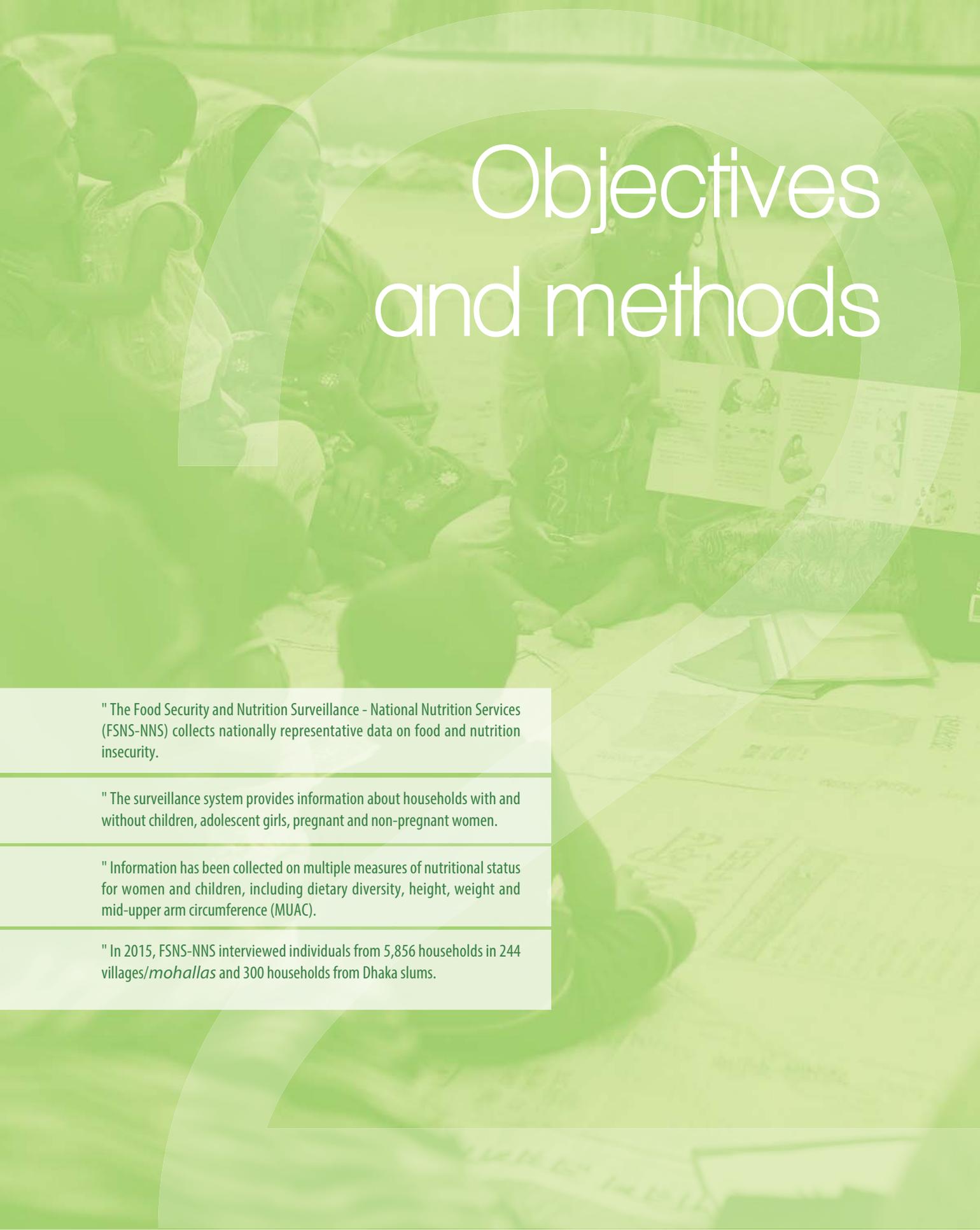
Improvements in the nutrition situation of Bangladesh require that critical planning and significant investments be made in nutrition specific interventions, as well as other related sectors that ultimately impact on food and nutrition security. As described in Figure 1.1, these investments span maternal and child health services, care for women and children, sanitation and hygiene, education, livelihoods, among others.

Information on trends in nutrition and health indicators at the national and divisional level are seen as useful inputs in planning and programme implementation, providing a means of tracking progress, identifying gaps, and targeting investments to populations in need. With a view to informing policy, planning and action, the Food Security and Nutrition Surveillance Project (FSNSP) is the only nutritional surveillance system in Bangladesh that is solely devoted to assessing nutrition and related-determinants, at national and divisional levels. As a key partner in FSNSP, the National Nutrition Services (NNS) has prioritized nutrition surveillance as a way to assess improvements associated with the implementation of evidence-based programmes. Likewise, the Bangladesh Bureau of Statistics (BBS) has included nutritional surveillance in its strategic and operational plans. The surveillance system is seen as a vital complement to the MIS system of NNS, and to the Food

**Figure 1.1: Conceptual framework**



Planning and Monitoring Unit (FPMU)'s annual monitoring reports. It may also be linked to external data sources such as economic data from macroeconomic reports, BBS's household income and expenditure survey, rain and weather data from meteorological services, and production data from agricultural reports, as well as news media and regular health surveys like Bangladesh Demographic and Health Survey (BDHS) that capture cultural and policy changes, and associated health effects.



# Objectives and methods

" The Food Security and Nutrition Surveillance - National Nutrition Services (FSNS-NNS) collects nationally representative data on food and nutrition insecurity.

" The surveillance system provides information about households with and without children, adolescent girls, pregnant and non-pregnant women.

" Information has been collected on multiple measures of nutritional status for women and children, including dietary diversity, height, weight and mid-upper arm circumference (MUAC).

" In 2015, FSNS-NNS interviewed individuals from 5,856 households in 244 villages/*mohallas* and 300 households from Dhaka slums.



## Methods

The section describes the methods guiding the development and implementation of FSNS-NSS surveillance system. In particular, it highlights lessons learned from efforts to streamline the surveillance system to ensure its logistical and financial viability and to strengthen its technical basis and relevance to decision makers.

Following five years of national surveillance under the Food Security and Nutrition Surveillance Project, surveillance activities have been institutionalized under the National Nutrition Services. With the goal of reducing the prevalence of malnutrition among women and under-five children, the Food Security and Nutrition Surveillance - National Nutrition Services (FSNS-NNS) gathers annual, nationally representative information on household food security and nutrition.

### Sample design

A four-stage sampling design is employed to reduce travel time and provide a representative sample per division. For the first stage of sampling, a set number of upazilas was randomly selected from each of the seven divisions of Bangladesh. In the second stage, two unions were selected from each selected upazila, and in third stage two villages/mohallas were selected from the selected unions/wards. Following the sampling procedure of the Food Security and Nutrition Surveillance Programme (FSNSP) 2013(12), the list of villages/mohallas in each union were broken into units of equal size before the selection of two villages/mohallas from a union. Fourth stage sampling was done in the field. In each sampled village, the team started data collection from the first eligible house using a randomly assigned approach road (North, South, East, or West) as determined by a random number generator. Subsequent households were chosen systematically by skipping three households from the previously interviewed household until 24 households were selected and interviewed. Households were considered eligible for selection if there was at least one woman (10-49 years) in the household.

### Sample size calculation

Sample size was determined to obtain divisionally representative prevalence estimates for indicators of child and women's malnutrition and household food consumption. Sample size calculations were based on the estimated prevalence of five key indicators:

1. Annual estimate of acute childhood malnutrition (based on weight for length/height) for each division(13,11,14)
2. Annual estimate of child underweight (based on weight for age) for each division(13,14)
3. Annual estimate of chronic childhood malnutrition (based on length/height for age) for each division(13,11)
4. Annual estimate of proportion of women with chronic energy deficiency (CED), which is defined as a body mass index (BMI) of less than 18.5 among women 19-49 years of age, for each division(8,10)
5. Annual estimate of the proportion of households with poor or borderline food consumption patterns, which is defined using the Food Consumption Score (FCS) method and cut-offs designed for Bangladesh from the Household Food Security and Nutrition Assessment (HFSNA), for each division(4)

Sample size for each division was calculated using the formula for calculating a 95% one-sided confidence interval for a single population proportion (given below). The formula used to calculate sample size,  $n$  is as follows (15):

$$n = DEF \times \left[ \frac{Z_{.95}^2 \times P \times (1-P)}{E^2} \right],$$

Where

DEF = the design effect

$P$  = the estimated level of an indicator

$Z_{.95}$  = 0.95 quintile of standard normal design

$E$  = half-length of confidence interval which is considered as 5%

**Table 2.1: Estimated sample size**

Stunting							
Division	Estimated prevalence	Required child	Design effect	Required adjusting for design effect	child after	after	Required Households
Barisal	36	249	1.6	398			797
Chittagong	37	252	1.6	403			806
Dhaka	31	231	1.6	370			739
Khulna	33	239	1.6	382			765
Rajshahi	35	246	1.6	394			787
Rangpur	38	255	1.6	408			816
Sylhet	46	269	1.6	430			861

Wasting							
Division	Estimated prevalence	Required child	Design effect	Required adjusting for design effect	child after	after	Required Households
Barisal	10	97	1.6	155			310
Chittagong	12	114	1.6	182			365
Dhaka	10	97	1.6	155			310
Khulna	9	89	1.6	142			285
Rajshahi	13	122	1.6	195			390
Rangpur	11	106	1.6	170			339
Sylhet	15	138	1.6	221			442

Underweight							
Division	Estimated prevalence	Required child	Design effect	Required adjusting for design effect	child after	after	Required Households
Barisal	31	231	1.6	370			739
Chittagong	32	235	1.6	376			752
Dhaka	26	208	1.6	333			666
Khulna	26	208	1.6	333			666
Rajshahi	34	243	1.6	389			778
Rangpur	34	243	1.6	389			778
Sylhet	40	260	1.6	416			832

Women's CED							
Division	Estimated prevalence	Required women	Design effect	Required adjusting for design effect	women after	after	Required Households
Barisal	16	145	2	290			363
Chittagong	16	145	2	290			363
Dhaka	15	138	2	276			345
Khulna	13	122	2	244			305
Rajshahi	16	145	2	290			363
Rangpur	23	192	2	384			480
Sylhet	26	208	2	416			520

HH Food Consumption Score (FCS) (poor/borderline)							
Division	Estimated prevalence	Required HH	Design effect	Required for design effect	HH after	adjusting	Required Households
Barisal	16	145	4	580			580
Chittagong	11	106	4	424			424
Dhaka	7	70	4	280			280
Khulna	18	160	4	640			640
Rajshahi	19	167	4	668			668
Rangpur	27	213	4	852			852
Sylhet	8	80	4	320			320

Table 2.1 shows the required sample for each of the five key indicators for each division. Estimates of the prevalence used in calculating the sample size were drawn from the 2013 FSNSP dataset. Since a cluster sampling approach was employed or sample selection, sample size was adjusted to take into account design effects. The design effect used in the sample size calculation was derived from observations from previous FSNSP reports. Based on FSNSP 2013, it was assumed that children would be present in 50% of households, and women aged 18+ years would be found in

80% of the households. These proportions were used to convert the sample size requirements for individuals (6th column, Table 2.1) into estimates of the number of households that would have to be visited to reach that many individuals (7th column, Table 2.1). For all divisions except Rangpur, the largest sample size required by these indicators was the number of households needed to estimate the prevalence of stunting among under-five children. In Rangpur, the largest sample size required by these indicators was the number of households needed to estimate the prevalence of households with poor or borderline food consumption patterns. This requirement was met by including 8 *upazilas* each from Dhaka and Khulna divisions, and 9 *upazilas* each from the remaining five divisions. In keeping with these requirements, the final sample size was 5,856 households (768 from each of Dhaka and Khulna divisions and 864 households from each of the remaining five divisions).

### Sampling in Dhaka slums

To measure the state of food and nutrition insecurity in slum populations, three hundred households were selected from selected slums in Dhaka district including Dhamalkot, Kamrangir char, Bhashantek, Sabujbagh and Mohammadpur.

**Table 2.2 : Estimated sample size of slums**

	Estimated prevalence	precision	Required sample
<b>Child</b>			
Stunting	52%	5.0%	270
Wasting	12%	5.0%	114
Underweight	61%	5.0%	257
<b>Women</b>			
Women's CED	68%	5.0%	235
<b>Household</b>			
HFIAS	25%	5.0%	203
FDS	8.0%	5.0%	80

Table 2.2 displays the estimated sample size of households from Dhaka slums derived from the estimated prevalence of important indicators. To select the required households, predefined slums were divided into 23 clusters according to their total number of households. Each cluster contained almost 3,250 households. Among these, 10 clusters were randomly selected without replacement. To obtain information on three hundred households, we selected 30 households per cluster using systematic sampling by skipping 4 households from the previously interviewed household until 30

households were selected and interviewed. Directions were also selected randomly without replacement for each selected cluster. As shown in Table 2.3, the final sample was comprised of: 211 women aged 19 to 49 years of age, 77 adolescent girls aged 10 to 18 years of age and 15 pregnant respondent. Additionally, 150 children were measured and 132 caregivers were interviewed about care and feeding practices of the youngest child in the household.

**Table 2.3: Number of households, and individuals sampled in Dhaka slums**

	<i>Total Number</i>
Households	300
Adolescent girls	77
Women	211
Pregnant	15
Under five children	150

## Data collection

Data were collected by 28 JPGSPH staff and 47 government staff. Three-member teams, consisting of one government staff, one female and one male data collector, shared responsibility for interviewing and collecting anthropometric measurements. Monitoring officers supervised the activities of every team while a field manager oversaw the data collection process. The data collection teams spent almost two months in the field (7 October - 28 November, 2015). The monitoring officers visited each data collection team at random at least once a week to check filled-in questionnaires and to ensure adherence to the questionnaire protocols in the field.

During 2015, 5,856 households were interviewed in 146 rural communities and villages, and 98 urban communities (244 communities in total) located in 122 *unions*/wards. Refusal rate was low (2%), with only 122 households among 5,856 choosing not to participate in the survey.

**Table 2.4: Number of communities, households, and individuals sampled**

	<i>Total Number</i>
Villages/Mohalla	244
Households	5856
Adolescent girls	1009
Women	4623
Pregnant	291
Young children (under 5 years)	2710

As expected, the refusal rate in urban areas was much higher than in rural areas (rural 1% and urban 3.7%). In selected households, a total of 4,623 women aged 19-49 years, 1,009 adolescent girls aged 10-18 years, and 291 pregnant women were interviewed. Additionally, 2,710 children were measured and 2,304 caregivers were interviewed about the care and feeding practices of the youngest child in the household (Table 2.4).

### **Data collection tools**

Paper questionnaires were used in the FSNS-NNS project to collect surveillance data. Filled-in questionnaires were entered into a custom-made data entry screen. The sampling unit of the surveillance system was a household having at least one woman aged 10-49 years.

### ***Anthropometric measurement***

For each selected household, a portable electronic weighing scale (TANITA Corporation Japan, Model HD-305) was used to measure the weight of children, adolescent girls and women. To measure the height of women, adolescent girls and children older than two years of age, a locally made height board was used. Recumbent length was measured for under-two children using a locally made length board. A numerical insertion tape that produced by Teaching Aids at Low Cost (TALC), was used to measure MUAC of children, women (both pregnant and non-pregnant), and adolescent girls. All anthropometric measurements were performed based on WHO guidelines as specified in the FANTA anthropometry manual (16).

### ***Training and standardization***

Data collectors received a 3-day training on conducting interviews and anthropometric measurements, and maintaining anthropometric instruments. They also attended anthropometric measurement standardization sessions and a field practicum to reinforce their newly acquired skills and knowledge.

### ***Ethical considerations***

FSNS-NNS field coordinators explained the motives and procedures of the surveillance system to the leaders of the selected districts, *upazila*, union and communities to obtain informed consent. At the beginning of each interview, the data collectors gave detailed information about the objective of the surveillance and read a statement which informed the participants that their participation was completely voluntary and that respondents had the right to refuse to answer any questions and to discontinue the interview at any time. Consent for measuring under-five children was obtained from their caretakers.

## **Quality control**

The data were reviewed and cross-checked to ensure quality. Monitoring officers reviewed entire questionnaires at the time of survey so that any errors or inconsistencies identified could be corrected in the field. To verify the quality of data, quality control officers revisited a randomly selected sub-sample (around 5%) of interviewed households within 48 hours of the initial visit by the data collectors. To recheck, data collectors compared the surveillance data to the quality control data. Inconsistencies, if any, were reviewed by the nutrition director, project coordinator, training officers, and the field manager to identify possible reasons for the discrepancy and to implement appropriate solutions.

### ***Data processing***

Data entry was done concurrently with data collection. Data were entered on ten computers using a data entry programme developed in FoxPro software (v2.6). One senior data management officer supervised data entry, and reviewed, edited, and cleaned the data by performing a series of logic, frequency and data range checks in SPSS software. <sup>1</sup>Inconsistencies were checked visually by comparing the electronic entry to original questionnaire or to the data collectors' notebooks. The senior data management officer consulted with field managers, monitoring officers and statistician to understand any discrepancies during the data cleaning procedure.

<sup>1</sup> The manual which guides these routine operations is available upon request.

***Statistical analysis***

Data analysis was performed using Stata (Stata Corp, v13.0) software. In the FSNS-NNS report, data are described using proportions and means. Statistical significance tests were performed using an Adjusted Wald test (for proportions) or a t-test (for means) with a 95% confidence level. To estimate prevalence, sampling weights were assigned that took into account each household's probability of selection. These weights were constructed using the same sampling frame used for sample selection (2011 BBS census). All analyses and estimates were performed using the svy commands in Stata, to take into account the complex sampling design.

***Limitations***

The limitations of the surveillance system mainly occurred due to sampling challenges at field level. The data collectors faced high refusal rates in wealthier urban areas and in a few isolated rural communities. Due to lack of transport, communication facilities, and insufficient numbers of households, some selected villages were replaced by other villages (resampled) from the same unions. FSNS-NNS involved local government staff to ensure that the purpose of the project was understood by the local communities and that data collection staff were promptly notified if political considerations required that data collection to be suspended in an area.



# Characteristics of households

Nationally, the mean size of households was 4.8 members in 2015. Overall, less than half of households had under-five children (42%), with the smallest proportion recorded in Rajshahi division (37%) and the highest in Sylhet division (46%).

The highest levels of educational attainment of mothers and fathers were found in Dhaka and Khulna divisions, respectively, and the lowest in Sylhet division .

Nearly three-fourths (72%) of households consumed iodized salt in 2015. Those living in Sylhet division consumed the most and those living in Rangpur and Rajshahi consumed the least.

Nationally, farming and business were the principal sources of income (about 20% each).

Rural areas were much poorer than urban areas. In urban areas, 50% households belonged to the wealthiest quintile whereas in rural areas only 4% of households fall into this group.

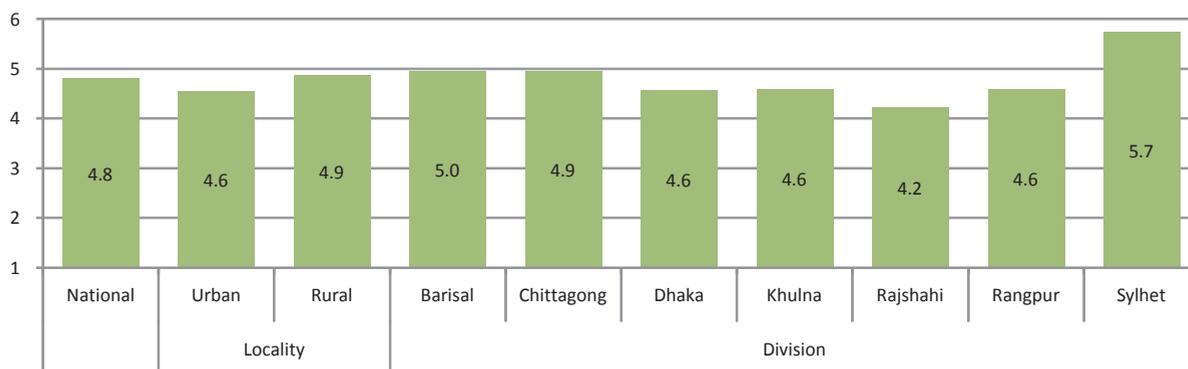
Nationally, only 14% of households received remittances in 2015 - ranging from 24% of households in Sylhet and Chittagong divisions, to 4% in Rangpur division.



## Demographic information

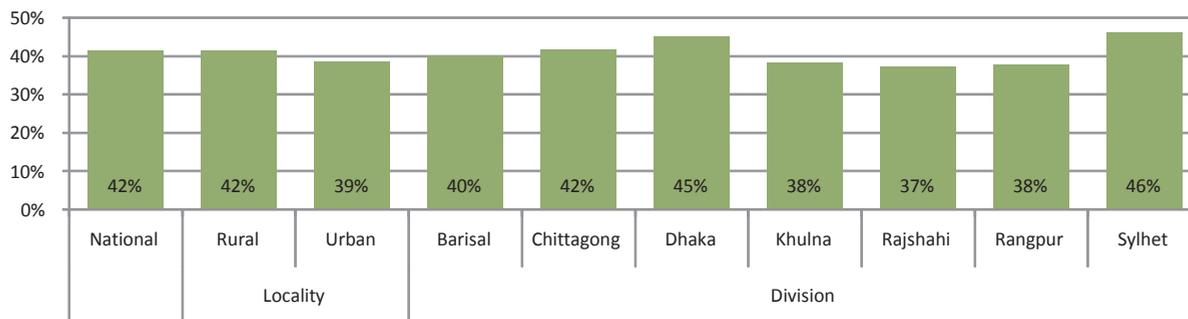
The FSNS-NNS surveillance system was implemented during October to November 2015 in 244 villages/*mohallas*; 98 of which were in urban areas and rest in rural areas. The average household size was 4.8, which is slightly higher than the corresponding estimates obtained from the national census of 2011 (4.35) and the BDHS, 2011 (4.6) (1,2)<sup>1</sup>.

**Figure 3.1: Average household size by area of residence**



The small difference in average household size compared to the 2011 census is most likely due to the exclusion of households without a woman aged 10-49 years in the FSNS-NNS system. Estimated mean household size is, however, very similar to results from FSNSP 2014 (3,4,5).

**Figure 3.2: Households with under-five children**



Average household size was greater in rural areas compared to urban areas, and divisionally, largest in Sylhet and smallest in Rajshahi. Consistent with previous FSNSP results (3,4,5), 42% of households included a child aged under five years (Fig. 3.2). Rural areas had a higher proportion of households with under-five children compared to the urban areas. Rajshahi division had the lowest proportion of households with young children (37%) while Sylhet division had the highest proportion (46%).

<sup>1</sup> The 2014 BDHS full report was not yet released at the time of writing chapter

**Table 3.1 : Mean number of under-five children per household**

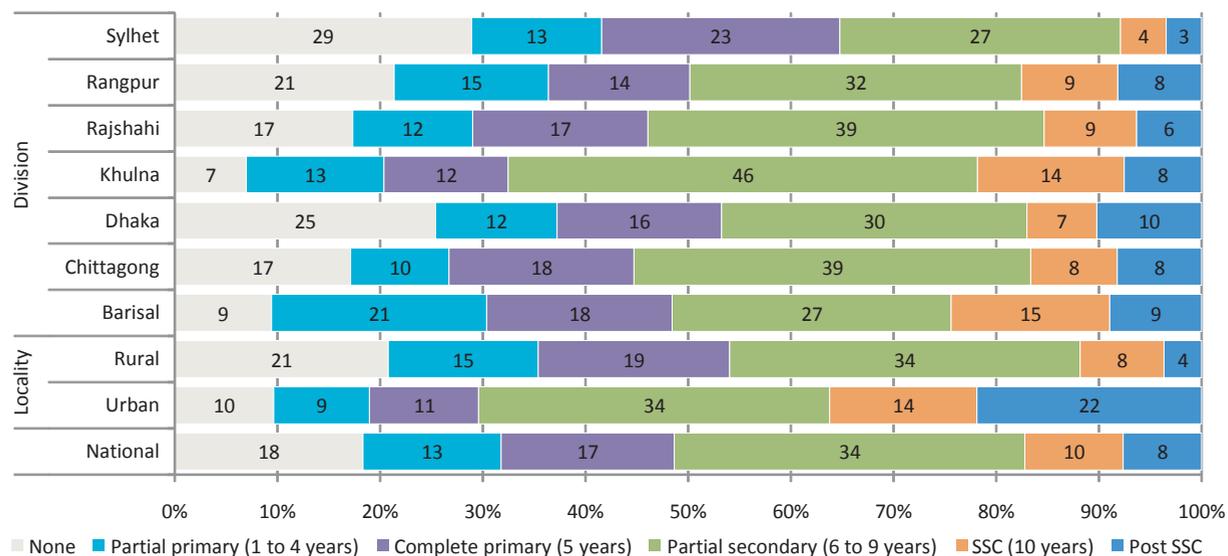
Mean Number of Children	
<b>National</b>	0.47
<b>Locality</b>	
Rural	0.48
Urban	0.43
<b>Division</b>	
Barisal	0.46
Chittagong	0.48
Dhaka	0.53
Khulna	0.42
Rajshahi	0.39
Rangpur	0.42
Sylhet	0.60

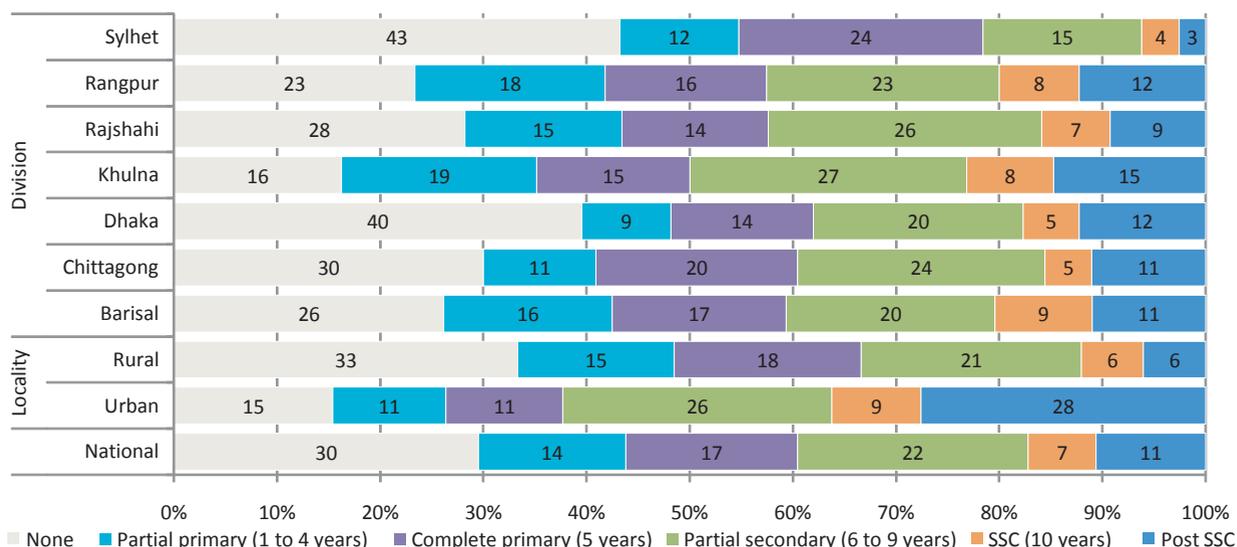
The average number of under-five children per household was higher in rural areas (0.48) compared to urban areas (0.43) (Table 3.1). Across divisions, the number of under-five children per household was highest in Sylhet (0.60) and lowest in Rajshahi, Khulna and Rangpur (about 0.40).

#### **Educational attainment**

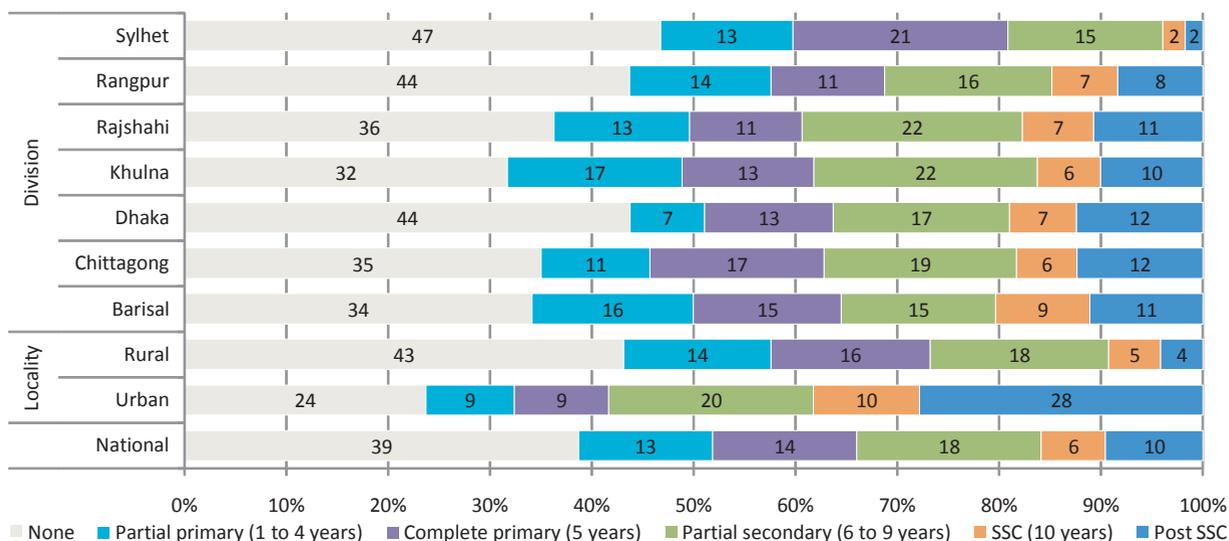
The educational attainment of all household members was categorised into six groups: 1) none (no education); 2) partial primary (1 to 4 years); 3) primary completion (5 years); 4) partial secondary (6 to 9 years); 5) SSC certificate (10 years); and 6) Post SSC (11 or more years).

In Bangladesh, 18% of mothers of under-five children are uneducated while 8% are highly educated (more than SSC) (Fig. 3.3). As expected, the proportion of illiterate mothers was higher in rural areas compared to urban areas; and the proportion of highly educated mothers was greater in urban areas (22%). Across divisions, the highest proportion of completely uneducated mothers was found in Sylhet and the lowest proportion in Barisal division.

**Figure 3.3: Educational attainment of mothers by area of residence**

**Figure 3.4: Educational attainment of fathers by area of residence**

The highest level of maternal education (SSC and post SSC) was found in Barisal and Khulna. Interestingly, at the national level, fathers of under-five children were more illiterate (30%) compared to mothers (18%). In urban areas, fathers of under-five children were much more educated (28%) than those residing in rural areas (6%). Sylhet division reported the largest proportion of fathers with low educational attainment, while the highest level of educational attainment was found in Khulna (Fig. 3.4). More than one-third of principal income earners were completely uneducated and one-tenth were highly educated. Principal income earners working in urban areas were highly educated compared to those in rural areas (Fig. 3.5). Across divisions, the education of income earners was lowest in Sylhet and highest in Dhaka, followed by Chittagong.

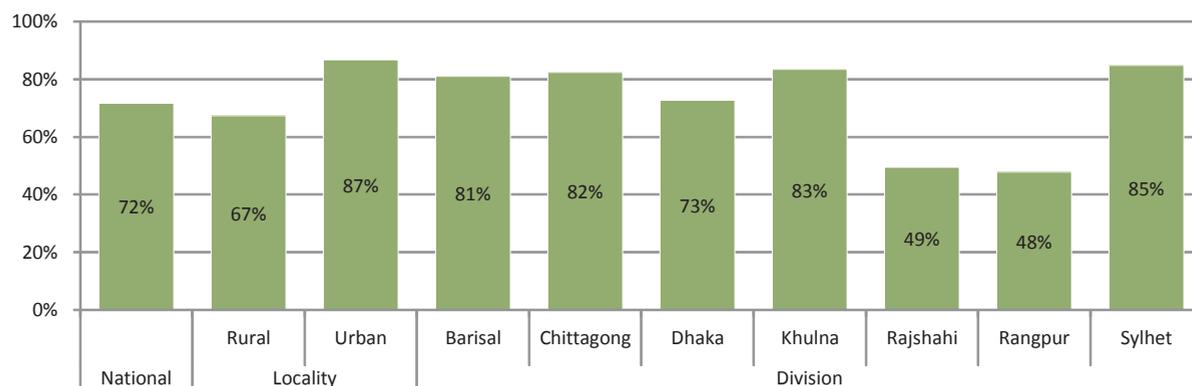
**Figure 3.5: Educational attainment of principal income earners by area of residence**

### Consumption of micronutrient rich fortified items

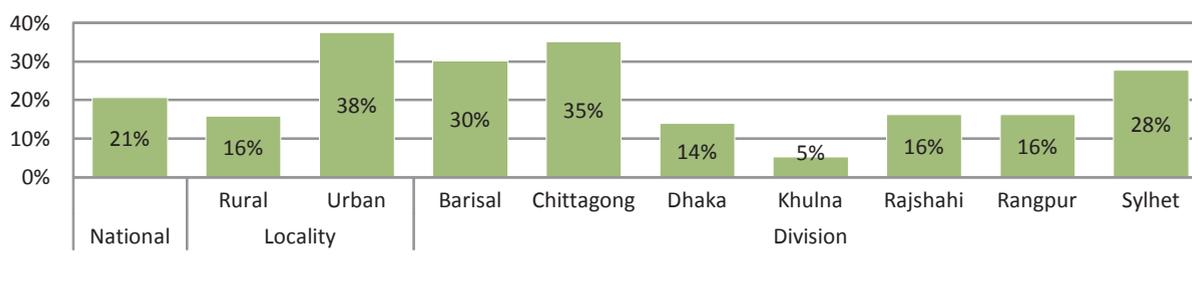
The surveillance system collects information from households on the consumption of iodized salt and vitamin A fortified edible oil. According to the National Micronutrients Survey 2011-12, about 80% of the households used iodized salt, although rates of utilization were lower in rural households (76.6%) than urban areas (91.7%) or slums (91.1%) (6). In 2015, FSNSP-NNS found that almost three-fourths of the households consumed iodized salt in Bangladesh. As expected, people in urban areas consumed much more iodized salt than those in rural areas. Sylhet had the highest proportion of households (85%) consuming iodized salt, while the lowest rates of consumption were recorded in Rajshahi and Rangpur divisions (Fig. 3.6).

Another key feature of the 2015 FSNS-NNS survey was the collection of data was to collect information on the awareness and consumption of vitamin A fortified edible oil. Oil fortification is an effective and sustainable strategy to combat vitamin A deficiency and its negative health consequences such as night blindness or increased risk of illness and mortality from childhood infections, such as measles and diarrhoe. a (7)Nationally, 23% of households surveyed in 2015 were aware of the existence of vitamin A fortified edible oil, and 21% households reported consuming it on a regular basis. Rates of reported consumption were greatest in urban areas. Across divisions, the proportion of households consuming vitamin A fortified edible oil was greatest in Chittagong, and lowest in Khulna (Fig. 3.7).

**Figure 3.6: Households consuming iodized salt by area of residence**



**Figure 3.7: Households consuming vitamin A fortified edible oil by area of residence**



### Household occupation and wealth

The FSNS-NNS survey assessed how household members earned income in the two months preceding interview. Income earned by the principal income earner <sup>2</sup>and other members of the households were included in the survey. For simplification of FSNS-NNS report, 20 categories of occupation were further grouped into seven occupation categories: 1) farmer (farming their own leased, owned, controlled, or sharecropped land); 2) unskilled day labourer (daily or contract wage labour that does not require training); 3) skilled day labourer (labour that requires formal or informal training); 4) transport sector (transporting goods or people); 5) fisherman (catching fish on open or owned waters); 6) salaried worker (employed and drawing a regular wage); and 7) business (trade in any goods, including petty trading).

The surveillance system also gathered socio-economic information on household structure, cooking, water and sanitation systems, asset ownership and access to electricity (8,9,10).

**Figure 3.8: Occupation of principal income earner by area of residence**

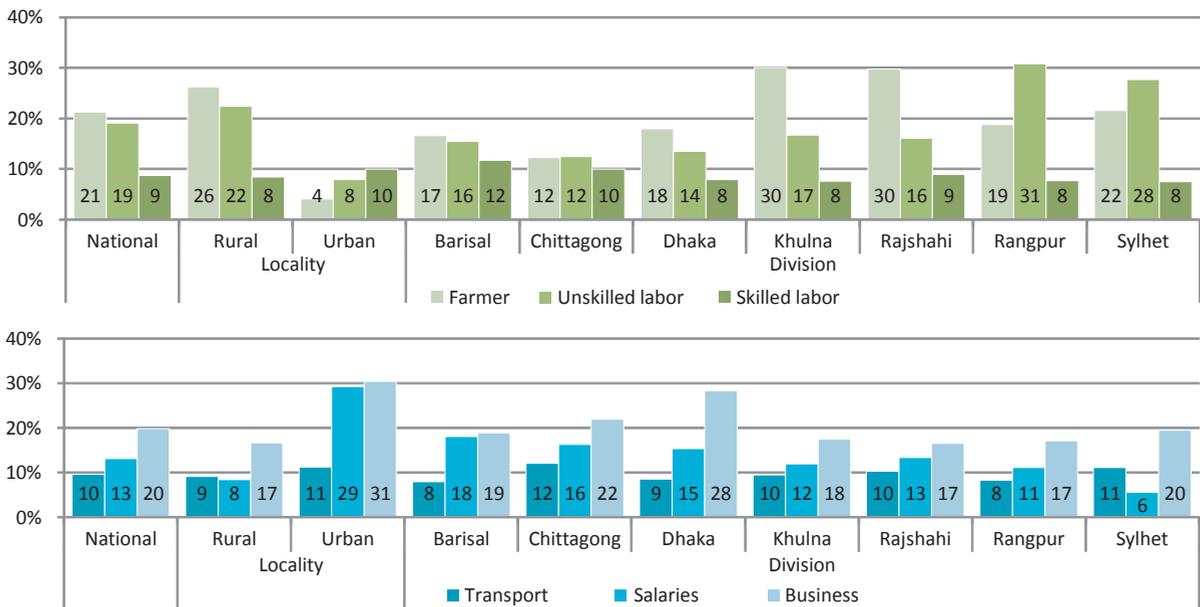


Figure 3.8 shows the distribution of the occupation of principal income earners by area of residence and division. Nationally, about 60% of the principal income earners' occupation reported in FSNS-NNS survey fall into the categories of farmer, unskilled labour or business. Skilled labour was found to be the principal income earner's occupation in about 9% of the households, while involvement in unskilled labour was reported by 19% of principal income earners. As expected, the proportion of households earning income from farming and unskilled labour was much higher in rural areas compared to urban areas. Business and salaried employment (combined) constituted the principal source of income for 60% of households in urban areas and 25% in rural areas. In Rajshahi and Khulna divisions, about 30% of principal income earners were farmers. In Sylhet and Rangpur divisions, a large proportion of principal income earners were involved in unskilled labour, whereas in Dhaka, business was the most prominent principal occupation.

<sup>2</sup> Even if the principal income earner for the households did not reside in the household, the income category for this member was obtained and categorised.

**Table 3.2 : Percentage of adolescents, women and mother earning income by area of residence**

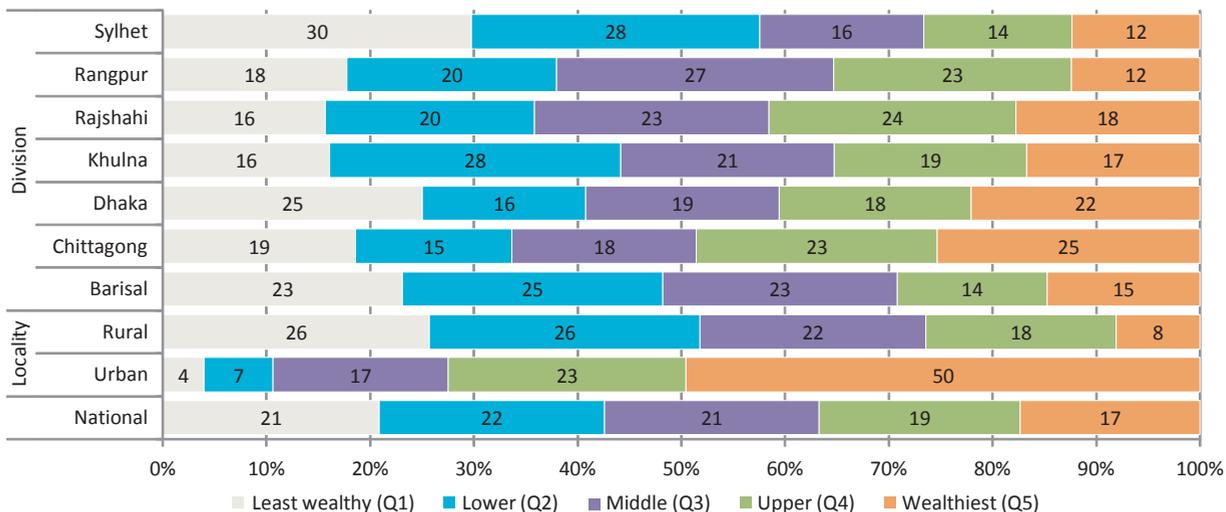
	Earning status		
	Adolescent	Women	Mother
<b>National</b>	5%	24%	18%
<b>Locality</b>			
Rural	5%	25%	19%
Urban	7%	23%	17%
<b>Division</b>			
Barisal	2%	15%	11%
Chittagong	5%	15%	9%
Dhaka	5%	23%	21%
Khulna	6%	29%	23%
Rajshahi	7%	33%	27%
Rangpur	13%	40%	29%
Sylhet	1%	12%	9%

Table 3.2 displays the distribution of the contributions of adolescent girls and women to household income. Nationally, 5% of adolescent girls and 24% of women contributed to household income.

A slightly larger proportion of urban adolescents were involved in income generation (7%) than those residing in rural areas (5%). Across divisions, Rangpur had the highest proportion of women contributing to household income and Sylhet had the lowest proportion. Nationally, 18% of mothers contributed to household income (Table 3.2), with little difference between rural and urban areas. In Rangpur and Rajshahi divisions, over a quarter of mothers' earn income compared to only 9% in Chittagong and Sylhet.

### Wealth index

Based on household characteristics (e.g. cooking, and water and sanitation systems) and the assets that they possess, a composite wealth index was derived using the DHS method which consists of

**Figure 3.9: Proportion of households in each wealth quintile by area of residence**

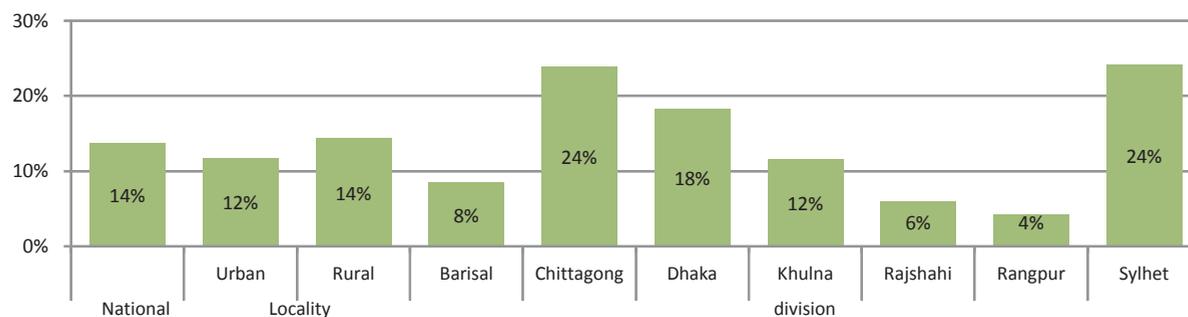
area specific indexes that are combined into a national model (10). <sup>3</sup>The wealth index was then divided into five quintiles, each containing an equal population of household members. Figure 3.9 displays the wealth index of households by division, and rural and urban areas. Khulna and Rajshahi divisions had the lowest proportion of households in the poorest wealth quintile (16%) while Sylhet had the highest proportion in the poorest group (30%). By contrast, Chittagong had the highest proportion of the households in the wealthiest quintile (25%), followed closely by Dhaka (22%). Rural areas were much poorer than urban areas. In urban areas, 50% households belonged to the wealthiest quintile whereas in rural areas only 4% of households fall into this group.

### Remittance

Foreign remittances (money transferred by migrant workers to their home countries) play a pivotal role in financial flows to developing countries. A large portion of these remittances are allocated towards fulfilling the basic needs of family members, and helping improve their quality of life (11).

It was found that about 14% of the households received remittances (both internal and external). Figure 3.10 shows the distribution of remittances received by division and place of residence. Sylhet and Chittagong had the highest proportion of households receiving remittances (24%), while Rangpur and Rajshahi had the lowest proportion (4% and 6% respectively).

**Figure 3.10: Divisional variation in reported household remittances**



<sup>3</sup> This wealth index was constructed using the same method that the DHS system has used since 2010 (10,2) and used in FSNSP starting with the 2012 report (3). This index was derived separately for rural areas, municipalities, and city corporations, before being combined with nationally relevant indicators. A complete list of the variables used in this index is given in Appendix no. B.



# Food security



Between FSNSP 2007 and FSNS-NNS 2015), the availability of foods from animal sources (e.g. meat, milk and egg) increased considerably, while the production of pulses remained static.

The number of households that reported only eating rice due to lack of access to other food items, decreased from 45% in FSNSP 2011 to 11% in FSNS-NNS 2015.

The proportion of households with no food stocks and no ability to purchase food on the market dropped from 51% in FSNSP 2011 to 13% in FSNS-NNS 2015.

In 2015, hunger was reported in only 4% of households, and declined by a quarter (24%) during the last five years.

Consumption of sub-optimal foods increased from 2014, with the highest rates found in Sylhet followed by Rangpur division.

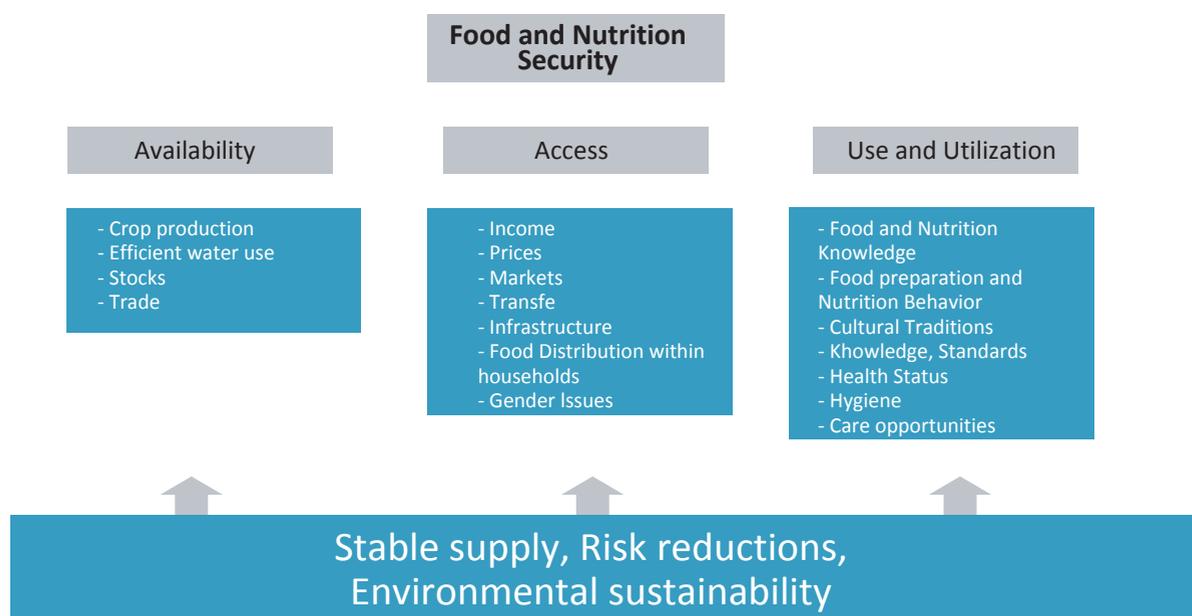
Adult females sacrificed consumption in response to household food security much more than their male counterparts. Worryingly, this coping strategy was also reported among adolescent and younger girls.



FSNS-NNS follows a conceptual framework of food and nutrition security that is presented in Figure 4.1. According to this framework, food and nutrition security can be achieved when foods of sufficient quantity and appropriate quality are available through domestic production or imports; when individuals have access or have adequate resources for acquiring/purchasing appropriate foods for a nutritious diet; and individuals can appropriately use knowledge on basic nutrition, and maintain clean water and sanitation, to ensure maximum nutrient uptake. Food security is a complex sustainable development issue linked to health through malnutrition, and with dimensions that move from national to regional to household to individual. Sufficiency in each dimension is necessary to ensure that food security is achieved (1).

Cultural beliefs, religion and traditional knowledge have a significant effect on food and nutrition security by shaping a community's diet, food choice, intra-household food distribution, child feeding practices, food preparation techniques, food processing and preservation. For example, pregnancy and childbirth are characterized by numerous cultural or religious beliefs and practices that affect a mother's health and the survival and nutrition of her child. There is also a synergistic relationship between infection and under-nutrition, which may not simply be a result of insufficient food or poor dietary habits, but to poor sanitation and healthcare, or inadequate absorption of nutrients (2,3).

**Figure 4.1: Relationship between components of food and nutrition security**

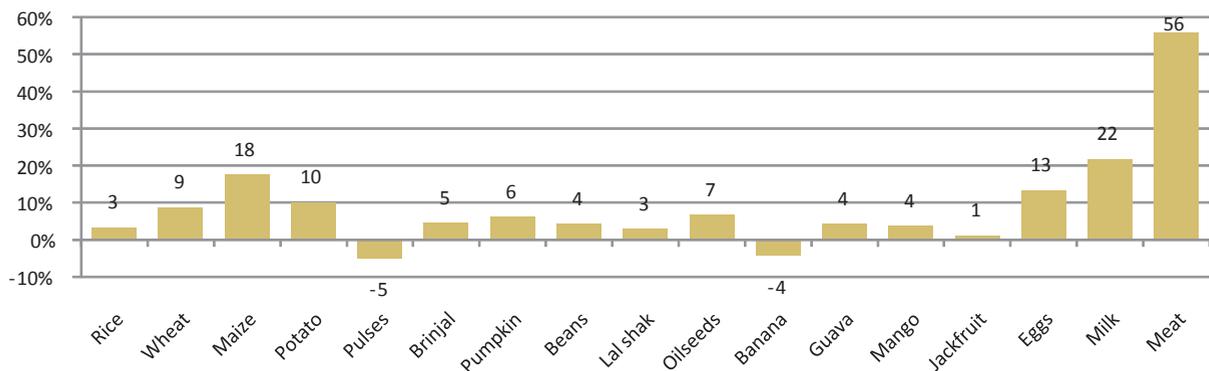


FSNS-NNS estimates the prevalence of food insecurity in Bangladesh using internationally standardised questions to assess respondents' perceptions of household access to food. Following the above diagram, this section will focus on indicators that attempt to quantify gaps in food availability, access, and equitable utilisation of food in Bangladesh, while analysis of nutrition security and its determinants will be taken up in subsequent chapters. In addition to the divisional estimates, trends in food security indicators are assessed using FSNSP surveillance data starting from 2011.

## Availability

The Government of Bangladesh is seeking to increase the availability of diverse food supply through improved agricultural production and trade, and by according priority to food security and nutrition as important national goals (4). This commitment is evident in the Government's adoption of the comprehensive National Food Policy (NFP, 2006), The Plan of Action (PoA, 2008-2015) the Country Investment Plan for Agriculture, Food Security and Nutrition (CIP, 2011-2015), the Sixth Five-Year Plan, Vision 2021, as well as Global MDGs and SDG (5). The only crops which have not increased in production in the eight years between 2007 and 2015 are pulses, banana, and jackfruit (Fig. 4.2). The annual growth of food production from animal sources (e.g. meat, milk and egg) has been comparatively larger, with an increase of 13% for eggs, 22% for milk, and 56% for meat from 2007/2008 levels. Between 2012/13 and 2013/14, production of eggs, milk, and meat indexed to 33%, 20%, and 40%, respectively (5). Despite these achievements, domestic production is increasingly unable to meet consumer demand for a more diversified diet, with a particular shortfall in the production of pulses and oilseeds (6,7).

**Figure 4.2: Annual growth rates for selected crops (2007 to 2014) and animal source foods (2008 to 2015)<sup>1</sup>**



The tropical and sub-tropical climate of Bangladesh favours the production of a variety of fruits and vegetables, but due to inappropriate processing, preservative and storage, a huge proportion of harvested produce is lost. This points to the need for national policy to reduce enormous post-harvest losses, maintain quality, and elevate the availability of fruit and vegetable supply throughout the country (8).

## Household food access

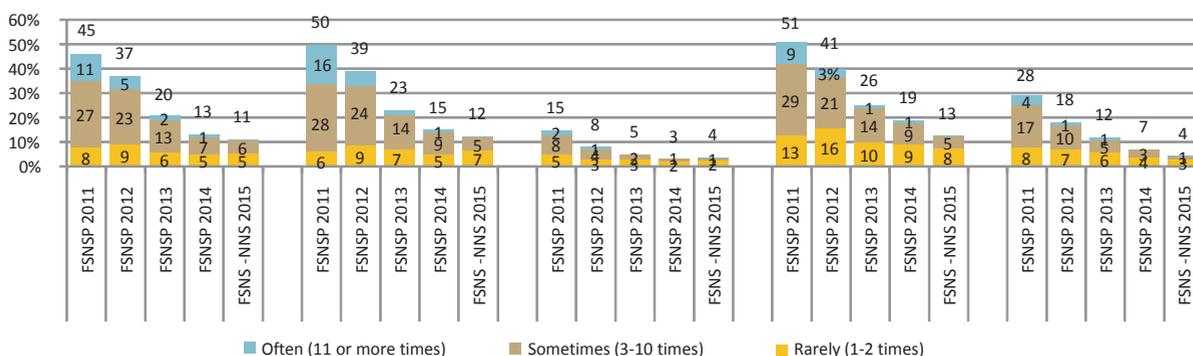
FSNS-NNS measures food access at the household level. Household food access was assessed by examining the household's capability to obtain sufficient food to meet the needs of the members during the month before interview. Food insecurity results in a typical range of responses independent of whether the episode of food insecurity is chronic or acute. Households usually adopt a number of coping strategies when individuals face or predict constraints in meeting household food needs such as consuming only rice in their meal or having to sacrifice or skip meals by one or more members of the family. When a gap exists between a household's food needs and its ability to procure food, various approaches are employed such as purchasing foods of lower quality, consuming smaller amounts or less item of food, or resorting to socially unsustainable

<sup>1</sup> This graph was constructed from Table 7 and Table 16 of the *National Food Policy: Plan of Action and Country Investment Plan: Monitoring Report 2015(14)* and the same tables from the previous reports of 2012, 2013 and 2014 (16,6,7).

behaviours such as borrowing money and food (9). A severe episode of food insecurity may result in reducing food intake. A range of consequences occur as a result of food deficiency and hunger, from short-term weight loss or to growth retardation among children. In FSNS-NNS, these indicators are measured by asking the household food manager about whether specific behaviours occurred during the month before interview.

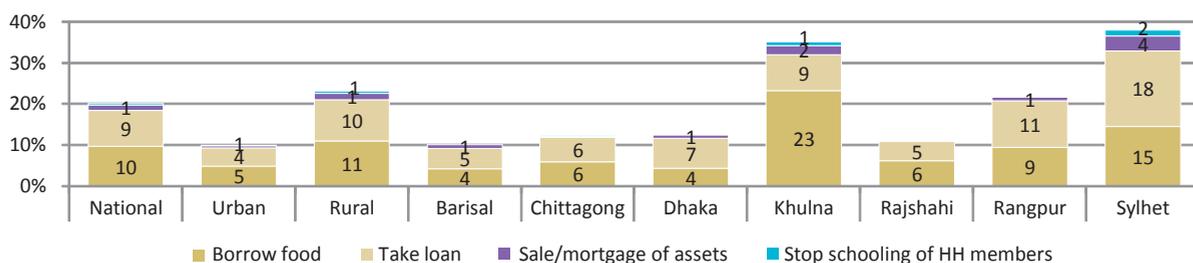
Figure 4.3 shows the average prevalence of selected behaviours in the month before interview over all surveillance rounds from FSNSP 2011 to FSNS-NNS 2015<sup>2</sup>. Notably, the prevalence of all indicators clearly decreased over these years. The overall height of the bars indicates the proportion of households in which any member practiced the selected behaviour one or more times during the month-long recall period. The different coloured segments inside the bars indicate the proportion of households who practiced the behaviour often, sometimes or rarely.

**Figure 4.3: Household behaviour related to food insecurity (FSNSP 2011- FSNS-NNS 2015)**



Households with members who had eaten insufficient meals during the month before interview declined to from one-half in FSNSP 2011 to around one-tenth in FSNS-NNS 2015. Similarly, reports of eating only rice due to an inability to arrange other food items also declined substantially from FSNSP 2011 (45%) to FSNS-NNS 2015 (11%). The proportion of households who reported running completely out of food stocks and being unable to purchase more that day at least once in the month before the interview also decreased from over half of the households in FSNSP 2011 to little more than one-tenth in FSNS-NNS 2015. In FSNS-NNS 2015, households with members who had skipped meals fell from 15% in FSNSP 2011 to 4% in FSNS-NNS 2015. Furthermore, over the last four years the proportion of households with one or more members going to bed hungry declined from 28 to 4%.

**Figure 4.4: Households adopting unsustainable means to obtain food by division**



<sup>2</sup> Estimated proportion for different food security indicators between the year of FSNSP 2011 to FSNSP 2014 are obtaining from the previous reports of FSNSP (18,17,19,20)

Figure 4.4 shows the proportion of household reliance on socially unsustainable means to obtain food. Borrowing foods and taking loans remain the most common means for coping with hunger or shortage of food. Nationally one-fifth of the households had to adopt untenable means to assure food for their family in the month before interview, while Sylhet had the highest (39%) proportion and Barisal had the lowest (9%). People living in rural areas are more appear more apt to employ these socially unsustainable practices than those in urban areas.

### Composite indexes

To assess the severity of food insecurity in Bangladesh, FSNS-NNS used an international index named the Food Deficit Scale (FDS) developed by Food and Nutrition Technical Assistance project (FANTA) A derivation of the food insecurity indicator discussed in the last section, the FDS measures serious limitations in households' ability to procure adequate levels of food.<sup>3</sup> FDS is based on the most severe subset of questions in Household Food Insecurity Access Scale (HFIAS) (food running out, sleeping hungry, and day and night without food) and has also been validated for comparing food access across cultures (10).

**Figure 4.5: Food deficit households in Bangladesh (FSNSP 2011- FSNS-NNS 2015)**



Figure 4.5 shows the year-wise estimates of the proportion of households reporting food deficits as measured by FDS. A step-wise downward trend has been seen since FSNSP 2011, declining from one quarter to around one-tenth of households in FSNSP 2013. The proportion of FDS decreased even more dramatically to only 4% of households in FSNS-NNS 2015.

### Household utilization of food

The quality and quantities of foods a household chooses for their daily consumption, termed as food utilisation, is a vital pillar of household food security. From 2011 to 2014, FSNSP has included food consumption score (FCS), an indicator developed by the World Food Programme (WFP), to capture the perceived diversity of available foods in the household, and a household's access or demand for diversified foods. Respondents were asked to recall how many days in the past week any food item from eight food groups had been prepared and consumed in the household (staples, pulses, vegetables, fruits, meat/fish/eggs, dairy, oil, and sugar). This indicator includes both food groups that have nutritive value, such as vegetables or meat, as well as those which have little nutritive value, such as sugar and condiments (11). Responses are weighted by a rough approximation of their nutritional content - standardized across the countries by WFP - and points given for each food groups and summed to create the final score (12,13). The resulting continuous index ranging from 0 to 112, is classified into groups by using standardized cut-offs to categorize households according to their ability to adequately access food.<sup>4</sup>

<sup>3</sup> This measure is identical to the Household Hunger Score. For more information on these indicators, please refer to past reports.

<sup>4</sup> For FSNS-NNS, cut-offs are drawn from the HFSNA survey which are: 1. Poor consumption (28); 2. Borderline consumption (28-42); 3. Acceptable but low consumption (43-52) (12)

**Figure 4.6: Households with poor or borderline food consumption (FSNSP 2011-FSNS-NNS 2015)**

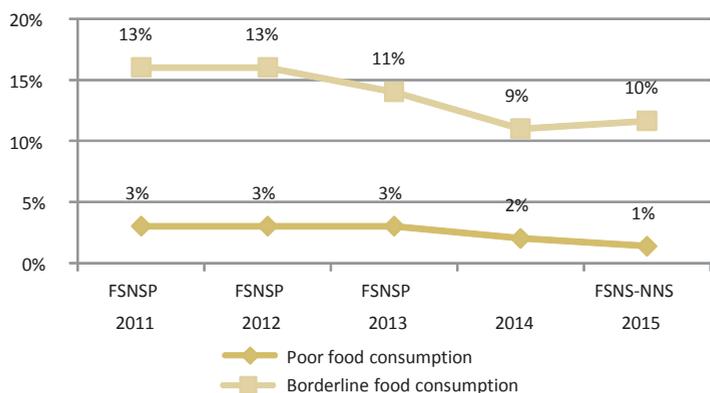


Figure 4.6 compares year-wise estimates of the proportion of households consuming poor and borderline diets from FSNSP 2011 to FSNS-NNS 2015. Although there has been a substantial decline in the prevalence of food insecurity, comparatively little reduction was observed in the proportion of households consuming poor or borderline diets.

**Figure 4.7: Divisional variation in households with sub-optimal food consumption**

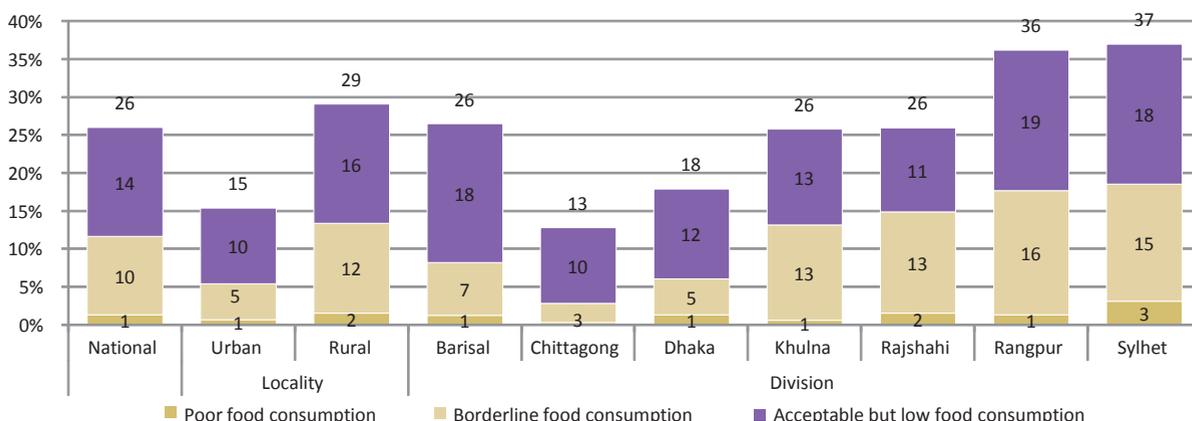
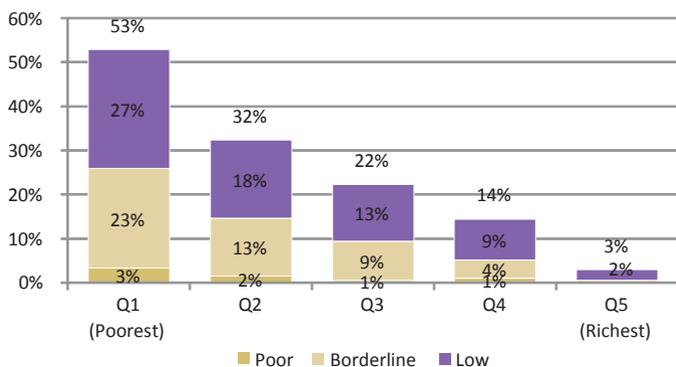


Figure 4.7 shows the proportion of households with poor, borderline, and acceptable low diets by division and rural or urban residence. A little more than a quarter of households consumed sub-optimal diets at the national level in 2015, slightly higher than the proportion in 2014. The highest proportion of households reporting sub-optimal food consumption was found in Sylhet division followed by Rangpur division. Compared to FSNSP 2014, some improvement is apparent, particularly in Chittagong where rates of sub-optimal diet dropped by 7%.

**Figure 4.8: Sub-optimal food consumption by household wealth**



A step-wise decline was observed in the level of sub-optimal food consumption with increasing household wealth (Fig. 4.8). Compared to FSNSP 2014, the proportion of households eating sub-optimal diets increased in all quintiles except the wealthiest. In line with 2014 results, households with under-five children consumed sub-optimal diets in a lower proportion than households without young children (24% compared to 26%).

### Intra-household utilisation of food

The effects of food insecurity within a household are often not experienced equally by all members of the household. Although the meals prepared and/or consumed in a household constitute an adequate diet, it should not be assumed that all members of that household are uniformly food and nutrition secure as diets and dietary requirements vary among household members. Among the households resorting to the use of coping behaviours that do not affect the whole household, such as skipping meals or reducing portion size, FSNS-NNS requests respondents to identify up to five people in the household who practiced that behaviour the last time it was required. This enables the FSNS-NNS system to identify who was disproportionately affected by household food constraints.

**Figure 4.9: Coping strategies of the members in food insecure households**

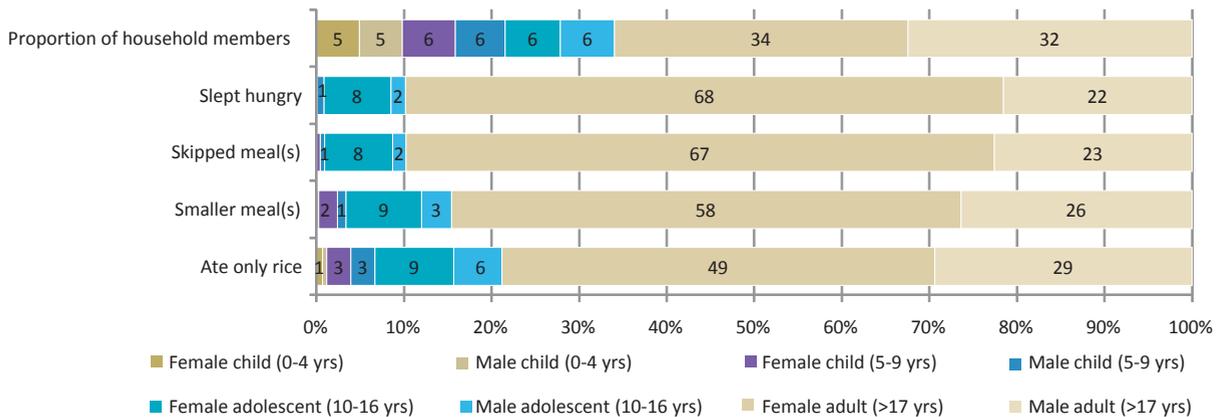
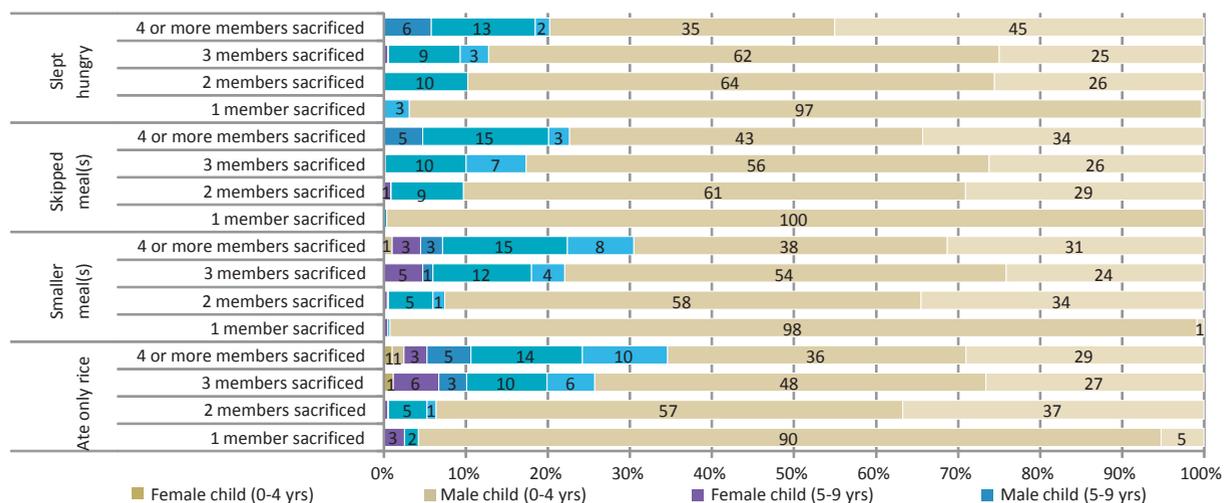


Figure 4.9 shows the proportion of household members by age and sex who adopted coping behaviours by reducing or changing consumption to cope with household food shortage. Adults were reported to reduce consumption to a greater extent than their underlying population would predict, indicating that they protected younger members of the household. But worryingly, among all age groups except the youngest (0-9 years), a larger proportion of female adolescents sacrificed their consumption compared to males.

**Figure 4.10: Number of household members reducing consumption using different coping strategies**



When only a few members of the household had to reduce or change their consumption, the probability they are female is much greater. For example if only one member of a household reduced consumption, it was almost always an adult woman (Fig. 4.10). When two members sacrificed, adults of both sexes were involved along with some adolescent girls. Children aged less than ten years of age only reduced or changed consumption when three or more members were already sacrificing consumption. Notably, almost no households reported cutting consumption of under-five children.

### Vulnerability

The methods used for estimating food insecurity in FSNS-NNS have a short recall period to minimise recall bias. This short recall period therefore enables the system to classify households based on their situation at the time of the interview but not their "regular" food security situation. As such, FSNSP cannot separate the population of the country into those who are food secure at the time of interview but are food insecure during other times of the year or vulnerable to food insecurity when shocks occur.

**Table 4.1: Households receiving benefits from any social safety net programme**

Types of social safety net programme	Proportion
None	71%
Cash for education	20%
Freedom fighter allowance	1%
Old age allowances	4%
Vulnerable group development	1%
Widow allowances	1%
Vulnerable group feeding	4%
Others benefits	1%

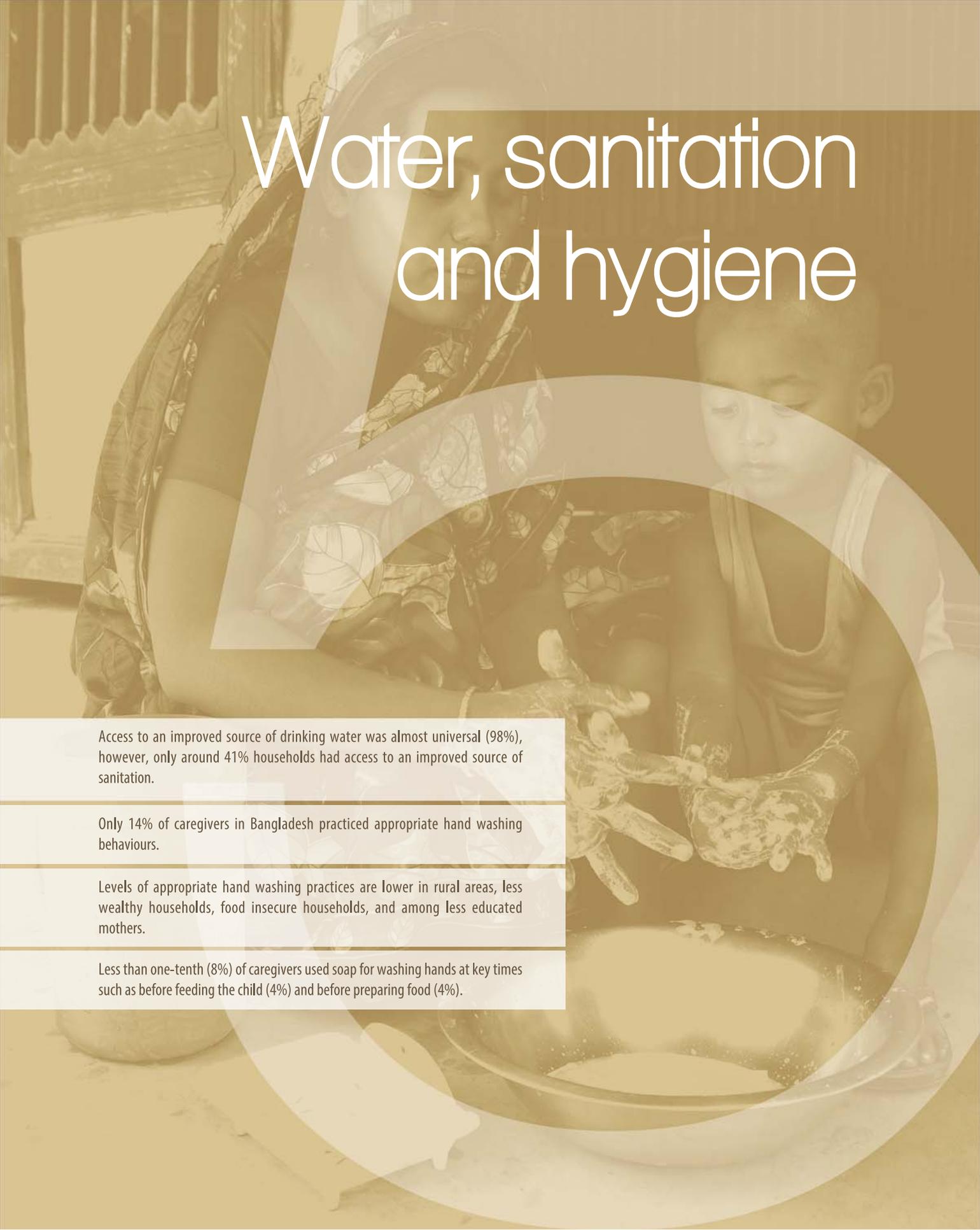
It is possible, however, to separate groups that are more vulnerable to food insecurity by recording if households had received benefits from any government social safety net programme in the past six months. Safety nets include income transfers for those chronically unable to work because of age or handicaps, and for those temporarily affected by natural disasters or

economic depression. These transfers can be without conditions, such as the freedom fighters allowance, or conditional, such as cash for work or cash for education programme. The government has taken these safety net programmes as an important component of national anti-poverty strategies (14,15). Around a quarter of the households in Bangladesh reported receiving any benefit from social safety net programmes while and about 20 are enrolled under the cash for education programme (Table 4.1).

### Recommendations:

- Consumption of adequate diversified diet by the households should be emphasized in different nutritional targets, guidelines and BCC intervention strategies.
- Awareness of the importance of maternal health and nutrition should be emphasized at the policy level, and the household level. Kitchen/home managers, mothers, grandmothers as well as fathers should be targeted for intensive awareness programmes to minimize intra-household inequities in the distribution of food and the diversity of diet.



A woman wearing a patterned sari is washing her hands in a large, shallow metal bowl. A young child is sitting next to her, looking down at the water. The scene is set in a simple, possibly rural, environment. The image has a warm, golden-brown color palette.

# Water, sanitation and hygiene

Access to an improved source of drinking water was almost universal (98%), however, only around 41% households had access to an improved source of sanitation.

Only 14% of caregivers in Bangladesh practiced appropriate hand washing behaviours.

Levels of appropriate hand washing practices are lower in rural areas, less wealthy households, food insecure households, and among less educated mothers.

Less than one-tenth (8%) of caregivers used soap for washing hands at key times such as before feeding the child (4%) and before preparing food (4%).

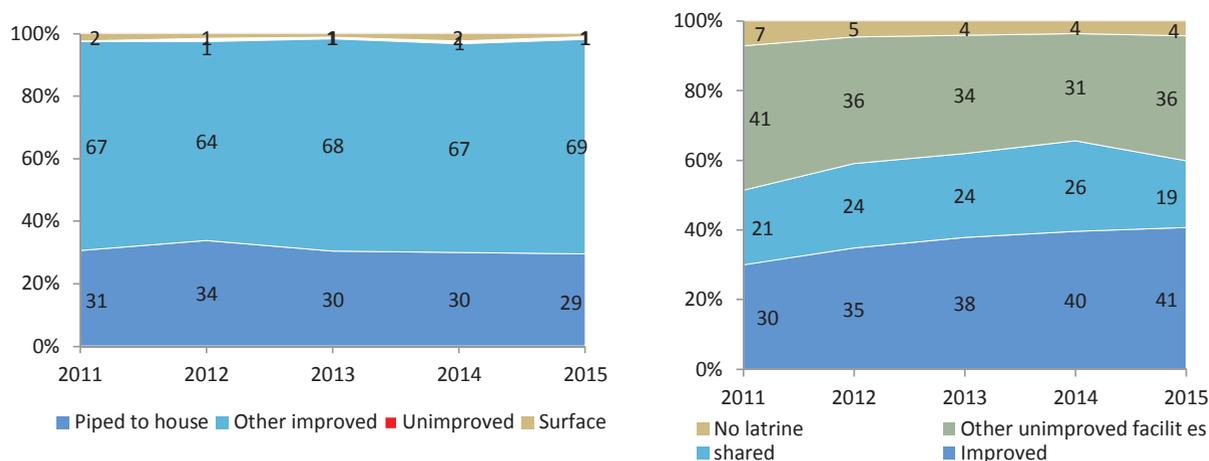


Globally, 4% of all deaths and around 6% of total disease burden result from inadequate water supply, sanitation, and hygiene (1). The majority of these cases are in developing countries where an estimated 2 million child deaths from diarrhea occur annually (2). In addition to the acute effects of these illnesses, frequent bouts of intestinal diseases and helminthes (worm) infections lead to medium term nutrient loss and long term damage to the digestive organs, impeding the absorption of nutrients from food and resulting in malnutrition. In Bangladesh, children as young as three months of age have been shown to have faltering growth related to chronic and acute infection (3). Furthermore, acute illnesses due to these infections result in significant costs to the health care system that could be easily prevented. This section will examine the water and sanitation facilities used by households in Bangladesh, and review progress on indicators of hygiene over the last four years in light of substantial investments in improving water and sanitation throughout the country.

### Drinking water and sanitation facilities

Based on WHO/UNICEF Joint Monitoring Programme guidelines for water supply and sanitation, two principle indicators of improved and unimproved water supply were divided into four sub-groups (5): improved sources<sup>1</sup>, other improved sources<sup>2</sup>, unimproved sources<sup>3</sup> and surface water. The proportion of households dependent on piped water declined slightly from 31 to 29% from FSNSP 2011 to FSNS-NNS 2015 (Fig. 5.1). However, the proportion of households dependent on other improved sources of water increased from 67 to 69% within the same period. No change in the proportion of households using unimproved sources of water was apparent. The sub-groups of sanitation facilities are the proportion of people with no toilet facility (open defecation), unimproved facilities which do not ensure hygiene, otherwise improved facilities which are shared by two or more households and thereby not sanitary, and lastly improved household facilities which include flush toilets, water sealed toilets and closed pit toilets. From FSNSP 2011 to FSNS-NNS 2015, the proportion of households' access to improved latrine increased from 30 to 41%. However, the proportion of households without access to any latrine decreased from 7 to 4% between FSNSP 2011 to FSNSP 2013 then remained same till FSNS-NNS 2015 (Fig. 5.1).

**Figure 5.1: Trends in sources of drinking water and type of latrine, FSNSP 2011- FSNS-NNS 2015<sup>4</sup>**



<sup>1</sup> Improved sources means piped water to dwelling, pipe to yard/plot and household tube well

<sup>2</sup> other improved sources means public tap, shared tube well, protected dug well and rain water

<sup>3</sup> unimproved sources means unprotected dug well, water tanker and spring

<sup>4</sup> Estimated proportions are obtained from the previous FSNSP reports, 2011, 2012, 2013 and 2014 (13, 14, 15, 16)

In terms of sanitation indicators, four-sub groups are identified: no toilet facility (open defecation), unimproved facilities which do not ensure hygiene, otherwise improved facilities which are shared by two or more households and thereby not sanitary, and lastly improved household facilities which include flush toilets, water sealed toilets and closed pit toilets. From FSNSP 2011 to FSNS-NNS 2015, the proportion of households with access to improved latrines increased from 30 to 41%. Although the proportion of households without access to any latrine decreased from 7 to 4% between 2011 and 2013, no further improvement has been apparent since that time (Fig. 5.1).

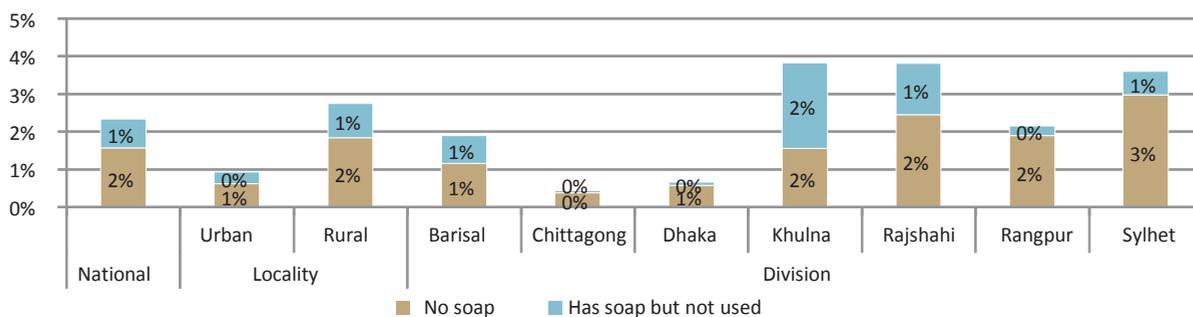
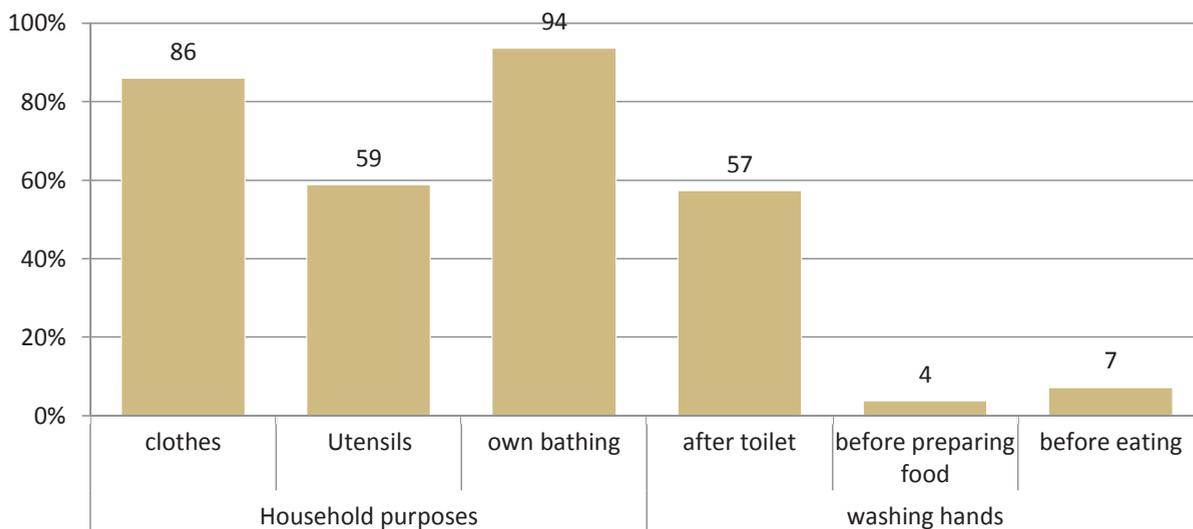
**Table 5.1: Household access to improved drinking water and toilet facilities by division**

		Access to improved drinking water (%)	Access to improved toilet facility (%)
National		98	41
Locality	Urban	100	59
	Rural	98	35
Division	Barisal	100	33
	Chitagong	98	44
	Dhaka	99	44
	Khulna	95	46
	Rajshahi	99	37
	Rangpur	100	46
	Sylhet	95	35

Overall 98% of households had access to improved drinking water at the national level with greater access reported in urban versus rural households. Among divisions, households in Barisal and Rangpur had the greatest access to improved drinking water, while Khulna and Sylhet had the lowest. Nationally, 41% of the households had access to improved toilet facilities. Access was greatest in urban households (59%), and in Khulna and Rangpur divisions (46%) (Table 5.1). We did not consider arsenic in our questionnaire and analysis.

### Hand washing behaviour

While Bangladesh has made considerable progress in ensuring safer drinking water and improved toilet facilities to its citizens, other components of a healthy environment are still lagging behind such as hand washing practices (6). Beginning in 2012 FSNSP has integrated hand washing indicators drawing from modules contained in the Maternal Child Health Integrated Programme/project (MCHIP) (7), supplemented by indicators shown to be effective at predicting diarrhoea episodes in Bangladesh (8). Since 2013 these indicators have been collected for all households (not just household's with children under five) thus permitting a more comprehensive look at households' hand washing behaviour.

**Figure 5.2: Distribution of households having soap by division****Figure 5.3: Use of soap for household and sanitation purposes**

Households in Sylhet division had less access to soap, although use of soap was least in Khulna (Fig. 5.2). Figure 5.5 shows that 94% of the kitchen managers used soap for bathing and 86% for washing clothes. On the other hand, only 4% of them used soap before preparing food and 7% used soap before eating (Fig. 5.3).

### Sanitation and hygiene in households with children

Lack of or inappropriate hand washing before child feeding can increase risk of infection, poor appetite and ultimately malnutrition and death (9). Research also suggests that one-third of diarrhoeal disease episodes can be reduced by promoting hand washing through education and/or the provision of washing goods (9). Efforts to motivate people around hand washing through behaviour change communication (BCC) is therefore critical (10). As under-five children frequently put their hands into mouth, proper hand washing practices among children can also help prevent the transmission of diarrhoeal diseases (11).

**Figure 5.4: Proportion of caregivers by the times when soap was used**

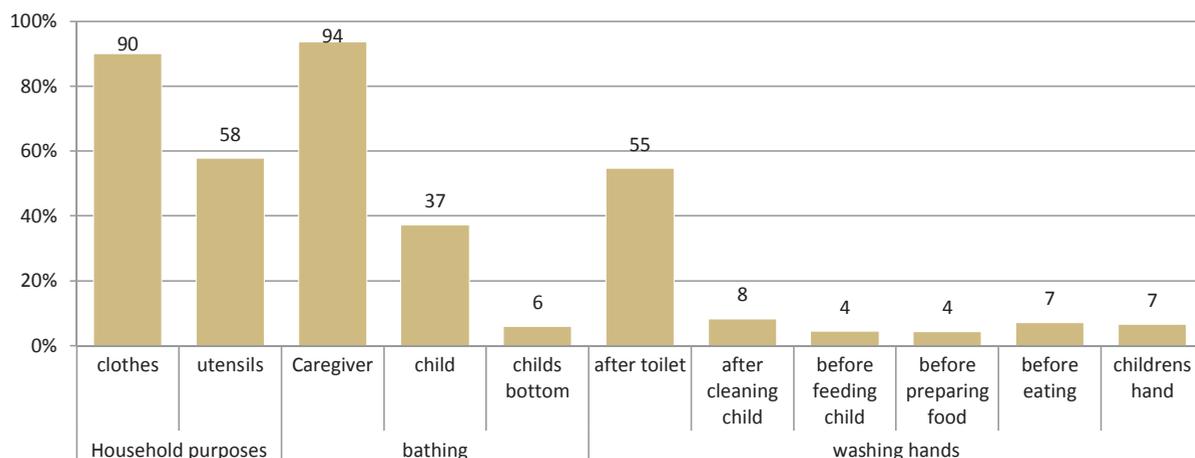
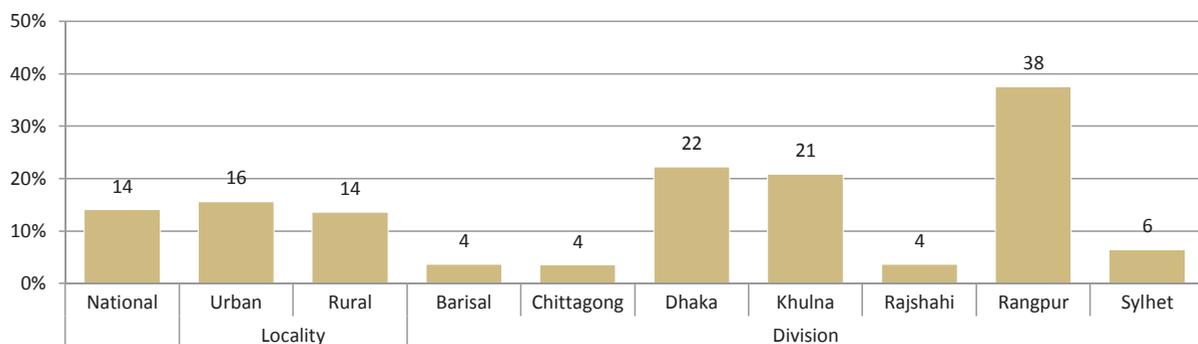
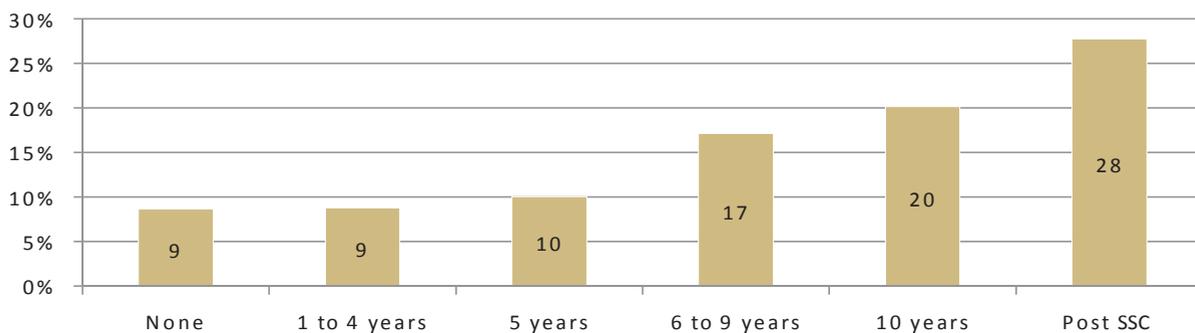


Figure 5.4 shows that 94% of caregivers reported that they used soap for bathing, whereas 90% used soap for washing clothes. However, only a small proportion of caregivers used soap for washing hands before feeding children, before preparing food, before eating or in washing children's hands. A little over one-half of caregivers (55%) used soap for washing their hands after using the toilet. FSNSP further classified hand washing practice by assessing knowledge, practices and coverage (KPC), a survey indicator, which measures the proportion of caregivers in households using soap for hand washing for at least two critical times in the past 24 hours (12).

**Figure 5.5: Caregivers with appropriate hand washing behaviour by division**

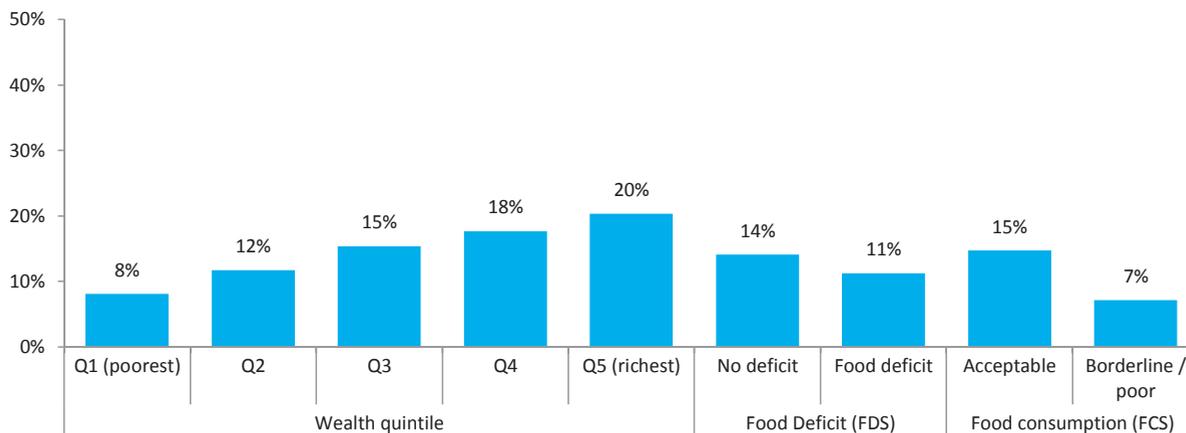


**Figure 5.6: Caregiver hand washing behaviour by educational attainment and water source**



These two critical times include after own defecation, and at least one of the following: after cleaning a young child, before preparing food, before eating, and/or before feeding a child. Figure 5.5 shows that only 14% of the caregivers practiced appropriate hand washing behaviour at the national level, with a slightly greater proportion noted in urban (16%) compared to rural areas (14%). The highest proportion of caregivers (38%) practicing appropriate hand washing was found in Rangpur division, while only 4% of caregivers did so in Barisal, Chittagong, Rajshahi and Sylhet. Educated caregivers (who completed at least SSC) practiced appropriate hand washing more than the uneducated caregivers (Fig. 5.6).

**Figure 5.7: Caregivers with appropriate hand washing by household wealth and food security**



The proportion of caregivers from poorer socioeconomic backgrounds practiced appropriate hand washing less than those from richest socioeconomic groups (Fig 5.7). Similarly, the proportion of households without food deficit practiced appropriate hand washing more than the caregivers of food deficit households. Regarding food consumption, the proportion of caregivers who consumed acceptable levels of food practiced appropriate hand washing more than households reporting borderline food consumption (Fig. 5.7). 12% of under-five children whose caregivers who practiced appropriate hand washing behaviour were stunted and 16% were not stunted. Similarly 9% were wasted while 15% were not wasted, and 9% were underweight while 17% were not underweight (Figure not shown).



# Women nutrition and care

Nationally, two-thirds of women consumed an inadequately diverse diet. This rate is much higher for rural women.

Adolescents and under-18 mothers without under-five children are shorter (26%) than those having children (22%).

Dietary diversity was related to the height of both adolescent girls and adult women

The nutritional status of adult women is associated with wealth and food security status. As the wealth quintile increases, there is a decrease in the proportion of underweight women and an increase in the proportion of overweight women.

In FSNS-NNS 2015, 20% of pregnant women did not receive any antenatal care (ANC) visit and only 29% received four or more visits.

Nationally, one-third of pregnant women and two-thirds of lactating mother took iron and folic acid (IFA).



In Bangladesh, in addition to extreme poverty, unemployment and natural disasters, women and adolescent girls confront additional challenges related to gender norms and power dynamics that further increase their vulnerability to food and nutrition insecurity relative to men.

**Table 6.1: Women interviewed and measured by age group**

Age group in years	Interviewed		Measured (BMI)	
	Number	Weighted proportion	Number	Weighted proportion
10 to 14	456	11%	455	12%
15 to 20	783	16%	708	16%
21 to 25	999	15%	872	14%
26 to 30	1174	15%	1070	15%
31 to 35	927	15%	882	15%
36 to 40	707	12%	690	12%
41 to 45	522	10%	514	10%
46 to 49	355	6%	352	6%
<b>Total</b>	<b>5923</b>	<b>100%</b>	<b>5543</b>	<b>100%</b>

In Bangladeshi society it is customary for women to eat last and less irrespective of their workload. In some cases, women nutritional requirements are not sufficiently prioritized, especially during pregnancy and after delivery (1). FSNS-NNS assesses the nutrition security of adults through the inclusion of one woman per household sampled. Women's nutritional status offers a window into the larger household, as they are

often the first to feel the effects of food shortage, and tend to receive lower levels of care and resources compared to male members of the household (2).

Nutrition plays a crucial role in the maintenance of women's health over their life span, but is even more important during periods of growth, pregnancy and lactation. Adequate nutrition in early life - particularly during the 1,000 days between a woman's pregnancy and her child's second birthday - has enormous benefits throughout the life cycle and across generations. This period provides a 'window of opportunity' to prevent irreversible nutritional loss (3).

To capture the health and nutritional situation of Bangladeshi women of reproductive age, FSNS-NNS collects data on their dietary habits and measures their height, weight, and MUAC. In 2015, over 5,543 women and girls aged 10-49 years were interviewed and measured throughout the country. This report provides nationwide estimates of the nutritional status and dietary patterns for two categories of women - adolescent girls aged 10-18 years and adult women aged 19-49 years. Table 6.1 shows the age distribution of women interviewed and measured (excluding pregnant women).

### Dietary assessment

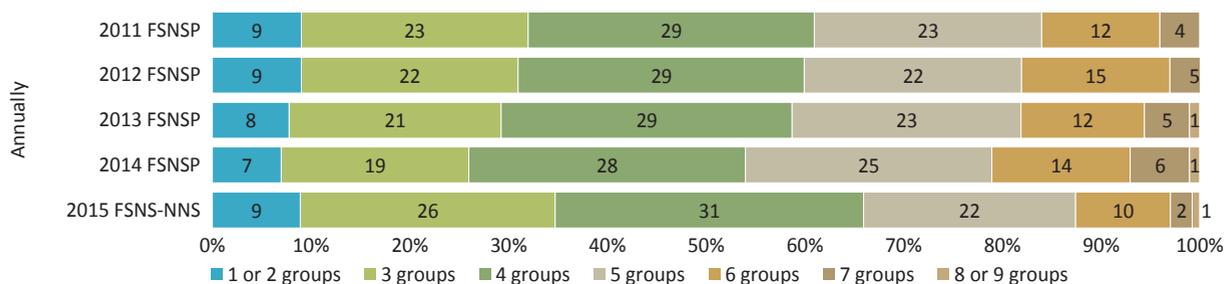
Measures of dietary diversity provide a means of documenting food purchases at the household level, and capturing the quality of diet in terms of macro and micronutrient content, and the number of different food groups consumed. Furthermore, dietary assessment makes it possible to examine food security at the household and intra-household levels (4). Dietary diversity was assessed by interviewing selected women aged 10-49 years about the food items they consumed during the day before interview. Food items were classified into 18 different pre-coded food groups containing different nutrients including those with high micronutrient content, such as dark green leafy vegetables, and those with poor nutrient content but denote increased household purchasing power, such as soft drinks (5,4).

### Dietary patterns and diversity

The proportion of women aged 10-49 years who ate any items from the 19 food types by division are shown in Figure 1. Results indicate that all the women interviewed consumed starches, and more than 90% consumed oil and condiments. In addition, 50% of women consumed small fish and about 40% consumed large fish. Dairy consumption was reported by a little over a quarter of the population, with the lowest rates in Barisal district and the highest Chittagong (Figure 1). About 43% of women consumed dark green leafy vegetables. The highest proportion was found in Rangpur and the lowest in Khulna (Appendix C, Fig. 1).

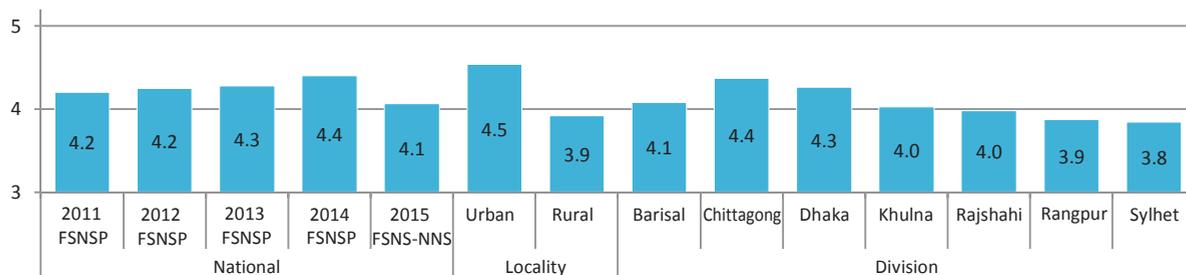
A composite measure of dietary diversity is derived by clustering the 19 food types listed in the questionnaire into a ten-item scale to measure Minimum Dietary Diversity - Women (MDD-W), which is a proxy indicator for global use in assessing the micronutrient adequacy of women's diets. MDD-W was developed to ascertain the quality of a woman's diet in the light of her nutritional needs and validated for women in Bangladesh (5,4). The ten items are: starchy staple foods, beans and peas, nuts and seeds, dairy, flesh foods, eggs, vitamin A-rich dark green leafy vegetables, and other vitamin A-rich vegetables and fruits.

**Figure 6.1: Trends in dietary diversity score among women<sup>1</sup>**



Trends in the dietary diversity score for women between FSNSP 2011 and FSNS-NNS 2015 are shown in Figure 6.1. Between 28-31% of women reported that they consumed four food groups in the previous 24 hours across all five years of surveillance, with a larger proportion of women consuming more than four food groups.

**Figure 6.2: Divisional variation in mean dietary diversity score**



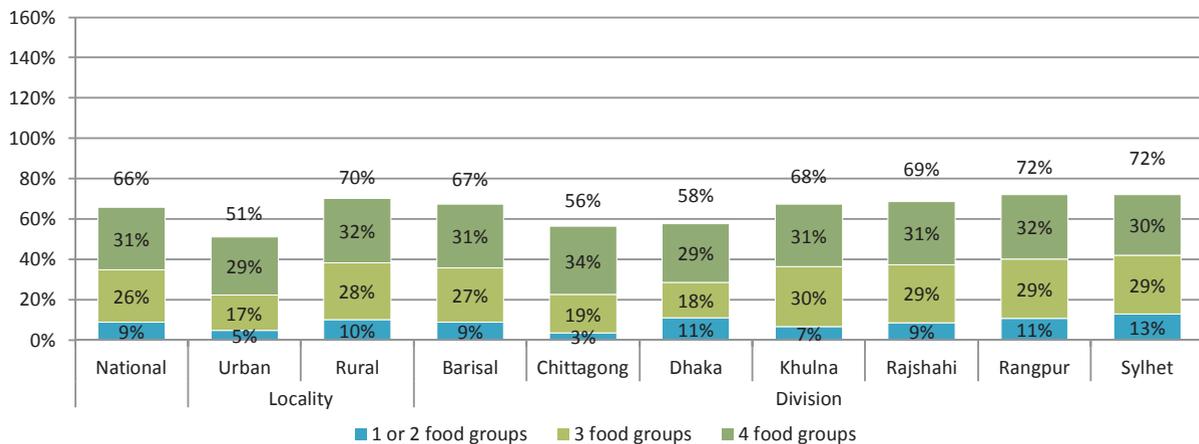
From FSNSP 2011 to FSNSP 2014 there was a steady increase in mean dietary diversity scores. However, in FSNS-NNS 2015 it decreased slightly from 4.4 to 4.1. Mean dietary score was higher in urban areas than the rural areas. When examined by division, Chittagong had the highest and Sylhet had the lowest dietary diversity score (Fig. 6.2).

<sup>1</sup> Estimated proportions are obtained from the previous FSNSP reports, 2011, 2012, 2013 and 2014 (29, 30, 31, 32)

## Dietary inadequacy

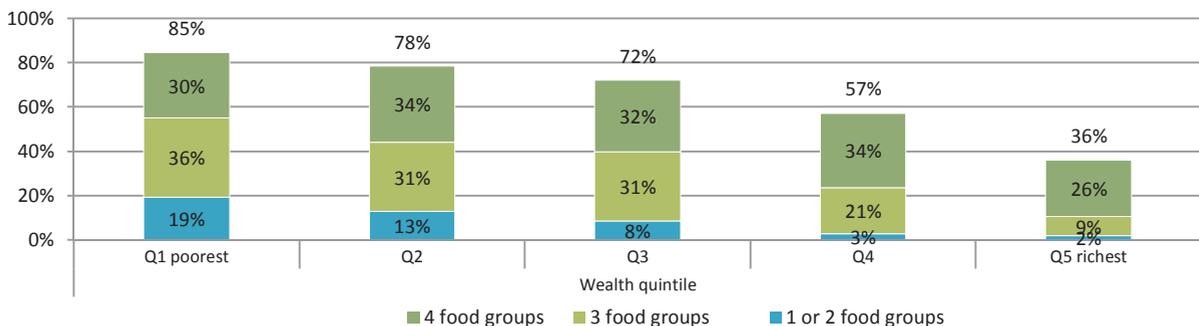
MDD-W is useful in identifying food access and consumption problems among women, and targeting interventions when needed. It may also be used at the community level to evaluate programmes intended to improve food security and nutrition. According to Food and Nutrition Technical Assistance 2 (FANTA-2) it has been seen that the most consistent relationships between the food group scores and the micronutrients status of individuals/women are for riboflavin, folate, vitamin B12, vitamin A and calcium. These nutrients were also positively correlated with dietary diversity indicators, and remained so after even after controlling for energy intake. FSNS-NNS uses the FANTA-2 cut-off considers the consumption of fewer than five food groups out of ten as indicating a diet inadequate in micro- and/or macronutrients (6). Though these cut-offs have only been evaluated among non-pregnant and non-lactating married women aged over 15, FSNSP also applies this method to unmarried women, lactating women, and girls aged less than 15.

**Figure 6.3: Women consuming inadequately diversified diets by division**



At the national level, two-thirds (66%) of women consumed inadequately diversified diets, although the proportion was smaller in urban versus rural areas. About 70% of women of Rangpur, Sylhet and Rajshahi consumed inadequately diversified diets, whereas less than 60% of the women of Dhaka and Chittagong did the same (Fig. 6.3).

**Figure 6.4: Women consuming inadequately diversified diets by household wealth and food security status**



Overall, the consumption of inadequate diet was less common among women from wealthier and food-secured households (Fig. 6.4). However, even among the wealthiest households, more than one-third of women consumed inadequate diets, underlining the need for intensified nationwide nutrition education. Nearly one-third of the women in households with poor and borderline food consumption habits consumed one or two food groups during the day before interview.

### Nutritional status of women and adolescent girls

Malnutrition in adolescence poses multiple risks in terms of growth, morbidity, cognitive development, educational attainment, reproductive health, and adult productivity (6). Children are much more likely to be born with low birth weight (LBW) and to remain malnourished throughout their lives if their mothers are malnourished during adolescence, and/or before and during pregnancy (7). The nutritional status of adolescent girls was assessed by using two measurements, height and body mass index (BMI). As girls are still growing in adolescence, their nutritional status must be examined in light of the normal growth pattern for their age in a well-nourished population. By contrast, women aged 19 years or older have completed their growth, and thus cut-offs can be applied which indicate varying degrees of risk to health and well-being. Because of this difference, direct comparisons between these two populations cannot be made.

#### *Height of women and girls*

The height of adolescent girls is useful in capturing periods of malnutrition suffered during childhood or adolescence. For younger adolescent girls, this measure may provide information about current or recent experiences of chronic malnutrition (8). Assessment of height is based on growth curves from the World Health Organization's (WHO) 2007 growth standards for school-aged children (9,10). These standards are used to compare the growth of adolescent girls in Bangladesh to what is expected for an average, well-nourished population using z-scores. For adult women, height also predicts the risk of complications during delivery, because pelvic size is related to height (8). In addition, since small stature can result from inadequate nutrition during childhood, women of short stature also have higher chance of delivering low-birth weight (LBW) babies due to the inter-generational cycle of malnutrition (9,11). Women's height is typically evaluated against a cut-off between 140 and 150 cm that indicates increased risk of requiring a caesarean section during delivery and of giving birth to LBW babies due to intra-uterine growth restriction. FSNS-NNS uses a cut-off of 145 cm since that is the benchmark used by the DHS system (12).<sup>2</sup> Table 6.2 shows the cut-offs employed for adult women and adolescent girls.

<sup>2</sup> Due to the use of these two internationally standardised methodologies, a disjunction occurs between women aged 18 and women aged 19. Whereas a woman measuring 146 cm in height would be considered short for her age when she is 18 (z-score < -2SD from the mean), among 19 year olds, her height would fall into the normal range (see Figure 6.8).

**Table 6.2: Classification of malnutrition among women and adolescent girls based on height**

Population	Rationale	Category	Definition
Adolescent girls (10 to 18 years of age <sup>3</sup> )	Comparing the growth of the Bangladeshi population to an international standard	Severely undernourished	Height-for-age z-score less than -3 SD
		Moderately undernourished	Height-for-age z-score less than -2 SD but greater than or equal to -3 SD
		Globally undernourished	Height-for-age z-score less than -2 SD
Adult women (19 to 49 years of age)	Identifying the proportion of reproductive age women at increased risk during a normal delivery	Moderate risk	Height less than 145cm

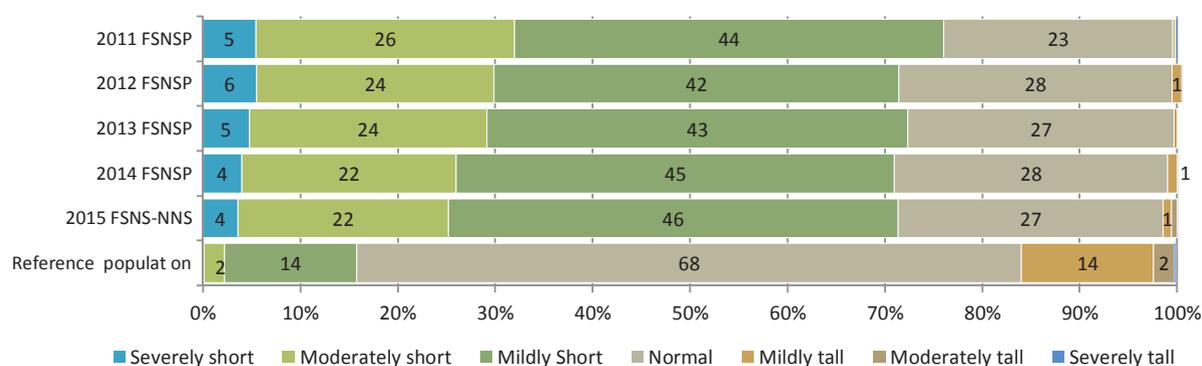
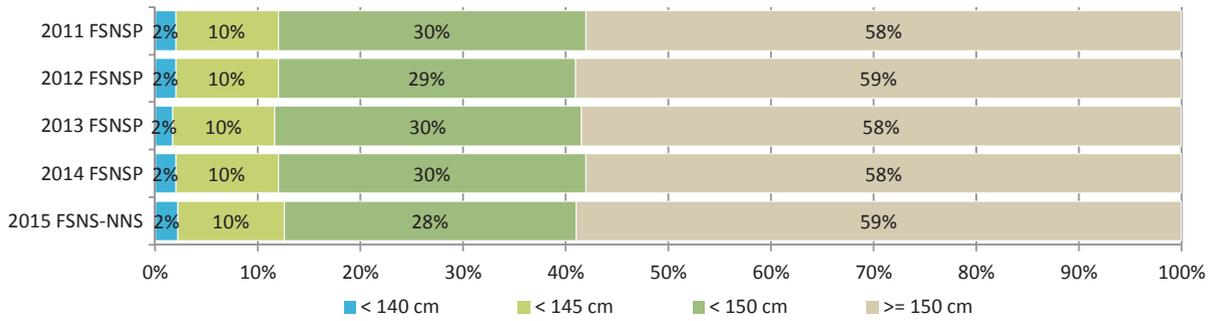
**Figure 6.5: Trends in nutritional status of adolescent girls aged 10 to 18 years using height for age**

Figure 6.5 shows that adolescent height attainment in Bangladesh is less than what would be expected for a well-nourished population. For example, 4% of adolescent girls were found to be severely short, while none would be expected in a well-nourished population. Similarly, 22% of the adolescent girls were moderately short, while 2% would be expected in a well-nourished population. In contrast, almost no girls were found to be mildly, moderately, or severely tall for their age, even though this figure should be 16% according to the reference population. Between FSNSP 2012 and FSNS-NNS 2015, there appears to be a steady decline in the proportion of adolescent girls moderately and severely short for their ages. For adult women, there is no 'ideal' height structure; but the proportion of women under 150 cm should approach zero. For adult women in Bangladesh, 2% of the population was shorter than 140 cm and one-tenth of adult women were shorter than 145 cm (Fig. 6.6).

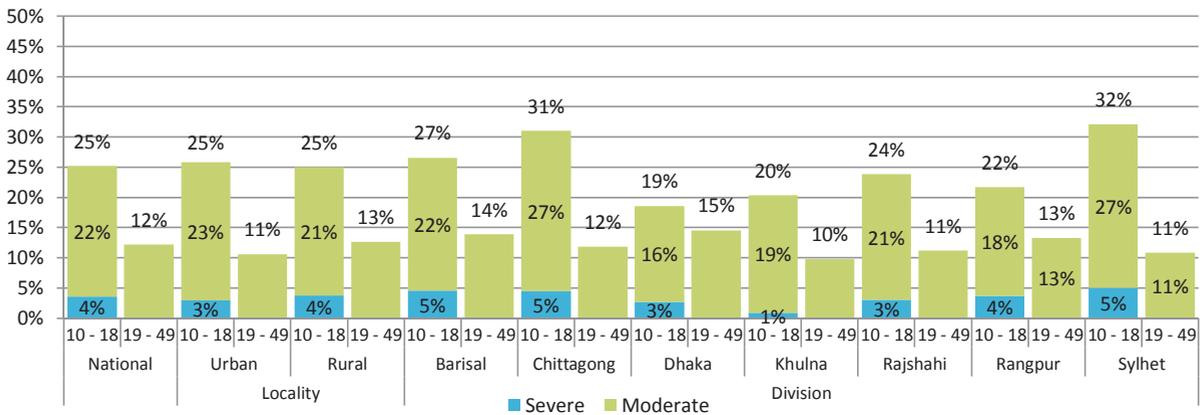
<sup>3</sup> 10 to 18 years of age group includes all the adolescent girls from 10 years to less than 19 years of age.

**Figure 6.6: Trends in the nutritional status of women aged 19 to 49 years based on height**

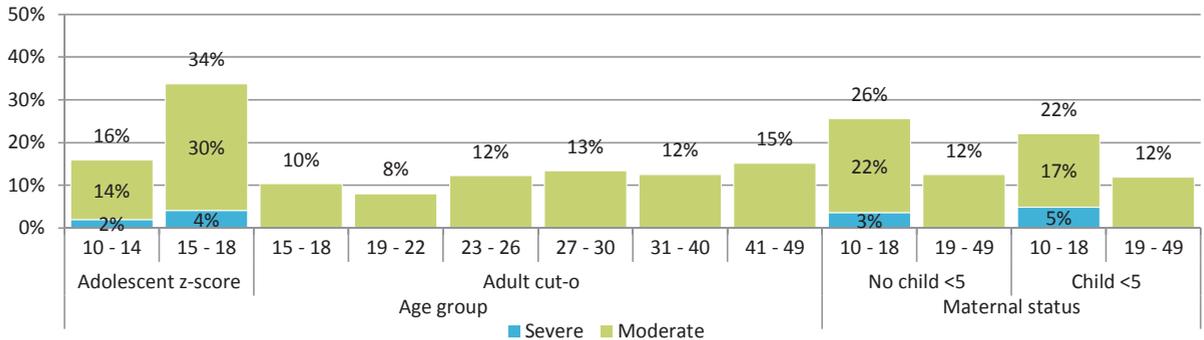


Some variation in both the proportion of women at risk during delivery due to the small stature and in the proportion of adolescents who were too short for their ages is apparent between divisions. Sylhet and Chittagong divisions had the highest rates of adolescent stunting (32% and 31% respectively). Interestingly, the prevalence of adolescent girl stunting was same across urban and rural areas. Among women aged 19 to 49 years, Dhaka district had the highest proportion of stunting (15%) while Khulna had the least (10%) (Fig. 6.7).

**Figure 6.7: Inadequate height of women and adolescents by division**



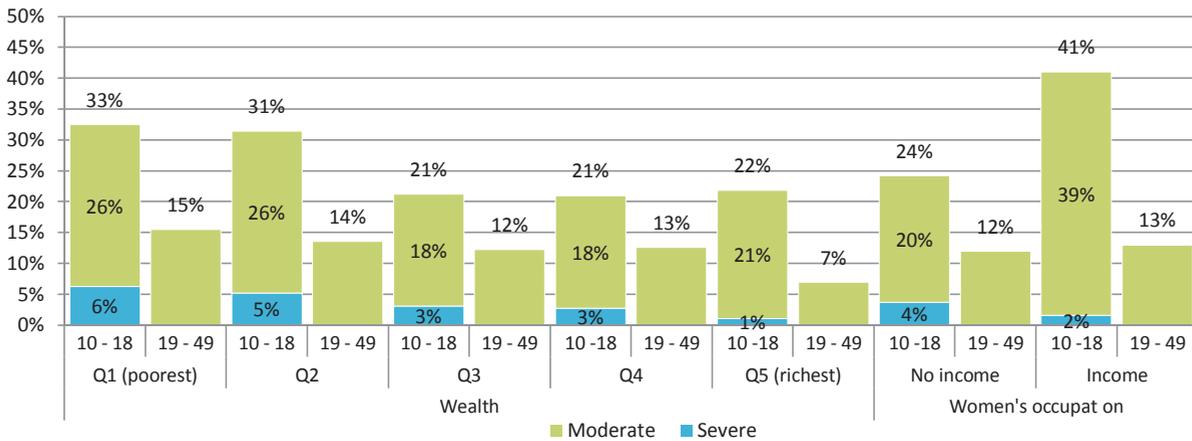
**Figure 6.8: Inadequate height of women and adolescents by age and maternal status**



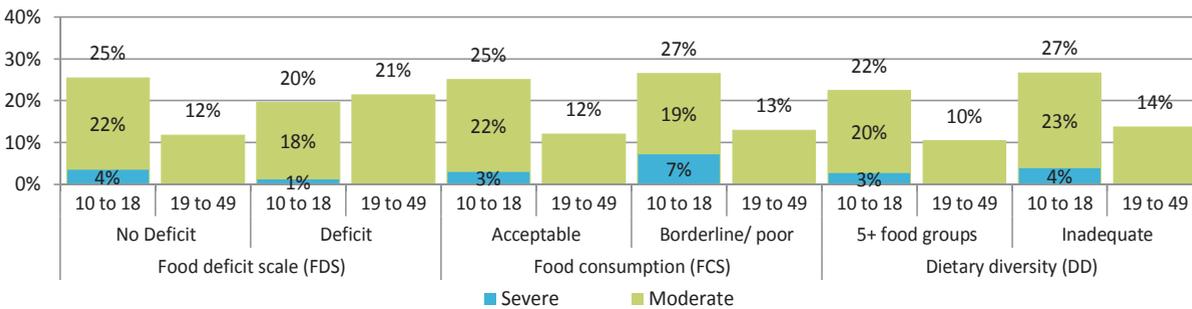
The proportion of women with short stature remained stable over the age range from 15 to 49 years. Among adolescent girls, those aged 15 to 18 were short for their age in much greater proportion (more than double) than girls aged 10 to 14 (Fig. 6.8). Over a quarter (26%) of

adolescent mothers without under-five children were short compared to 22% of those with children. 26% whereas proportion of adolescent mothers with under-five children were 22%. Figure 6.9 also shows the divergence between different adolescent and adult measures. Adolescent girls aged 15 to 18 years were almost three times shorter for their age based on the WHO growth standards than if they were classified using adult cut-offs.

**Figure 6.9: Inadequate height of women and adolescents by household wealth and women's occupation**



**Figure 6.10: Inadequate height of women and adolescents by household food insecurity and dietary diversity**



There was notable variation in the proportion of adolescents and adults with low height attainment across wealth quintiles. In 2015, a greater proportion of adolescents and adults belonging to the poorest quintile were short compared to those in wealthier quintiles. This difference was greatest for adolescent girls, probably due to underlying poverty and its relationship with child labour and height. Women who earned income were shorter than women who did not (Fig. 6.9). The association between short-term food security measures and height, a long-term measure of malnutrition, was rather weak for both adult women and adolescent girls. In contrast, dietary diversity was related to the height of both adolescent girls and adult women (Fig. 6.10).

### Body mass of non-pregnant women and girls

BMI gives an indication of the thinness or obesity of an individual {BMI=Weight (kilograms)/Height<sup>2</sup> (metres)} and is used to represent to the nutritional status of non-pregnant women and adolescent girls. By normalising the weights of individuals against their heights, nutritional status indicators

based on BMI are useful in detecting acute malnutrition, but cannot be applied to pregnant women or those who have recently given birth (12)<sup>4</sup>.

FSNS-NNS uses two different approaches to classify the nutritional status of women and girls based on BMI (Table 6.3). For adolescents and young women aged 10 to 18 years, BMI-for-age z-scores are employed (10,12,13), while for adult women aged 19 to 49, nutritional status is calculated through the use of BMI cut-offs (Asian).

For girls, growth curves provided by the WHO for school-aged children are employed as a reference population (9,10). This reference categorises the BMI of adolescents according to what is expected in a well-nourished population through the use of BMI z-scores. In contrast, for adult women aged 19 to 49, Asian cut-off values are applied which correspond to the point at which women have a greater propensity for illness and reduced work capacity (12).

As was the case with height measures, these two systems are not compatible or directly comparable, though there is a closer alignment between the BMI classification systems for malnutrition, and in both systems varying grades of severity are provided.<sup>5</sup> Because the adult measure includes mildly malnourished individuals while the adolescent measure does not, the adult measure of under nutrition is expected to contain a greater share of the population.

BMI measures are also used to estimate the proportion of the overweight or obese population and thereby at greater risk for non-communicable disease (13). Similar to the system used for malnutrition, to estimate the level of overweight and obesity in a population, different cut-offs are employed for adolescent girls and adult women. Girls are classified relative to what is expected in a well-nourished population, while women are classified based on BMI score at which an increased risk of non-communicable diseases has been observed (13). Like BMI malnutrition measures, these two approaches to BMI measurement are aligned but not entirely comparable. As an international system of classification, the adolescent measure more closely aligns with the international cut-offs for obesity in the highest age groups instead of the Asian cut-offs or at-risk values.<sup>6</sup> Because of these differences, and similar to the estimates of under nutrition, the adult measure of overweight and obesity contains a greater share of the population.

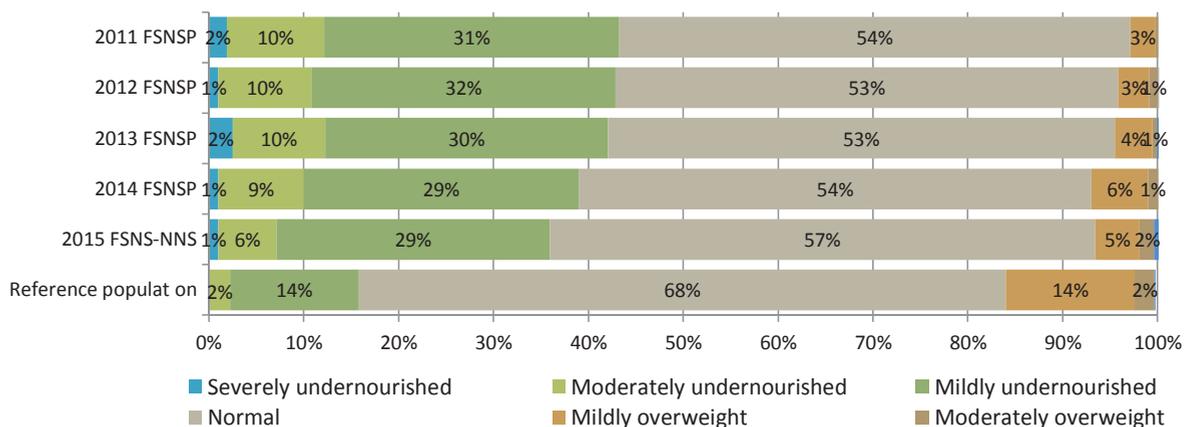
<sup>4</sup> All women who reported that they were pregnant and whose youngest measured child was less than two months of age are excluded from all estimates in this section in line with DHS recommendations.

<sup>5</sup> For example, a girl with a BMI of 18.4 at 18.9 years of age would be considered mildly malnourished (z-score < -1 SD but > -2SD), but this level of malnutrition is of less concern and generally not reported when z-scores are used, as approximately 14% of the population are expected to fall into this category in a well-nourished population. However, when this girl turns 19, she will be included in the estimate for CED.

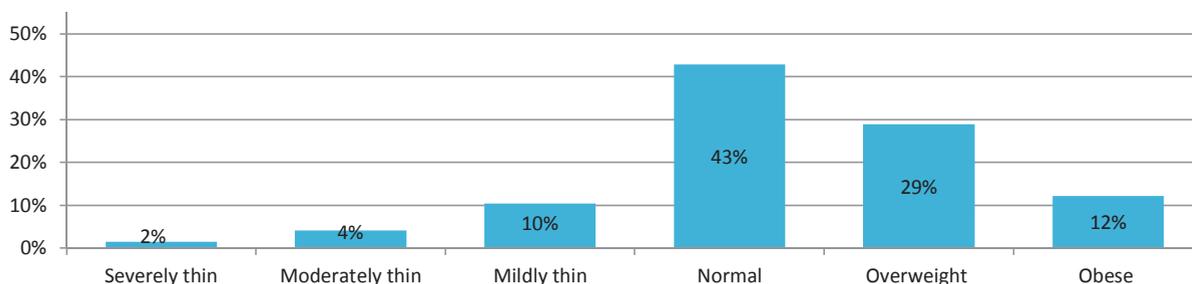
<sup>6</sup> For example, +1SD at 18.9 years of age is approximately equal to a BMI score of 25, while +2SD at 18.9 years of age is approximately equal to a BMI score of 30. As a practical example, a girl with a BMI of 23 at 18.9 years of age would not be overweight (z-score < +1 SD), but she would be when she became 19 as a member of an Asian population.

Table 6.3: Classification of malnutrition based on BMI for women and adolescent girls

<i>Population</i>	<i>Rationale</i>	<i>Category</i>	<i>Definition</i>
Adolescent girls (10 to 18 years of age)	Comparing the growth of the Bangladeshi population to an international standard	Severely undernourished	BMI-for-age z-score less than -3 SD
		Moderately undernourished	BMI-for-age z-score less than -2 SD but greater than or equal to -3 SD
		Globally undernourished	BMI-for-age z-score less than -2 SD
		Severely overweight	BMI-for-age z-score greater than +3 SD
		Moderately overweight	BMI-for-age z-score greater than +2 SD but less than or equal to +3 SD
		Globally overweight	Height-for-age z-score greater than +2 SD
Adult women (19 to 49 years of age)	Identifying the proportion of the reproductive age population with increased risk of communicable illness and decreased energy levels	Severely thin	BMI less than 16
		Moderately thin	BMI less than 17 but greater than or equal to 16
		Mildly thin	BMI less than 18.5 but greater than or equal to 17
		Chronically energy deficient (CED)	BMI less than 18.5
	Identifying the proportion of the reproductive age population with increased risk of non-communicable disease	Increased risk for Asian populations	BMI greater than 23 but less than 27.5
		Overweight (International cut-off)	BMI greater than 25 but less than 30
		High risk for Asian populations	BMI greater than or equal to 27.5
		Obesity (International cut-off)	BMI greater than or equal to 30

**Figure 6.11: Trends in the nutritional status of adolescent girls aged 10 to 18 years using BMI**

Using z-scores, figures for Bangladeshi girls aged 10 to 18 years (upper bars) are juxtaposed against the WHO reference group (lowest bar). This reference indicates that 68% of the population should fall in the normal range, with 16% in underweight and overweight groups on either end. In contrast to this ideal, in FSNS-NNS 2015, 57% of the girls in Bangladesh fell in the normal range and 36% were under-nourished below -1SD from the mean, with only a small percentage overweight (mild - 5%, moderate - 2%, severe - 0%). This distribution has been more or less static since FSNSP 2012, notwithstanding marginal improvements in the lower tail.

**Figure 6.12: Nutritional status of women aged 19 to 49 years using Asian cut-off values of BMI**

According to BMI based on Asian cut-off values, 43% of women fell into normal category (Fig. 6.12). The proportion of over-nourished women (41%) was more than the proportion of under-nourished women (16%). However, according to BMI categorized by international cut-off values, a different picture emerges: the majority of women (59%) fell into normal category, more than one-fourth fell into over-nourished category and the rest fell into under-nourished category (Figure not shown).

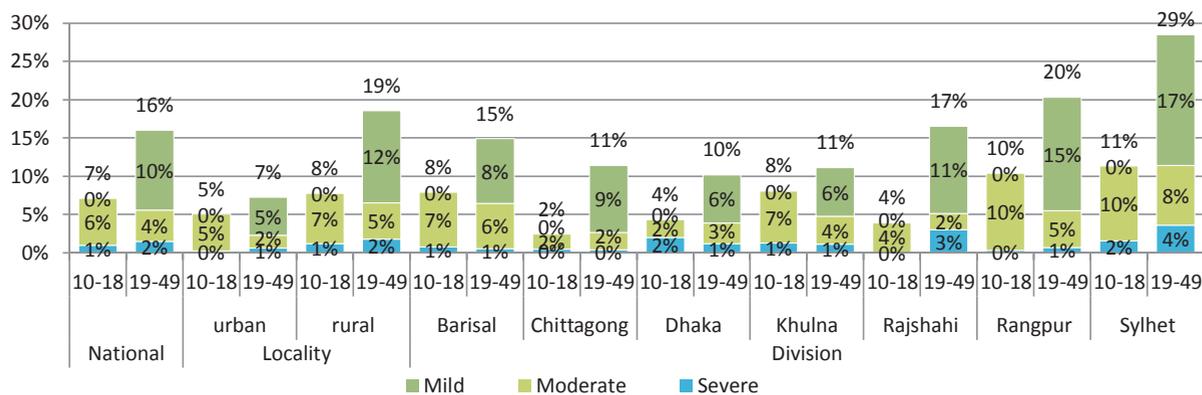
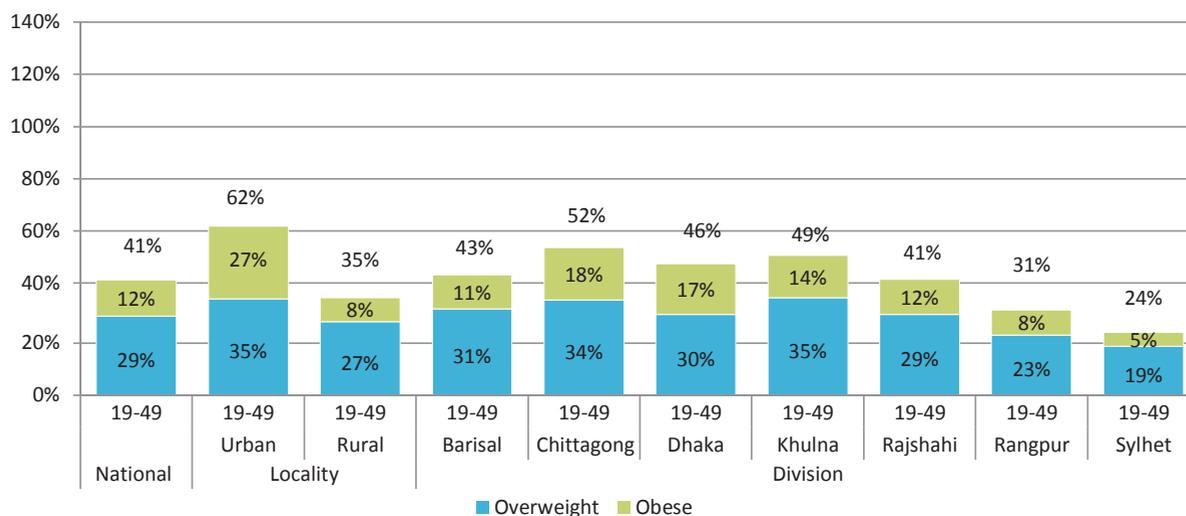
**Figure 6.13: Under-weight women and adolescent girls by division using Asian cut-off values of BMI <sup>7</sup>**

Figure 6.13 shows that nationally 16% women were underweight, of which 2% were severely underweight. By contrast, 7% adolescent girls were under-weight, of which 1% were severely underweight. The proportions of both underweight adolescent girls and women were greater in rural area than urban area. Among all the divisions, Sylhet had the highest proportion of underweight women and adolescent girls (4% and 2% of them respectively were severely underweight).

**Figure 6.14: Overweight and obesity) of women by division based on Asian cut-off values of BMI**

Based on Asian cut-off value of BMI, 29% women were overweight and 12% were obese. In urban areas the proportions of overweight (35%) and obese women (27%) were substantially larger than rural areas (27% and 8% respectively). Khulna and Chittagong had the highest proportion of overweight women (about 35%) and Chittagong and Dhaka had the highest proportion of obese women (about 18%) (Fig. 6.14). However, if international cut-off values of BMI are applied, Chittagong division had the largest proportion of overweight women followed by Khulna, while Dhaka had the largest proportion of obese women followed by Rajshahi (Figure not shown).

<sup>7</sup> For the remainder of the graphs in this chapter the following cut-offs will be used:

**10 to 18 years underweight:** Severe - BMI z-score less than -3 SD; Moderate - BMI z-score greater than or equal to -3 SD but less than -2 SD

**19 to 49 years underweight:** Severe - BMI less than 16; Moderate - BMI greater than or equal to 16 but less than 17; Mild - BMI greater than or equal to 17 but less than 18.5

**19 to 49 years overweight:** Mild - BMI greater than 23 but less than or equal to 25; Moderate - BMI greater than 25 but less than or equal to 28; Severe - BMI greater than 28

**Figure 6.15: Nutritional status of adolescent girls by age group**

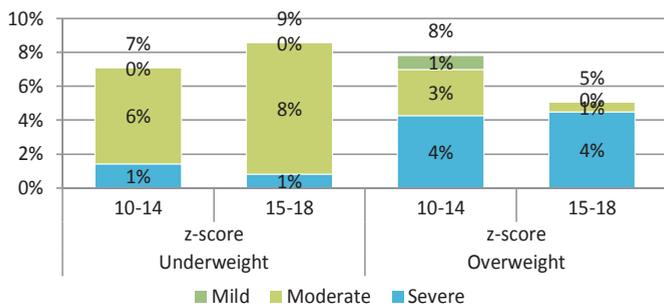
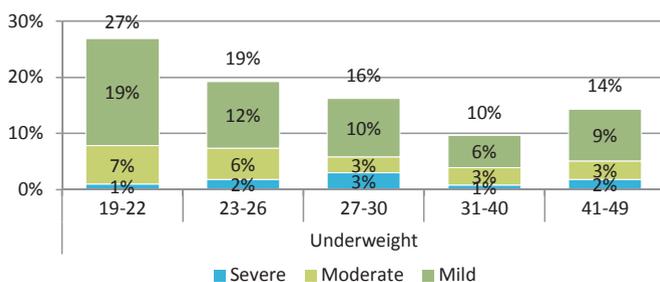


Figure 6.15 shows the distribution of nutritional status of adolescent girls by age group. The proportion of underweight adolescent girls was larger among older girls. By contrast, the proportion of overweight girls was greater the in 10-14 year age group, where half of them were severely overweight.

**Figure 6.16: Underweight women by age group using Asian cut-off values of BMI**



The proportion of underweight women was highest among the 19-22 years age group. The proportion was more or less similar for rest of the age groups except the women aged 31-40 years where 10% of the women were underweight (Fig. 6.16).

**Figure 6.17: Overweight and obese women by age group based on Asian cut-off values of BMI**

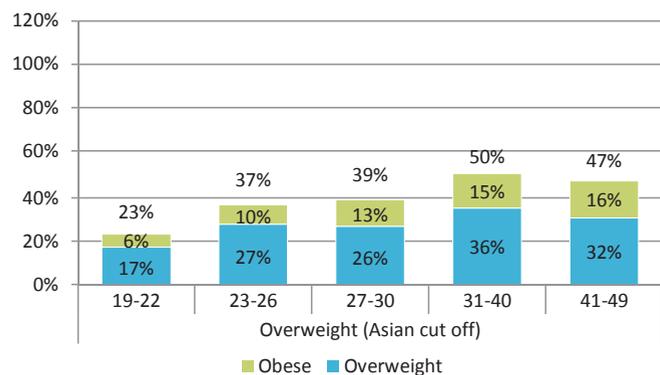
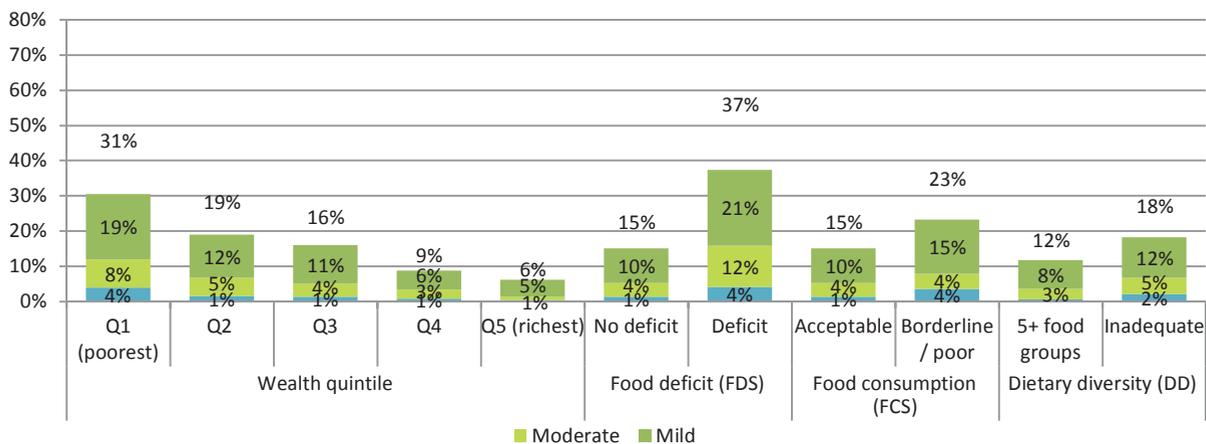
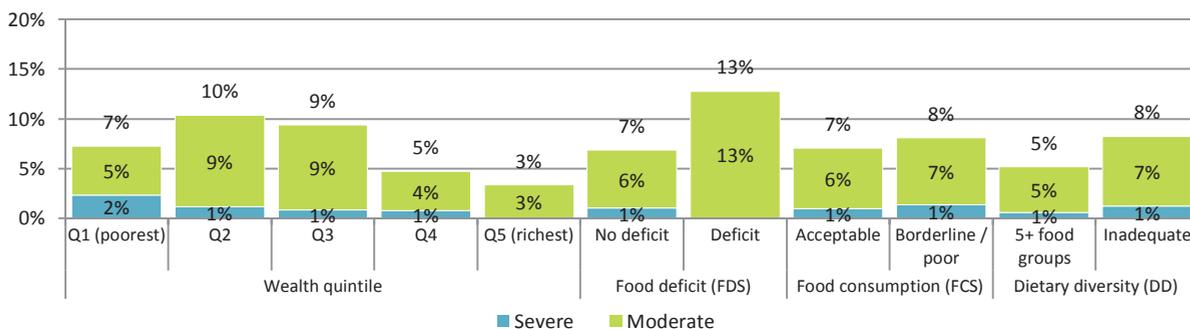


Figure 6.17 shows the prevalence of woman's overweight and obesity by age category based on Asian cut-off values of BMI. The proportion of overweight was highest among women aged 31-40 years, while obesity is highest among those aged 41-49 years.

**Figure 6.18: Underweight women by wealth, food security, and dietary diversity using Asian cut-offs of BMI**



**Figure 6.19: Underweight adolescent girls by wealth, food security, and dietary diversity**

The prevalence of underweight was five times higher (31%) among the women in the poorest quintile compared to those in the richest (6%). Similarly, the prevalence of underweight was higher among the women who had food insecurity, consumed poor and inadequate diversified food, and had inadequate dietary diversity (Fig. 6.18). For adolescent girls, the prevalence of underweight was among those from poor and middle-income families. Similarly, the prevalence of underweight was greater in adolescent whose families reported food insecurity, or consumed poor and inadequate diversified food. Interestingly, severely underweight girls were found in no food deficit families (Fig. 6.19). Further in-depth study is necessary to explore this issue.

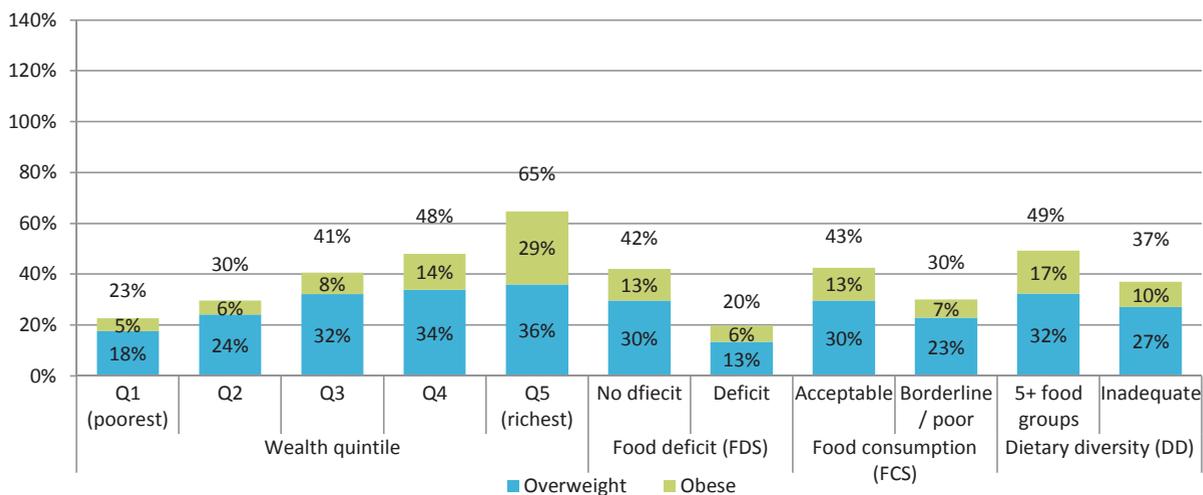
**Figure 6.20: Overweight and obesity among women by wealth, food security, and dietary diversity based on Asian cut-off values of BMI**

Figure 6.20 shows that the prevalence of overweight and obesity was higher among the richest women as well those living in food secure households, and who consume more than 5+ food groups. Similar findings were observed when International cut-off values for BMI were applied to categorize overweight and obesity (Figure not shown).

### Maternal nutrition

Optimal pregnancy outcomes occur when women are well-nourished and healthy throughout their life cycle and receive special care in preparation for, during, and after pregnancy. In Bangladesh,

multiple constraints, such as poverty, inadequate health services, and culturally-based taboos on care seeking, lead to a lack of adequate protection for pregnant women, compromising the health and well-being of both mothers and infants (1,2,3). Care in early pregnancy confers a beneficial effect on pregnancy outcomes. Women who do not receive clinical ANC have a significantly greater odds of miscarriage compared to those who attended a clinic for an ANC check-up during their first trimester (4). In addition, poor nutritional status of women results in giving birth to LBW babies. According to MICS 2012-2013, LBW (<2,500 g) affected 26% of infants in Bangladesh, almost twice the 15% threshold that indicates a public health problem (5). A recent study in 2013 recorded even higher rates, with nearly one-quarter of children born pre-term, over one-half born with LBW, and over one-third of children stunted from birth (4).

Care during pregnancy has multiple components, some requiring health professionals and some dependent on family. In FSNS-NNS 291 pregnant women were interviewed and measured, and 197 women with a child aged less than six months were interviewed to obtain information about the care they received during and immediately after their pregnancy.

### ***Antenatal care***

Pregnancy related complications and disabilities are mostly preventable by ensuring sufficient nutrition and care, which should ideally be started before conception, ensuring that the women are healthy enough to conceive and carry a child to full term (14,15,16). Therefore, care before pregnancy, between pregnancies and during pregnancy also affects the survival and health of the new-borns (17). Pregnant women who are malnourished are more likely to give birth to LBW babies, as are women who were undernourished during their first 1,000 days of life. Pregnancy should be delayed until a woman's body has matured and pregnancies should not be timed too close together (16,18,19). Bangladesh, however, has had limited success in raising the age of first pregnancy, although progress has been made in reducing the number of births among young girls (<15 years old) (20,21,22). Almost half of the pregnant women in the sample were  $\leq 22$  years of age, and the largest proportion of pregnant women were in the age group 19 to 22 years.

Access to skilled care during pregnancy, childbirth, and the first month after delivery is the key to saving the lives of pregnant women and their children. Bangladesh has made remarkable progress in achieving certain goals related to child health, family planning, and maternal health indicators over the last three decades (NIPORT *et al.*, 2011) (23), although improvements in maternal health status has been slower child health and family planning. According to the latest DHS survey, eight out of 10 pregnant women have had at least one ANC visit while majority of them (64%) received care from a medically trained provider.

Clinical ANC encompasses many different components, which together help ensure the health and safety of mother and baby during pregnancy and delivery. FSNS-NNS collects information on the use of ANC services by women during pregnancy by measuring the proportion of women who are meeting demand-level recommendations of the WHO Technical Working Group on ANC (12). These recommendations state that proper care for mother and child requires that pregnant women have a minimum of four visits with skilled health personnel which are to be completed at specific times during the pregnancy (24). The FSNS-NNS system ascertains this information by interviewing mothers of children aged <6 months about care they received during their pregnancy.

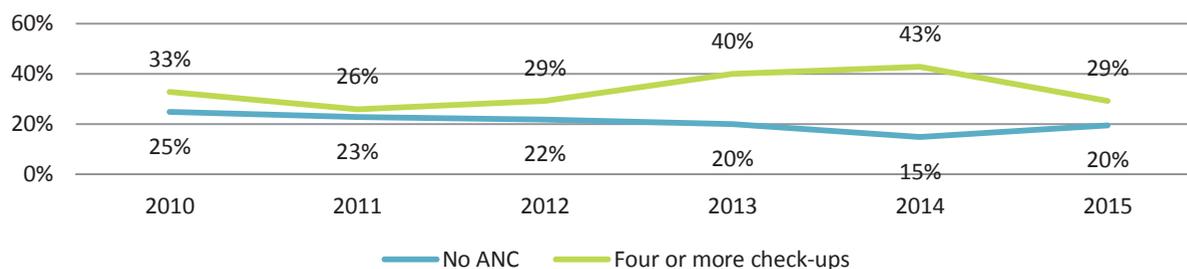
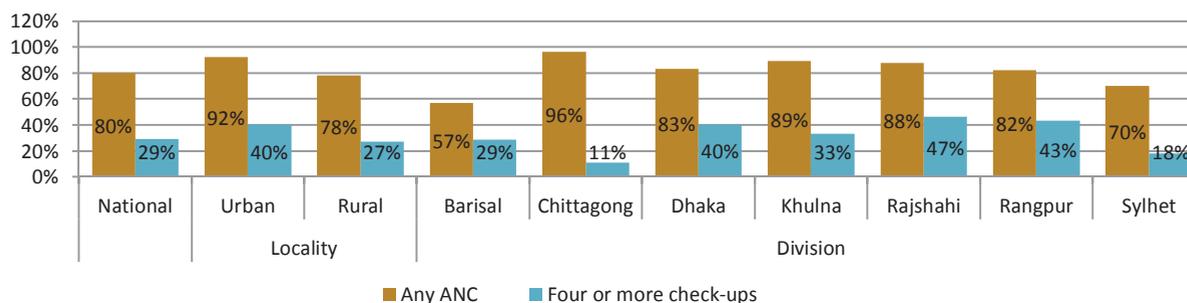
**Figure 6.21: Trends in ANC for women who gave birth in the six months before interview**

Figure 6.21 shows trends in ANC care among women between 2010 and 2015. The proportion of women who did not take ANC gradually decreased from 2010 to 2014, although in 2015 the proportion increased from 15% to 20%. The proportion of women who received four or more ANC declined in 2011, then gradually increased in the next three years, with another decline apparent in FSNS-NNS 2015.

**Figure 6.22: Mothers receiving ANC by division and locality**

In FSNS-NNS 2015, 80% of women took at least one ANC during their pregnancy, whereas 29% received four or more ANC at the national level. The proportion of women who received any ANC was higher in the urban population and among the women living in Chittagong followed by Khulna, Rajshahi and Dhaka divisions. The proportion of women who received four or more ANC was higher in urban areas and among women in Rajshahi, followed by Rangpur and Dhaka divisions (Fig. 6.22).

IFA tablets are an essential component of adequate ANC. Pregnant women need additional IFA to meet their own nutritional needs as well as those of the developing fetus (25). Iron assists in the prevention of anaemia and associated complications during pregnancy and delivery - such as pre-term and LBW births as well as increased risk of haemorrhage during delivery - and folic acid reduces the risk of neural tube defects in infants while helping fight anaemia (26).

In Bangladesh, this supplement is provided to pregnant women by the government as part of regular ANC services. However, coverage of and compliance with the IFA supplementation intervention are low due to lack of awareness and inadequate delivery mechanisms (27). Only 27% of lactating mothers consumed IFA for up to three months. FSNS-NNS keeps records of whether IFA tablets are received or not by pregnant women. It records two measures of women's consumption of IFA tablets - a) recommended quantity of at least 100 IFA tablets received during the last pregnancy for women with a child aged <6 months, and b) the number of tablets taken in the last week for currently pregnant women.

**Figure 6.23: Pregnant women taking IFA by trimester**

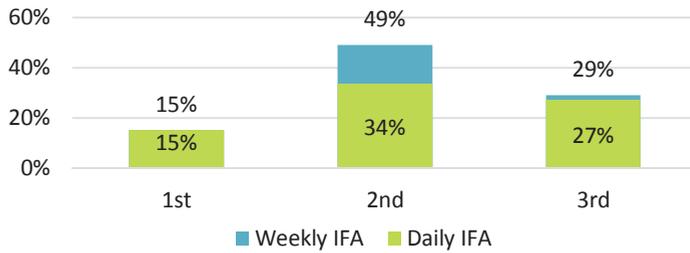
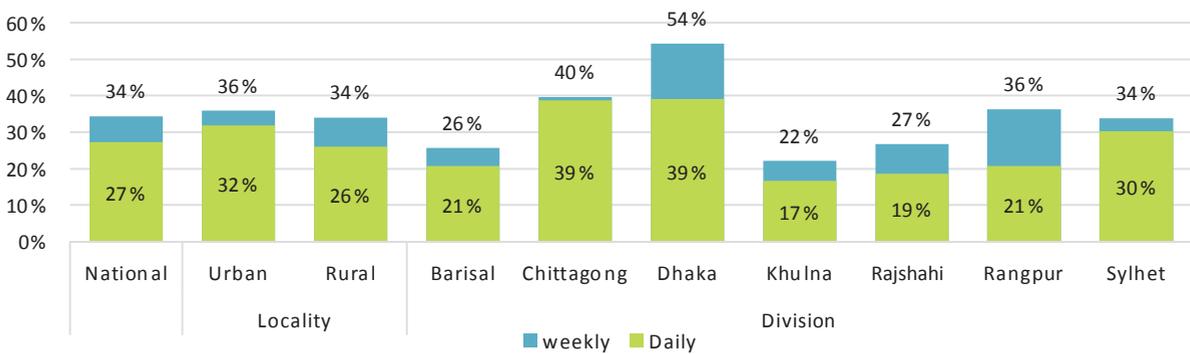


Figure 6.23 shows that the highest proportion of women took IFA (weekly and daily) during their 2nd trimester and the proportion was lowest among the women in their 1<sup>st</sup> trimester.

In FSNS-NNS 2015, 34% of pregnant women took IFA weekly while 27% took it daily. The proportion of women receiving IFA (weekly and daily) was

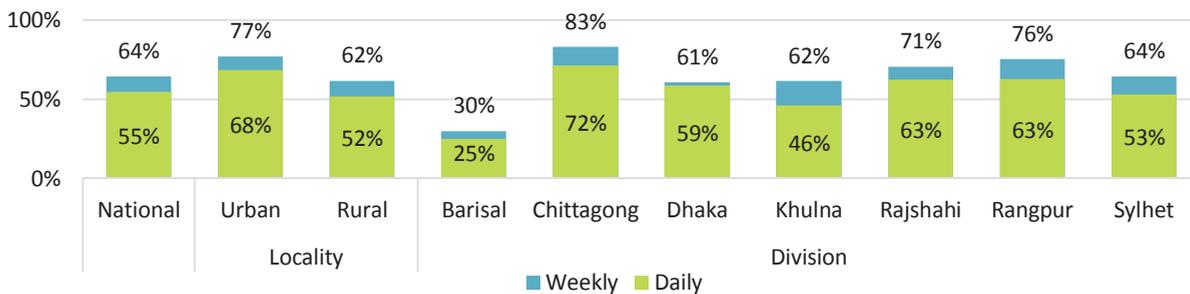
higher in urban areas and among women living in Dhaka division (Fig. 6.24).

**Figure 6.24: Pregnant women taking IFA by division**



Sixty-four percent of the lactating women took IFA weekly, and among them 55% took IFA daily. The proportion of lactating mothers who received IFA (weekly and daily) was higher in urban areas and among the women of Chittagong division. The proportion was lowest among women in Barisal division (Fig. 6.25).

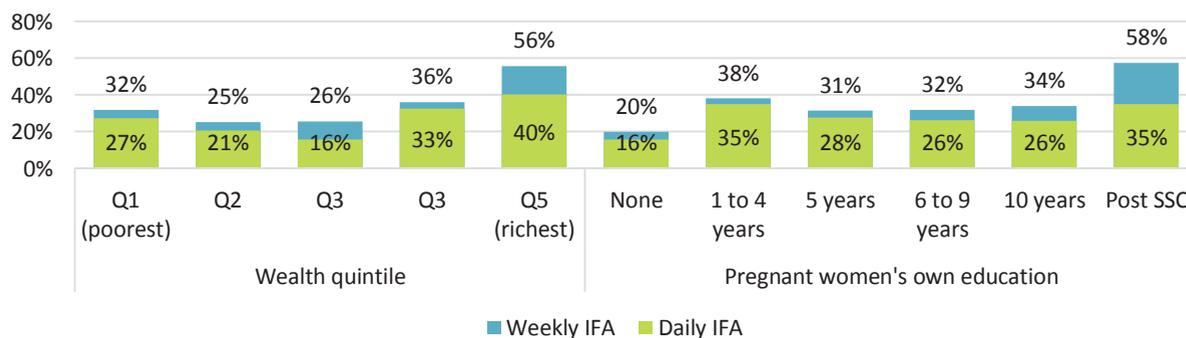
**Figure 6.25: Lactating women taking IFA by division**



The proportion of women taking at least 100 IFA tablets during their last pregnancy was only 18% (Figure not shown). While there was a limited association between women's age and adherence to an IFA regimen (not shown), expected patterns related to wealth were observed. The proportion of women of richest households took IFA was larger, as well as among those who had studied after completion of SSC and lowest in uneducated women.

The proportion of women taking IFA daily was highest in those who had studied 1 to 4 years after completing their SSC and lowest among uneducated women. However, the proportion of women taking IFA weekly and daily, who had completed five years or six to nine years of study was smaller than those who completed one to four years of study (Fig. 6.26). Further in-depth study is needed to explore this issue.

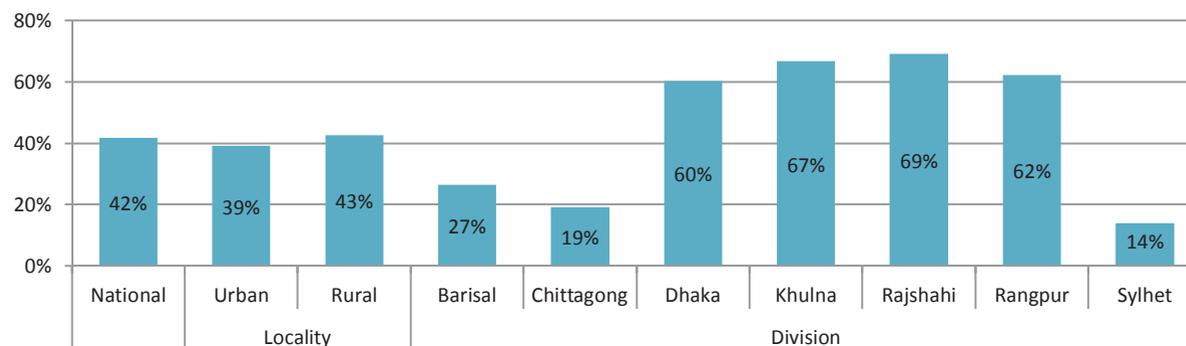
**Figure 6.26: Pregnant women taking IFA by household wealth and own education**



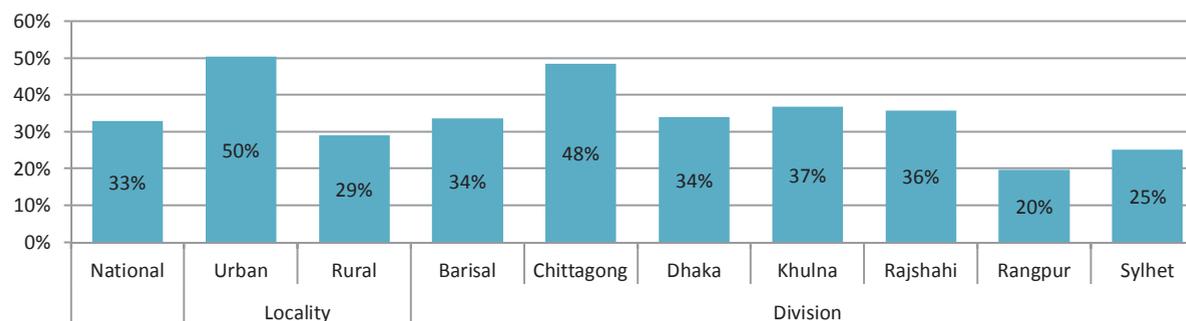
### ***Nutritional care and support during pregnancy***

Along with clinical ANC, women must receive special consideration at home during pregnancy to ensure optimum health of mother and child. A pregnant woman's household should support her to reduce heavy work and increase the quantity and quality of her diet (14). Household and self-care for pregnant women are captured by a number of FSNS-NNS indicators including diet composition, amount of rest taken, and amount of food consumed.

**Figure 6.27: Women taking extra food during pregnancy by division**

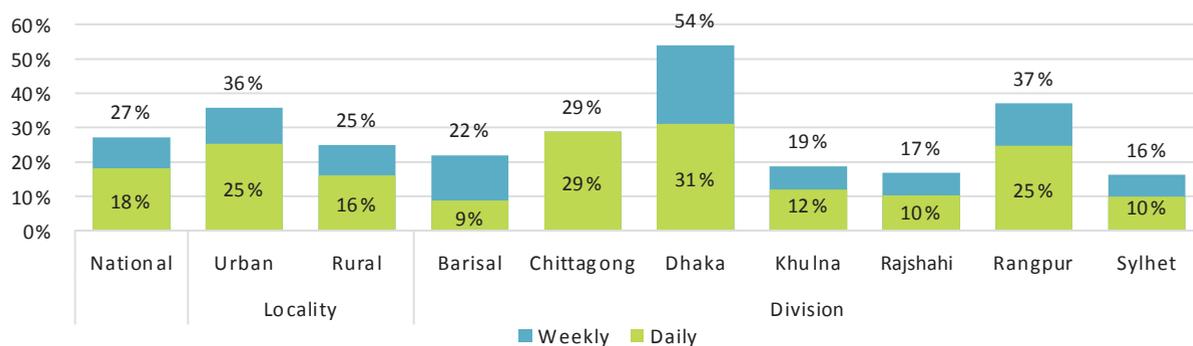


**Figure 6.28: Lactating women taking adequate diet by division**



As shown in Figure 6.27, at the national level, 42% of pregnant women reported taking extra food during their pregnancy. The proportion was slightly higher in rural compared to urban areas. Among divisions, less than a fifth of women in Sylhet and Chittagong took extra food during pregnancy, whereas in Dhaka, Khulna, Rajshahi and Rangpur divisions, more than 60% of women reported this practice. Given the importance of adequate diet during lactation, women who were breastfeeding were asked about the adequacy of their diet. Overall, a third of lactating women stated that they were consuming an adequate diet, although the proportion is greater in urban areas (50%) than rural (29%). Considerable divisional variation was apparent. About 50% lactating women of Chittagong division took adequate food, with a low of 20-25% in Sylhet and Rangpur (Fig. 6.28).

**Figure 6.29: Calcium supplementation in pregnant women within the last seven days**



**Figure 6.30: Calcium supplementation in lactating women within the last seven days.**

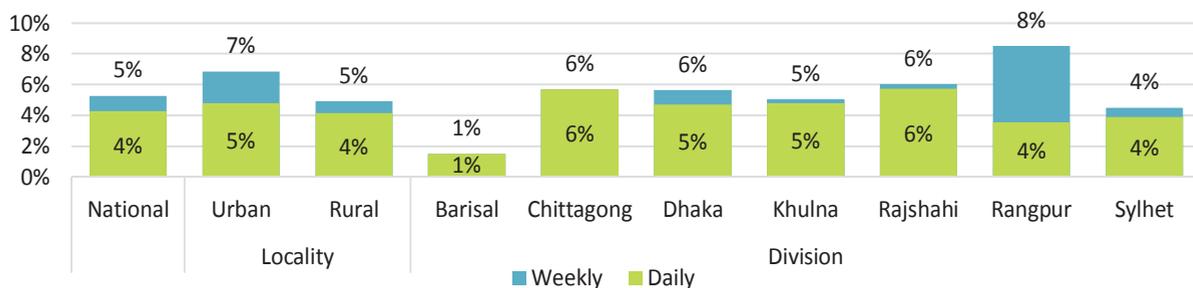
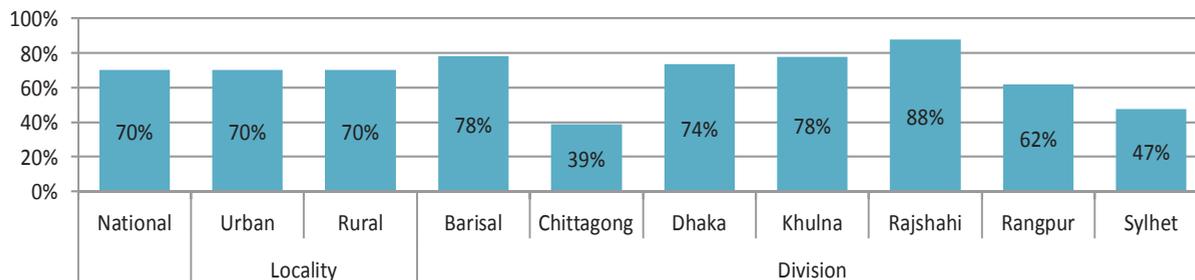


Figure 6.39 shows that 27% of pregnant women took weekly calcium supplementation, and among them, 18% took daily calcium supplementation within the last seven days. The proportion of women who took calcium supplementation within last seven days (weekly and daily) was higher in urban areas and among the pregnant women residing in Dhaka division. Figure 6.30 shows that only 5% of lactating women took weekly calcium supplementation, and among these women, only among 4% took daily calcium supplementation within last seven days. The proportion was higher among urban women compared to those in rural areas. The proportion of lactating women taking calcium weekly was greatest in Rangpur whereas the highest proportion of women taking calcium daily was in Rajshahi and Chittagong. At the national level, only 2% adolescent girls took calcium weekly among them 1% took calcium daily. This proportion was greater in urban areas compared to rural areas. Among divisions, the proportion of adolescent girls took calcium weekly was greatest in Dhaka and the proportion taking calcium daily was greater in Khulna and Barisal (Figure not shown).

Poor nutritional status in during the reproductive period and during pregnancy is an important health and nutritional problem among women and their children, heightening risks to reproductive health, as well as negatively affecting birth weight, later health and development (28).

**Figure 6.31: Women gaining weight during their gestational period**



At the national level, 70% of women gained weight during their gestational period. While the proportion was same in urban and rural areas, it was highest in Rajshahi and lowest in Chittagong (Fig. 6.31).





# Child feeding and care

In Bangladesh, the proportion of exclusively breastfed children in the first month of life increased from over three-fifths in FSNSP 2014 to four-fifths in FSNS-NNS 2015. The inappropriate practice of giving water to children aged one month rose while use of breast milk substitutes decreased substantially.

National rates of early initiation of breastfeeding, exclusive breastfeeding, and predominant breastfeeding improved in 2015. Khulna division performed the worst across all three indicators. The national rate of exclusive breastfeeding (47%) has not recovered to 2011 levels (52%).

The adequacy of dietary quality in complementary food decreased from 2014 to 2015 (from 87 to 83%). Sylhet and Barisal remain the most vulnerable districts.

Declines in minimum dietary diversity have occurred in children aged 6 to 24 months from 43% in 2014 to 37% in 2015.

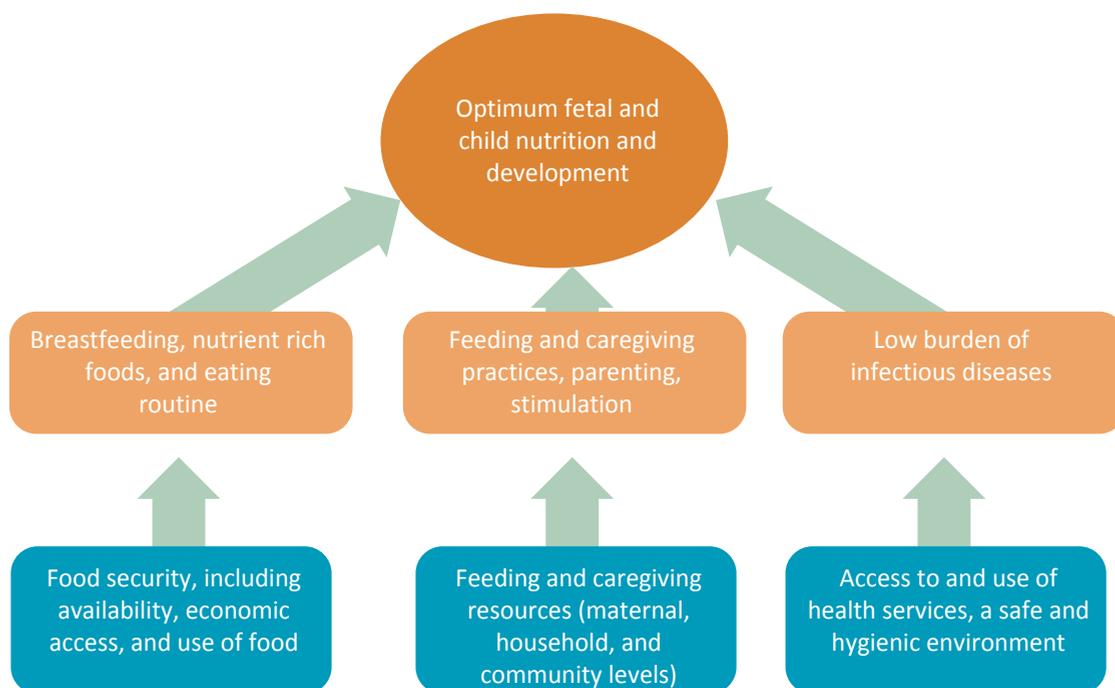
Vitamin A coverage for under-five children has decreased alarmingly from 90% in FSNSP 2010 to 67% in FSNS-NNS 2015. Coverage rates for Vitamin A were lowest in Barisal.

In 2015, almost 70% of children were treated with oral rehydration therapy while zinc supplementation was given to 17%.



Inappropriate infant and young child feeding practices are major causes of malnutrition among under-five children, and are related to increased risk of illness and mortality. Evidence suggests that infants who are not breastfed are 15 times more likely to die from pneumonia and 11 times more likely to die from diarrhoea, than those who are exclusively breastfed. Furthermore, all-causes of death are 14 times higher among non-breastfed children than exclusively breastfed children(1). Complementary foods compensate for nutritional gaps in energy, vitamin A and iron that occur when breast milk alone is no longer sufficient to meet the nutritional requirements of children over six months of age. The risks of improper feeding are not only confined to very young children, but can negatively impact growth and development in later childhood and adolescence (2).

**Figure 7.1: Lancet 2013 framework of child development**



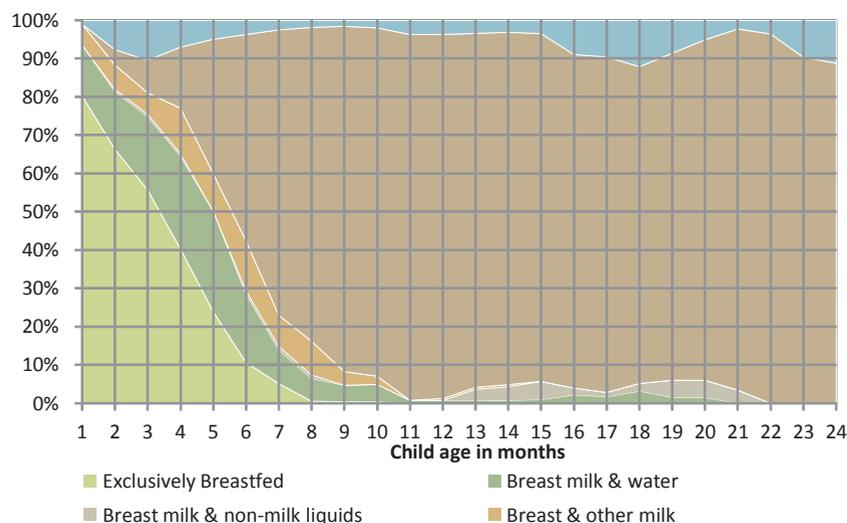
Looking ahead to 2030, scale up of proven interventions to prevent and treat childhood diseases is the key to accelerate progress towards improved child survival and achievement of the post-2015 targets (3). Appropriate duration of exclusive breastfeeding and the timely introduction of complementary foods are therefore effective strategies to reduce child deaths from infections and severe acute malnutrition, and thus improve child survival. It is reported that 10 to 15% of under-five deaths in resource poor countries could be prevented if 90% of babies were exclusively breastfed for the first 6 months of life (4).

Apart from contributing to childhood disease burden, early under-nutrition has been associated with long-term negative impacts on physical as well as cognitive growth in adolescence and adulthood (5). While economic and related factors are important broader determinants of child nutritional status, immediate causes such as feeding practices impact nutritional outcomes, particularly stunting, independent of socio-economic determinants (6). Together, food security, appropriate child care practices, access to healthcare services, and the availability of resources for appropriate maternal and child care, ensure optimal outcomes in child growth and development.

**Table 7.1: Child surveyed by age group**

Age group in months	Number surveyed	Weighted proportion
0 -5	218	10%
6 -11	249	10%
12 -17	245	12%
18 -23	248	12%
24 -35	486	22%
36 -47	458	19%
48 -59	400	16%
<b>Total</b>	<b>2304</b>	<b>100%</b>

This chapter explores infant and young children's care and feeding practices given their important influence on nutritional status, and health and development outcomes extending into adulthood. The caregiver of the youngest child in each selected household was also interviewed in FSNS-NNS. All estimates in this section, therefore, represent the prevalence of indicators for the youngest child of the household. A consequence of this method is that overall numbers of older children included in the surveillance system are less than their population prevalence would suggest. Table 7.1 indicates the number of surveyed children and their weighted proportions in different age groups.

**Figure 7.2: IYCF practices by age**

### Infant and young child feeding

Given the importance of infant and young child feeding (IYCF) practices to the nutritional status of children in the first two years of life, the World Health Organization (WHO) has developed and validated a series of core and optional IYCF indicators which include both breastfeeding and complementary feeding practices (7). Indicators are

chosen that capture inadequacies in age-appropriate feeding inclusive of dietary quantity, quality and diversity (8).

IYCF strategies of the Bangladesh government mainly focus on breastfeeding and complementary feeding. As per WHO, recommended practices are that infants should be breastfed within one-half an hour of birth, exclusively breastfed for the first six months of life, and thereafter, should receive nutritionally adequate and safe complementary foods while breastfeeding continues up to two years and beyond (9). In addition to ongoing large-scale activities by civil society in support of improved IYCF practices, nutrition programmes - focused largely on maternal and child nutrition - are currently being mainstreamed into the government health services.

IYCF practices in Bangladesh have remained largely unchanged over the past three years. A slight increase in the prevalence of exclusive breastfeeding in the first month of life was noted from three-fifths in FSNSP 2014 to four-fifths in FSNS-NNS 2015. This was accompanied by a small increase in the rate of water intake, and a substantial decrease in the use of breast milk substitute (Fig. 7.2). The majority of children continue to be breastfed throughout their first two years of life,

however, the proportion of children who continued to receive breast milk at two years of age decreased considerably between FSNSP 2012 and FSNS-NNS 2015. In the coming sections, patterns in IYCF practices are further explored using the standardized set of indicators recommended by the WHO.

## Breastfeeding

Optimal breastfeeding practices are vital to the growth and development of infants and young children, and protect them from illness and its adverse consequences (2). Breastfeeding for a longer duration appears to have significant benefits for child development, cognitive IQ, educational attainment and mental health (10). Breast milk is an important source of antioxidants and anti-inflammatory agents that prevent or reduce oxidative damages to various body tissues thus preventing infectious diseases and providing energy to aid recovery (11). Furthermore, optimal breastfeeding is linked to improved child survival, and is reported to prevent one-tenth of deaths among under-five children (12).

### *Breastfeeding during the first days of life*

Early initiation of breastfeeding within one hour of birth has various nutritional and immunological benefits and has been found to reduce neonatal mortality (13). Recently the 'Lancet Neonatal Survival Series' included breastfeeding in its recommended package of interventions to reduce neonatal mortality where promotion of breastfeeding remains a key element of child survival strategies (14). Early initiation helps ensure that infants consume the first milk and colostrum, which is highly nutritious and immunogenic, acting as a natural vaccine for the newborn. However, some prevalent traditional beliefs delay breastfeeding and promote pre-lacteal feeding, therefore placing a newborn at risk from their first hour of life (15). Pre-lacteal feeding is therefore strongly prohibited by the WHO and UNICEF (16).

**Figure 7.3: Trends in early initiation of breastfeeding rate (FSNSP 2010- FSNS-NNS 2015)<sup>1</sup>**

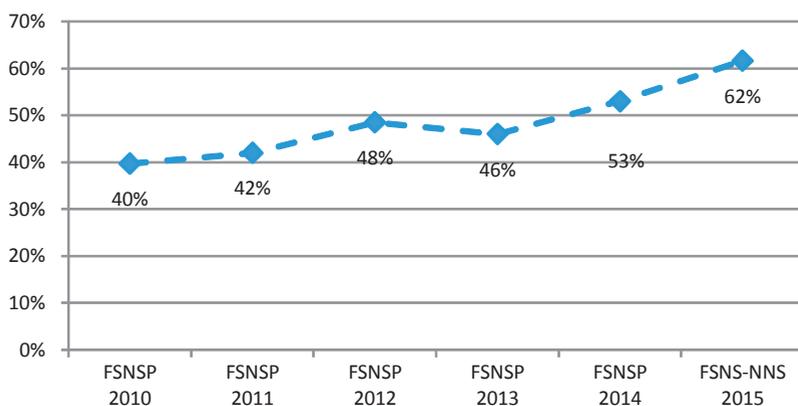


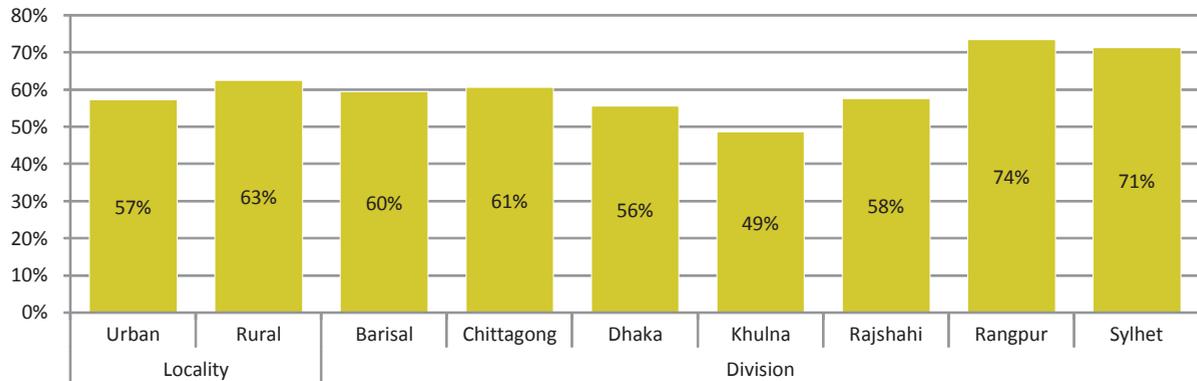
Figure 7.3 shows the proportion of children who initiated breastfeeding in their first hour of life. An improvement in early initiation of breastfeeding has occurred since 2010, with the most notable progress taking place between FSNSP 2014 and FSNS-NNS 2015 (53 to 62%). During FSNS-NNS 2015, Khulna had the lowest rate of early initiation while Rangpur

had the highest rate (Fig. 7.4). Rates of early initiation were higher among rural children than urban children. In addition, there was little variation in the rates of early initiation of breastfeeding across wealth quintiles or categories of food security, although rates of early initiation were higher in poorer households (figure not shown). Child sex had no significant effect on early initiation and pre-lacteal feeding (figure not shown). More educated mothers initiated breastfeeding later than the

<sup>1</sup> Estimated proportion for different child care and feeding indicators between the years of FSNSP 2010 to FSNSP 2014 are obtained from the previous reports of FSNSP(42,43,44,45,46)

less educated group (figure not shown), and earning mothers initiated breastfeeding earlier compared to mothers without income.

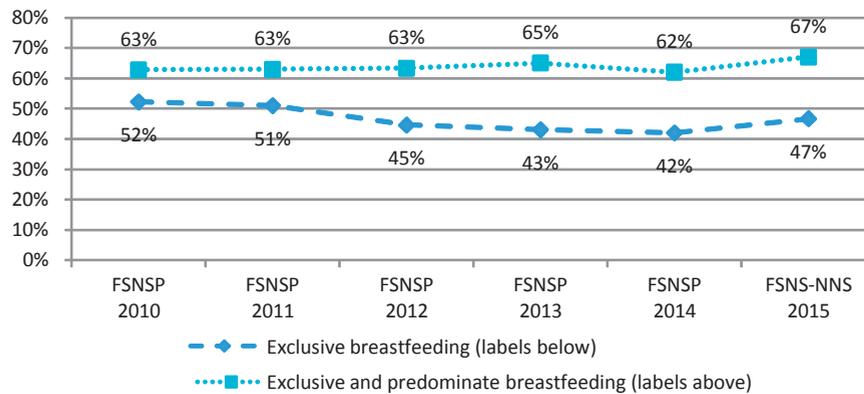
**Figure 7.4: Early initiation of breastfeeding by area of residence**



### Exclusive breastfeeding

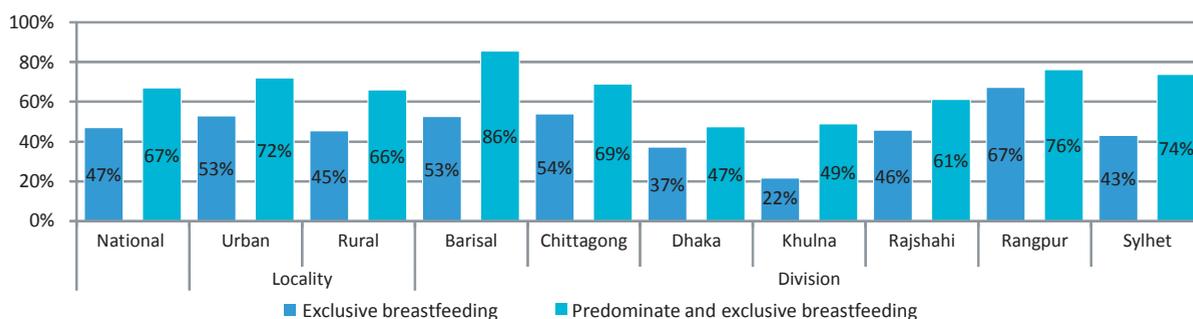
Breast milk is a unique source of natural food for a baby, containing all the necessary nutrients to ensure infant health, growth, and development (10). The benefits of breastfeeding could be substantially enhanced were exclusive breastfeeding practiced up to the first 6 months of an infant's life.

**Figure 7.5: Trends in exclusive breastfeeding rates**

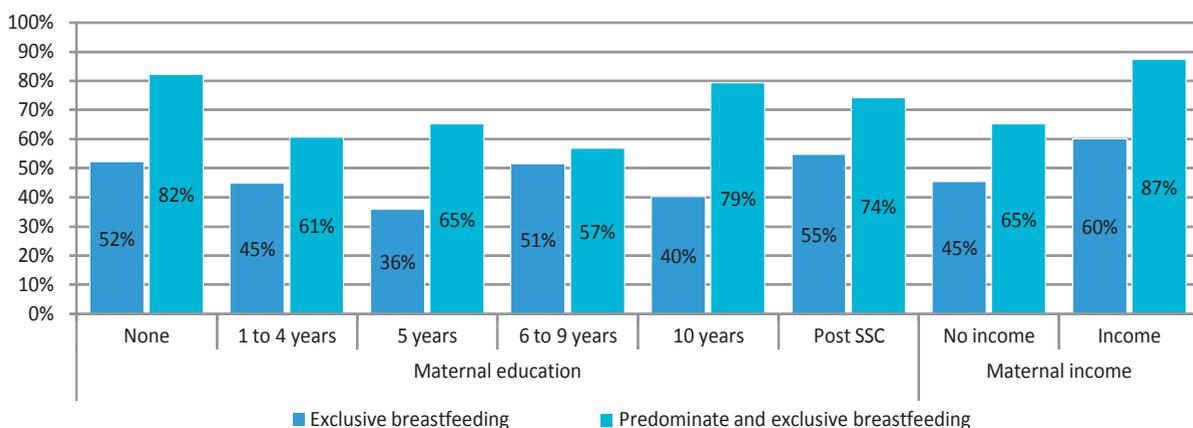


Research findings have associated six months of exclusive breastfeeding with a 53% decrease in hospital admissions for diarrhoea and a 27% decrease in respiratory tract infections among infants (17). Furthermore, exclusive breastfed children have been found to be less

prone to develop childhood obesity and diabetes in later years of life (18). The extent to which breast milk constitutes the principal source of nutrients in a child's diet can be assessed by combining two indicators; exclusive breastfeeding and predominant breastfeeding. Between FSNSP 2010 and FSNS-NNS 2015, the proportion of exclusive breastfeeding fell from 52 to 47%, although exclusive breastfeeding practice has marginally improved in 2015 compared to comparatively low prevalence rates between 2012 and 2014 (Fig. 7.5). On the other hand, exclusive and predominant breastfeeding have improved from 63% in FSNSP 2010 to 67% in FSNS-NNS 2015. While this trend is promising, Bangladesh has a way to go to reach the global goal set by the HPNSDP and 65<sup>th</sup> World Health Assembly target of at least 50% of infants being exclusively breastfed by 2016 and 2025, respectively (19).

**Figure 7.6: Exclusive breastfeeding rates by area of residence**

Khulna had the lowest rate of exclusive breastfeeding followed by Dhaka, while Rangpur had the highest rate (Fig. 7.6). Surprisingly, more children from urban areas were exclusively breastfed than rural areas in FSNS-NNS 2015, with a significant improvement in urban rates apparent in the last few years of surveillance. When predominant and exclusive breastfeeding are considered together, Barisal division posted the highest rate, while Dhaka had the lowest.

**Figure 7.7: Exclusive breastfeeding rates by maternal education and income**

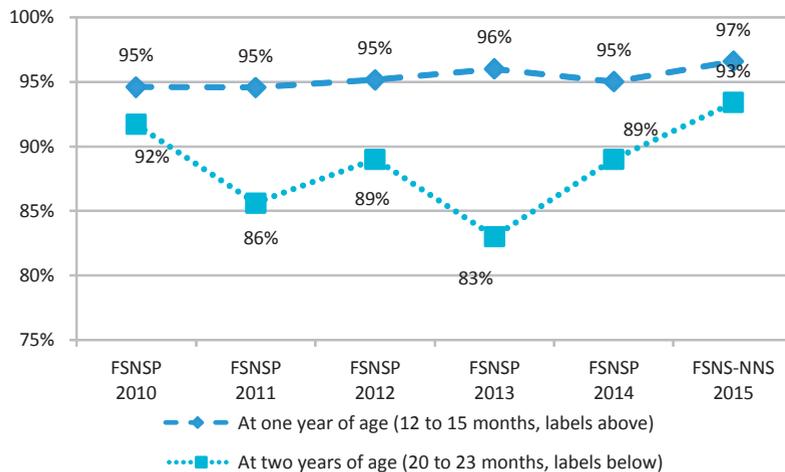
In FSNS-NNS 2015, the proportion of exclusive breastfeeding was higher among mothers who had either no or less than primary education as well as mothers with secondary education. This finding highlights the importance of awareness for exclusive breastfeeding practice rather than formal education of mother when thinking about promotion strategies. Mothers who were involved with any income earning work reported a higher rate of exclusive breastfeeding practice than their non-income earning counterparts (Fig. 7.7). In line with past findings, there was little variation in exclusive breastfeeding rates comparing food secure and food insecure households or wealth quintiles (figures not shown), though a slightly higher proportion of poor or food insecure households practiced exclusive breastfeeding.

### **Continued breastfeeding**

Continued breastfeeding can provide a vital nutritional contribution up to two years of a child's life. According to a study, after six months of age, breastfeeding should be complemented by other semi solid or solid food. However, breast milk can provide half or more of a child's energy needs between 6 and 12 months of age, one-third of energy needs between 12 and 24 months, and

serves as a critical source of energy and nutrients during illness, thus reducing the frequency of morbidity as well as growth faltering (20).

**Figure 7.8: Continuation of breastfeeding (FSNSP 2010- FSNS-NNS2015)**



Breastfeeding is virtually universal (98.3%) and notably prolonged in Bangladesh with a mean duration of 26 to 29 months. To assess trends in continued breastfeeding, FSNS-NNS 2015 uses two WHO indicators. The first is continuation of breastfeeding at one year of age, which is defined as the proportion of children aged 12 to 15 months who were breastfed the day before the interview. The second is continuation of breastfeeding at two years of

age, which is defined as the proportion of children aged 20 to 23 months who were breastfed the day before the interview (21). As previously noted, a high rate of continued breastfeeding is apparent between 2010 and 2015 (Fig. 7.8). Continued breastfeeding rates at one year of age remained quiet steady during this period, while breastfeeding up to two years was less consistent, dropping to a low point in 2013 (83%), then dramatically increasing in 2015 (93%). Across the nation, there was limited divisional variation in these indicators. The proportion of children who continued to receive breast milk at one year of age was comparatively lower in Rajshahi (91%), whereas Chittagong (89%) and Dhaka (89%) scored lowest for continued breastfeeding at two years compared to other divisions of Bangladesh (figures not shown).

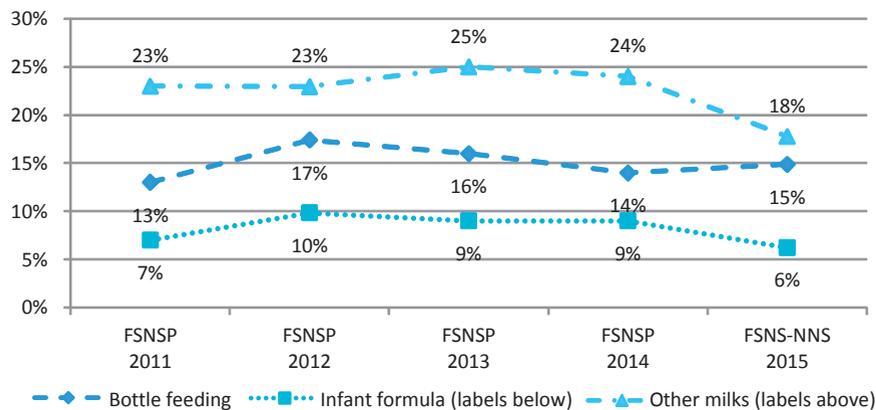
Education of the mother does not show any association with continued breastfeeding. However, among mothers' earning an income, a higher proportion of children continued to be breastfed at one and two years of age than the children whose mothers having no income. Furthermore, continued breastfeeding varied considerably by sex at one year of age - with rates higher among boys (99%) than girls (94%). However, no variation was observed between male and females with respect to continuation of breastfeeding at two years of age (figures not shown).

### **Breastfeeding threats**

In many communities, the support of a 'breastfeeding culture' and its vigorous protection against 'formula-feeding culture' promoted by media and multinationals, is imperative. In Bangladesh, lack of knowledge about the mechanisms of breast milk production and attitudes towards giving breast milk, create a widespread misconception that mothers lack capacity to produce milk sufficient to meet their baby's needs (9,15). According to WHO, powdered infant formula (PIF) has been associated with serious illness and death in infants due to infections with *Enterobacter sakazakii* (22). In addition, bottles are a frequent source of microbial contamination, and breast milk substitutes do not provide any immunological protection for children (2,7,23). On a positive note, in 2013, the government of Bangladesh has enacted an essential International Code for the Marketing

of Breast Milk Substitutes and has also implemented various policy initiatives - such as six months maternity leave, health systems support, and community support for protection and promotion of breastfeeding (9,24).

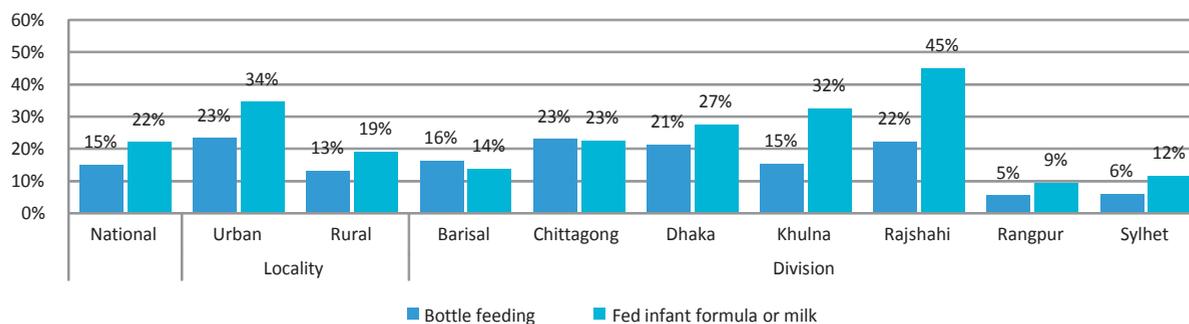
**Figure 7.9: Trends in threats to breastfeeding**



To monitor the use of breast milk substitutes, FSNS-NNS investigated the proportion of infants and young children (0 to 23 months) who were fed animal milk or milk substitutes, such as infant formula the day before the interview, as well as the proportion of those fed anything using an artificial nipple, such as a bottle.

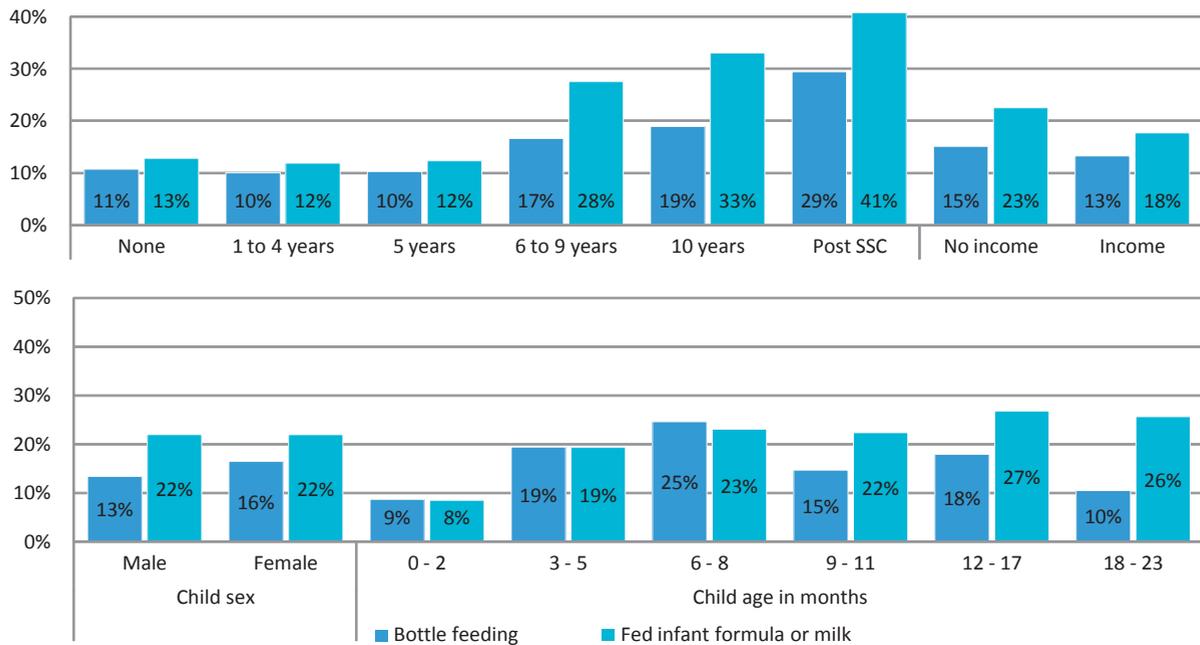
Between 2014 and 2015, the proportion of children who were fed with infant formula and other milk declined, although no change was observed for bottle feeding (Fig. 7.9). Nevertheless, a considerable proportion of children continued to receive breast milk substitute or were bottle-fed. Feeding by either category of milk supplement represented one quarter of children in FSNS-NNS 2015, compared to one third of children in FSNSP 2014.

**Figure 7.10: Threats to breastfeeding by area of residence**



The proportion of infants and young children fed breast milk substitutes or with bottles varied greatly across divisions (Fig. 7.10). Chittagong division had the highest rate of bottle usage (23%) followed by Rajshahi for both bottle-feeding (23%) and breast milk substitute (45%). Bottle and milk-supplement feeding were much more frequent in urban areas compared to rural areas.

Mothers who attained more than primary level education fed their children breast milk substitutes more compared to less educated mothers (Fig. 7.11). A mother's income earning status, however, had no association with these practices. As expected, less wealthy and food insecure households fed their children through these means less frequently (figure not shown). No significant difference was found between the proportions of male and female infants and young children who were fed by bottle or received infant formula or milk.

**Figure 7.11: Threats to breastfeeding by maternal and child characteristics**

### Complementary feeding

The majority of bottle-feeding took place during the first year of life; almost one-fifth of children aged 3-5 months were fed with a bottle and breast milk substitutes instead of being exclusively breast-fed while approximately one quarter of children received supplementary milk from 6-23 months of age (Fig. 7.11).

#### Complementary feeding

The transition from exclusive breastfeeding to semi-solid and solid foods is referred to as complementary feeding. WHO and UNICEF recommend exclusive breastfeeding for six months, and addition of complementary foods (CF) at six months of age with continued breastfeeding till at least two years (2).

According to the Bangladesh National IYCF Strategy, adequate complementary feeding should be *timely*; adequate to meet the energy, protein, and micronutrient needs of the child; safe and hygienically prepared; *responsively fed*, meaning that the foods are provided in response to the child's cues and that the child is actively encouraged to self-feed, and should include proper *recuperative care* when children fall ill (3,4). The indicators used in this section will be focused on children aged 6-23 months, a critical period when inappropriate diets and nutritional deficiencies can retard growth and development for the remainder of a child's life (25).

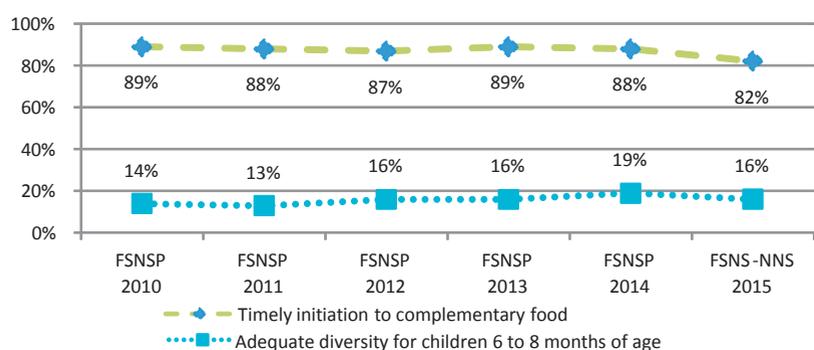
#### Introduction of complementary feeding

Children should receive CF as soon as they reach six months of age while continuing to breastfeed. Too early or too late an introduction of CF may lead to nutritional deficiencies of iron, zinc, calcium, and vitamins (2). Therefore, CF needs to be nutritionally adequate and safe and appropriately fed

to meet the energy and nutrient needs of under-two children. According to WHO, the proportion of infants who receive CF can be assessed by identifying the number of children at 6-8 months of age who ate any solid or semi-solid food on the day before the interview. While the rates of timely CF remained steady between FSNSP 2010 and 2014, a disturbing decline was noted in FSNS-NNS 2015 (Fig. 7.12). The majority of children's (84%) diets were not diverse enough to provide adequate macro and micronutrients.

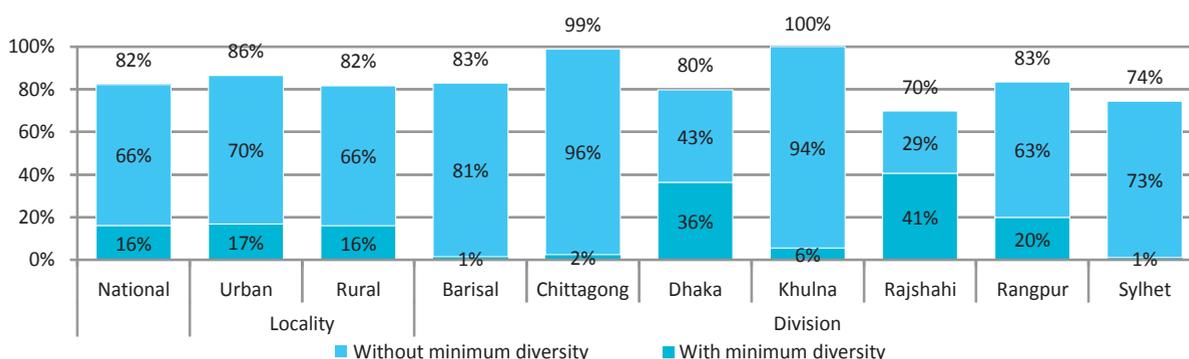
According to the National Strategy for IYCF in Bangladesh, children aged 6-23 months eat a diverse diet, WHO defines a diverse diet as consisting of at least four out of seven food groups every day (7,9).

**Figure 7.12: Introduction of complementary feeding (FSNSP 2010-FSNS-NNS 2015)**



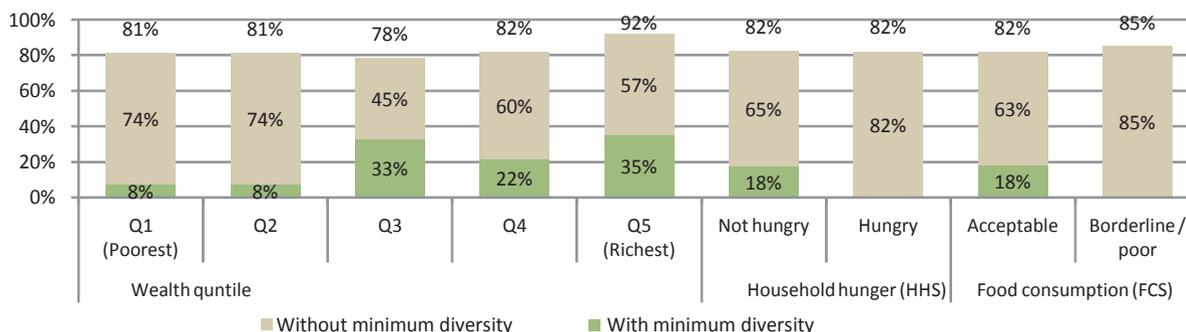
Nationally, around 16% of infants aged 6-8 months were eating in line with this standard. This figure has remained constant since FSNSP 2012, with a slight increase in FSNSP 2014.

**Figure 7.13: Timely introduction of complementary feeding by division**



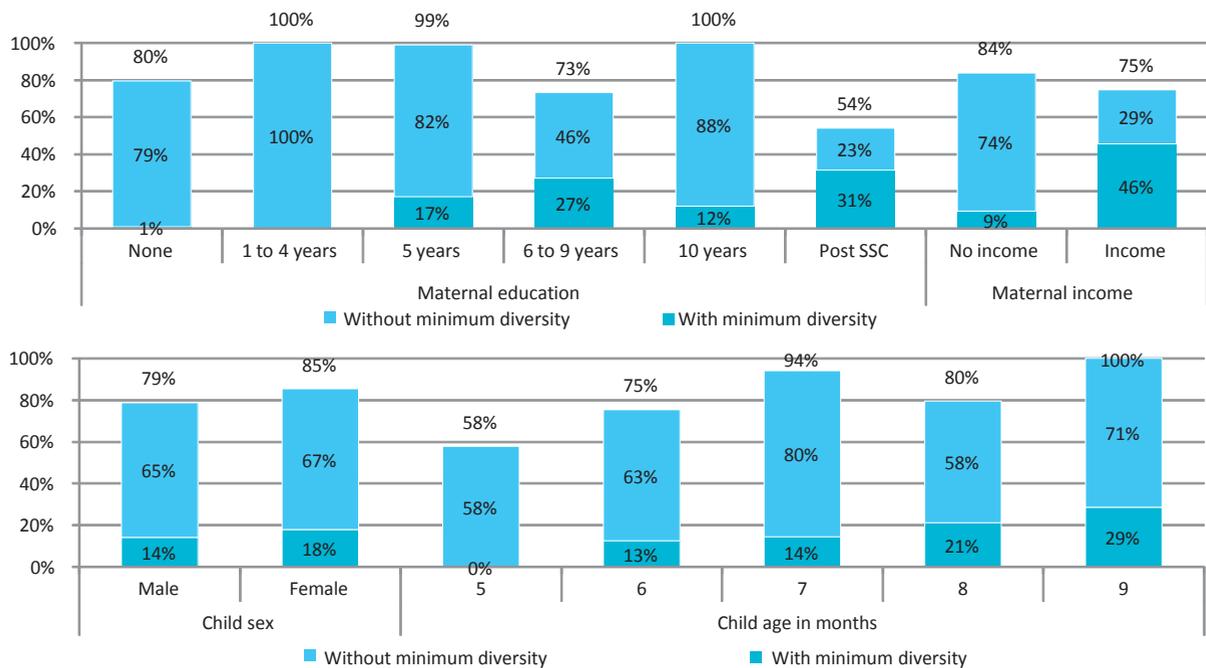
Minimum dietary diversity for children aged 6-8 months was <6% for Sylhet, Chittagong and Barisal and >35% for Rajshahi and Dhaka divisions. At the national level, timely introduction of CF occurred for at least 70% of all children aged 6-8 months (Fig. 7.13).

**Figure 7.14: Timely introduction of complementary feeding by household wealth and food security**



Household wealth quintile and household hunger had a limited association with the proportion of children who were introduced to complementary foods at 6-8 months of age, but a stronger association with the proportion of children receiving an adequately diverse diet. While 8% of infants aged 6-8 months in the lowest wealth quintile had an adequately diverse diet, over one-third (35%) of those in the wealthiest quintile did. Food consumption score, itself a household dietary diversity measure, was highly associated with adequately diversified diets among infants; almost no children from households with poor or borderline food consumption habits had adequate diversity (Fig. 7.14). Almost all mothers who had completed primary and higher education introduced CF to their children, however a very small proportion (less than 25%) provided CF with adequate diversity to their child. A significant relationship was found between maternal income and introduction to CF with adequate diversity (Fig. 7.15).

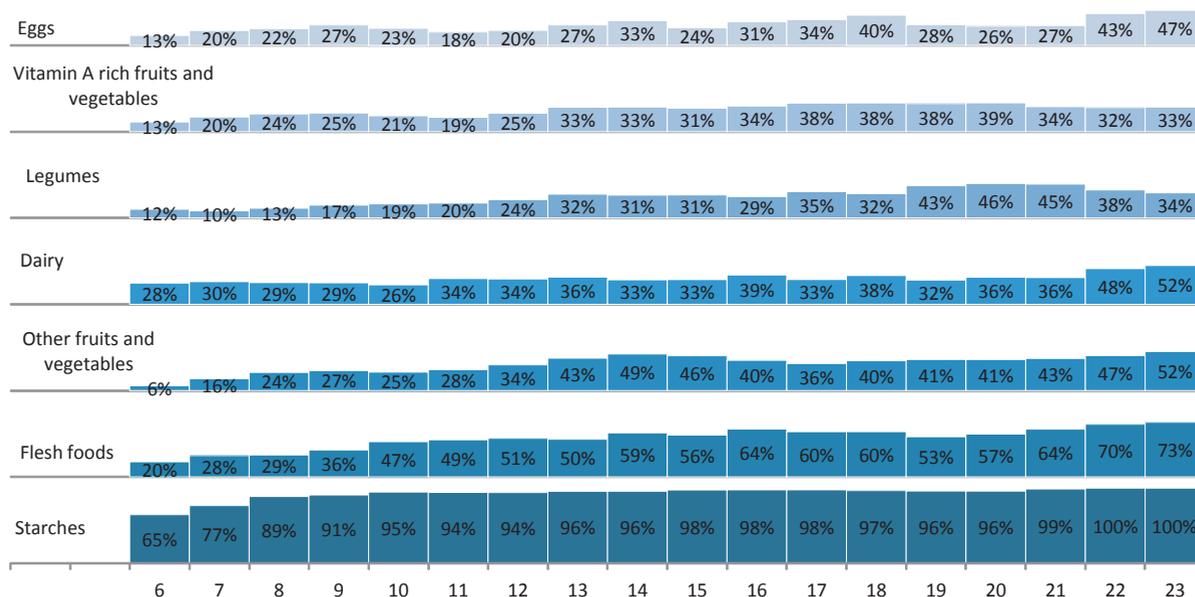
**Figure 7.15: Timely introduction of complementary feeding by maternal and child characteristics**



Although there were no significant gender differences in terms of timely introduction of CF for the consumption of foods with adequate diversity, for both indicators, proportions were lower for male infants compared to female infants (Fig. 7.15). Early introduction of CF at five months of age occurred in almost sixty percent of children in Bangladesh.

### **Dietary quality**

A child goes through a rapid phase of growth and development in their first two years of life, which results in increased nutritional needs relative to a child's overall size and the amount of food that they are able to eat at each meal. Therefore, during this period, children need to get a variety of foods rich in animal protein, as well as fruits and vegetables every day to meet their nutritional requirements (9,20).

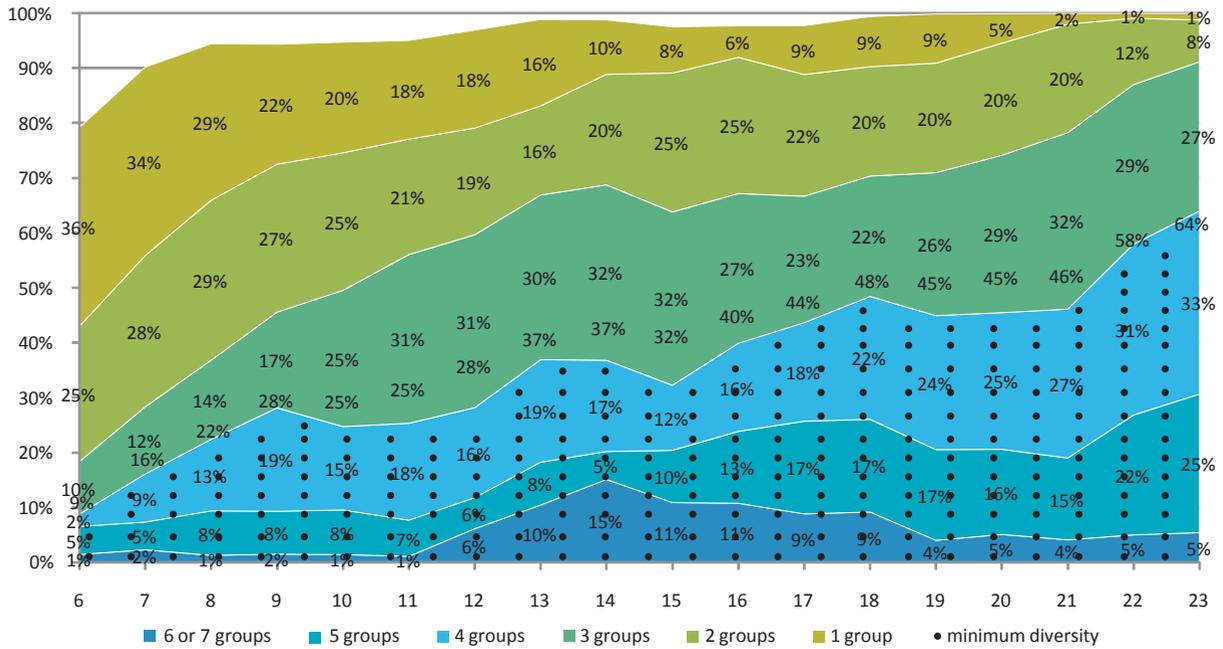
**Figure 7.16: Composition of childhood diets by WHO's seven food groups across age in months**

Dietary quality is measured through the use of a seven-item scale recommended by WHO containing starches, legumes and nuts, dairy products, flesh foods, eggs, vitamin A rich fruits, and vegetables, and other fruits and vegetables-constructed from the 16 food type categories included in WHO's standardized IYCF questionnaire (7,21). Figure 7.16 shows the proportion of children who were consuming foods from these seven food groups by age. The cut-off for the minimum number of food groups required for an adequate diet among children aged 6-24 months, is when out of seven food groups consumed each day. Unlike the adult indicator, the minimum dietary diversity measure for children identifies probable dietary sufficiency.

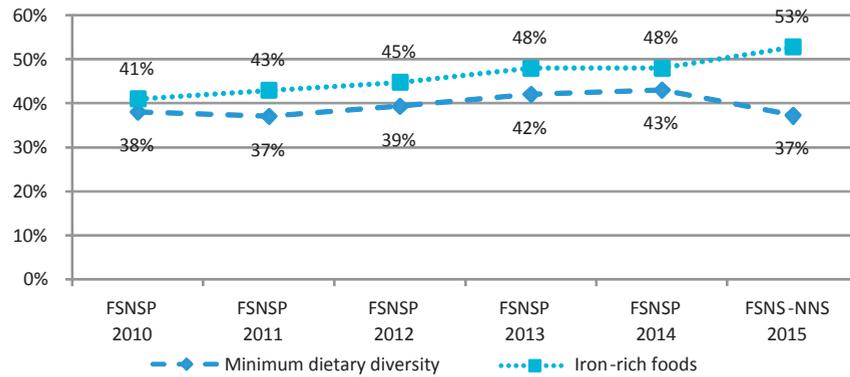
Figure 7.17 shows the proportion of children aged 6-24 months who consumed foods from seven groups in 2015. Until 10 months of age, the only food groups eaten by most children were micronutrient-poor starches and dairy products that often replace breast milk, while Vitamin A rich fruits and vegetables were consumed to a very limited extent.

A summary of food groups eaten is not enough to quantify the proportion of children eating a diet with adequate diversity. Though virtually all children are fed CF by 13 months of age, 16% of these children consumed foods from one food group, usually micronutrient-poor starches. After six months of age, however, the proportion of children who met the standard for minimum dietary diversity increased relatively sharply from less than one-tenth to around one-third at one year of age. This increase was much more gradual after the first year of life, although by two years, two-thirds of children were eating a diet that was minimally diverse.

**Figure 7.17: Number of food groups consumed by child's age in months**

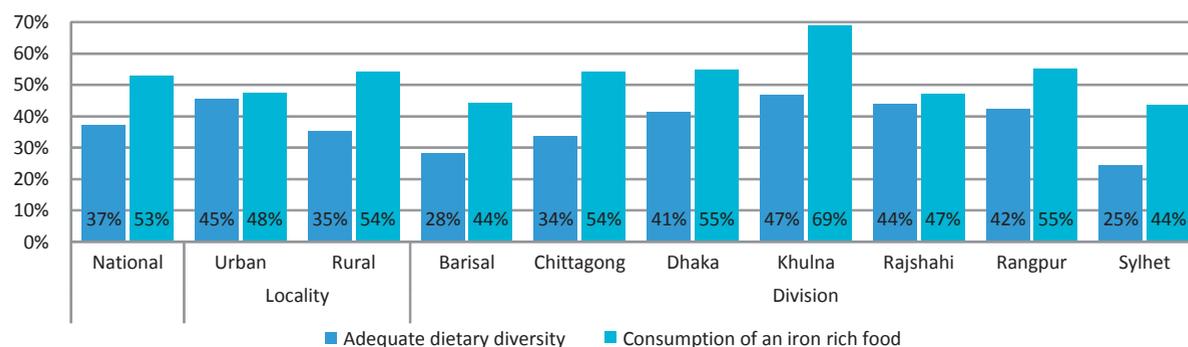


**Figure 7.18: Trends in child dietary quality indicators**

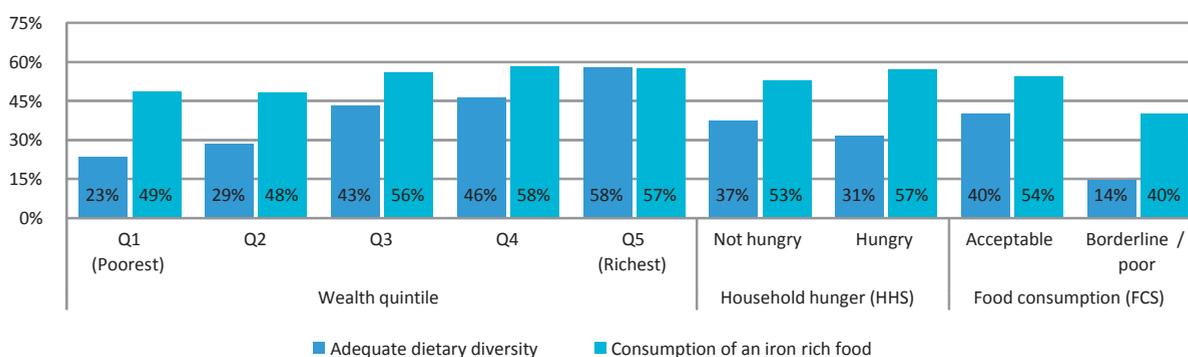


The proportion of children fed a minimally diverse diet increased gradually between FSNSP 2010 to FSNSP 2014, but declined considerably in FSNS-NNS 2015 (Fig. 7.18). Another measure of dietary quality recommended by is the proportion of children aged 6-24 months who

ate an iron-rich food (any item in the flesh food category) or any iron supplement or iron-fortified food (including home fortified foods) the previous day. Inclusion of iron-rich foods or iron supplementation into infant and child diets is needed to supplement breast milk around six months of age (7). In FSNS-NNS 2015, more than half (53%) of children had diets that met this criteria; which was an improvement over levels in FSNSP 2014. The majority of these children met this requirement by consuming flesh foods, particularly fish, and around 1% of children aged 6-24 months had consumed an iron supplement or micro-nutrient in the week before interview.

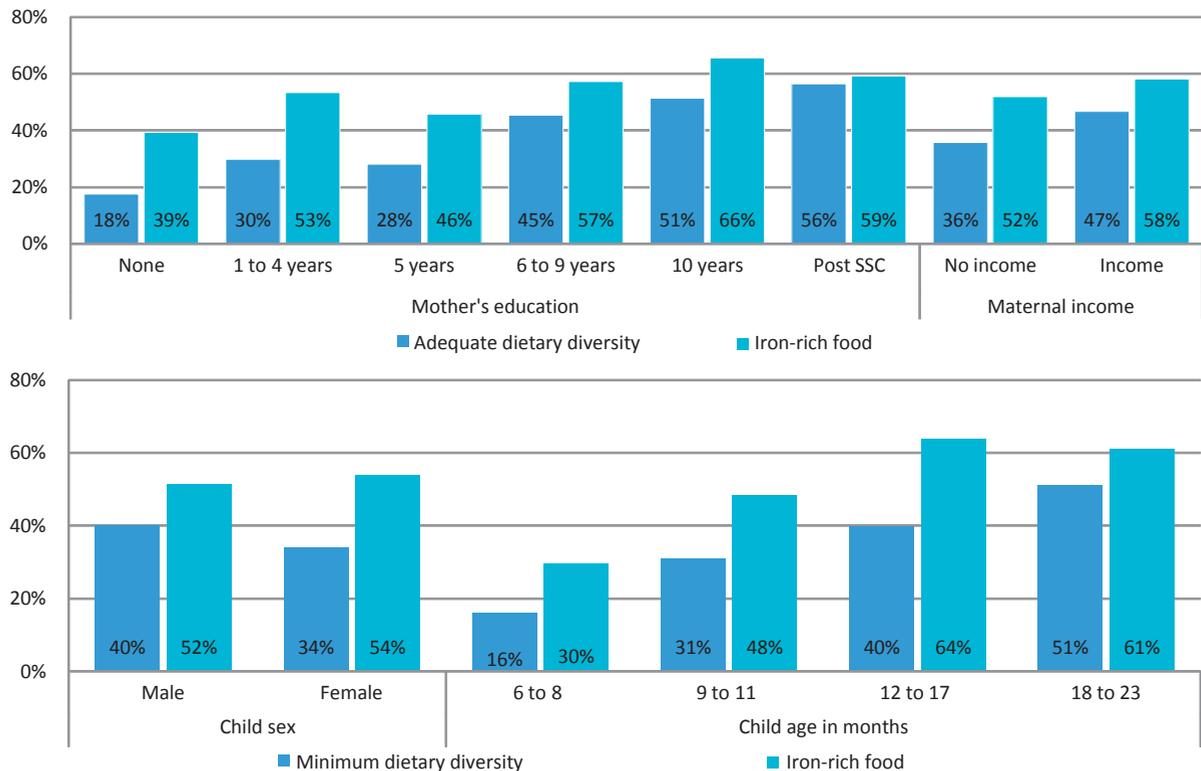
**Figure 7.19: Minimum dietary diversity and iron consumption by area of residence**

In FSNS-NNS 2015, Sylhet division had the lowest proportion of children (25%) meeting minimum diversity standards, followed by Barisal (28%). Children aged 6-24 months in Sylhet and Barisal also reported the least consumption of iron-rich foods. A greater proportion of children in urban areas met minimum dietary diversity standards than children in rural areas, but the consumption of iron-rich food was higher in rural areas.

**Figure 7.20: Indicators of dietary quality by household wealth and food security status**

There was a step-wise increase in the proportion of children consuming diverse diets with increasing wealth quintile. Children from households in the wealthiest quintile ate significantly more diverse diets than children from households in the lowest quintiles (Fig. 7.20). Variation was also found across food security categories in terms of adequate diversified diet and iron-rich foods, with better performance apparent among food secure groups. As expected, maternal education, female income earning and higher wealth quintile were positively associated with children's dietary quality (Fig. 7.21).

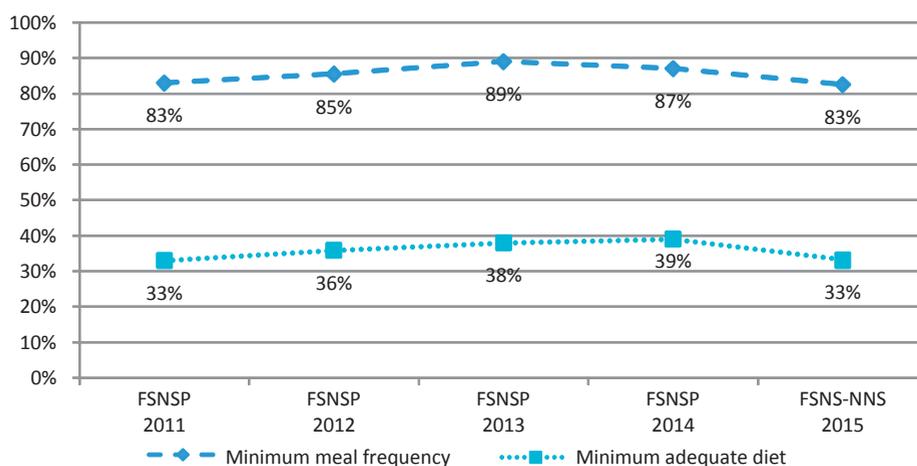
There were small and statistically insignificant differences in the proportions of male versus female children who ate an iron-rich food. However, age was significantly associated with both of these indicators; as age increased, so did the proportion of children that ate in line with these practices. However, even among children aged 18 to 23 months, half (51%) were given minimally diverse diets and around two-third (61%) were fed iron-rich foods the day before the interview (Fig. 7.21).

**Figure 7.21: Indicators of dietary quality by maternal and child characteristics**

### ***Minimum acceptable diets***

Apart from adequate dietary diversity, CF should be given to infant and young children in sufficient quantity and quality. The proportion of CF in children's diets should increase gradually over the period of 6-24 months, with the objective of complementing breast milk but not replacing it. According to Bangladesh's IYCF strategy and WHO complementary feeding guidelines, the frequency of feeding should be used as a proxy for amount of food fed - 6-8 months, 2-3 meals + 1-2 snack(s) (200 kcal) per day; 9-11 months - 3-4 meals + 1-2 snack(s) (300 kcal) per day; and 12-23 months - 3-4 meals + 1-2 snack(s) (550 kcal) per day (7,9).

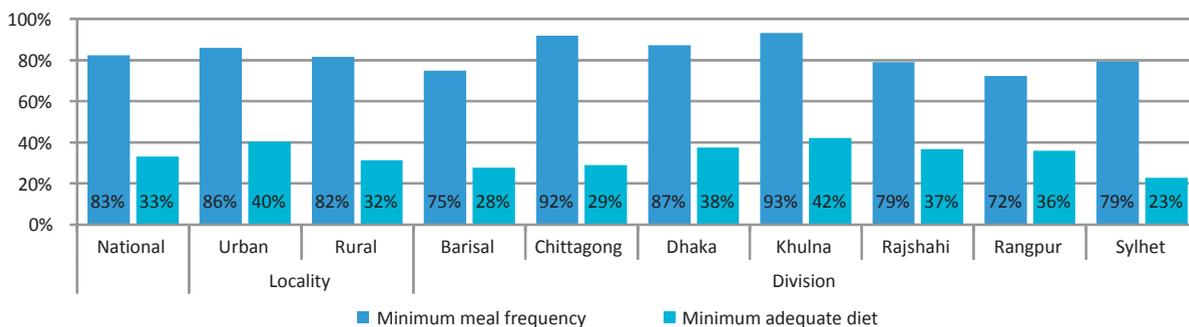
To measure the proportion of children consuming minimum acceptable diet, FSNS-NNS uses two indicators recommended by WHO - minimum meal frequency and minimum acceptable diet. The definitions of these indicators differ by breastfeeding status. It is therefore important to refrain from comparing indicators between breastfed and non-breastfed children but to tabulate them separately (7,21). FSNS-NNS asks caregivers the number of times they fed their children a meal or snack during the day before the interview. For breastfed children, the indicator for minimum meal frequency is met when a breastfed child is fed in line with the recommendations given above. For non-breastfed children, the frequency with which children were given milk feeds is also considered, and the indicator for minimum feeding frequency is met when a child aged 6-24 months ate meals, snacks, and had milk-feeds a total of at least four times.

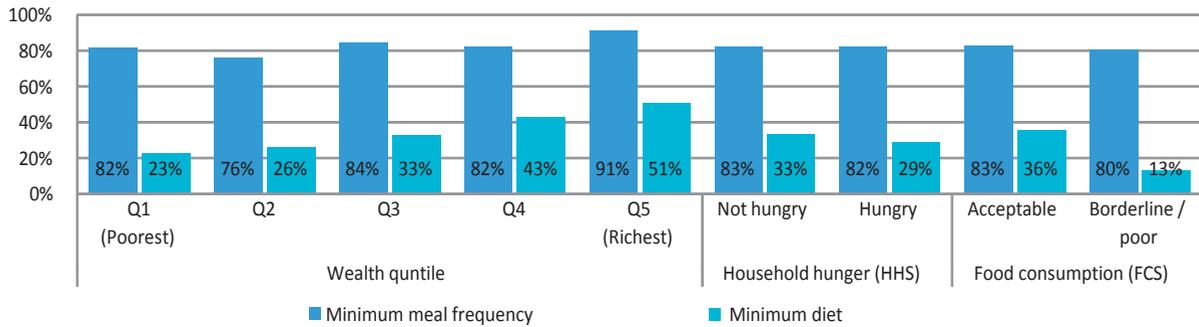
**Figure 7.22: Trends in adequate diet (FSNSP 2010- FSNS-NNS 2015)**

Minimum acceptable diet is the combination of the dietary diversity measure given in the previous section with the feeding frequency indicator as described above. Breastfed children aged 6-24 months are classified as having had a minimum acceptable diet if they met the

criteria for both of these indicators. Non-breastfed children aged 6-24 months are classified as having had a minimum acceptable diet if they had been fed milk at least twice, milk or solid/semi-solid foods at least four times, and if they had eaten at least four food groups excluding dairy products. According to both FSNS-NNS and Bangladesh Demographic and Health Survey (BDHS), an alarming decline in minimum meal frequency and minimum adequate diet has been noted in recent years in contrast to previous improvements. In FSNS-NNS 2015, one-third of children were fed minimally adequate diets and 83% fulfilled the requirement for minimum meal frequency for both breastfed and non-breastfed children (Fig. 7.22).

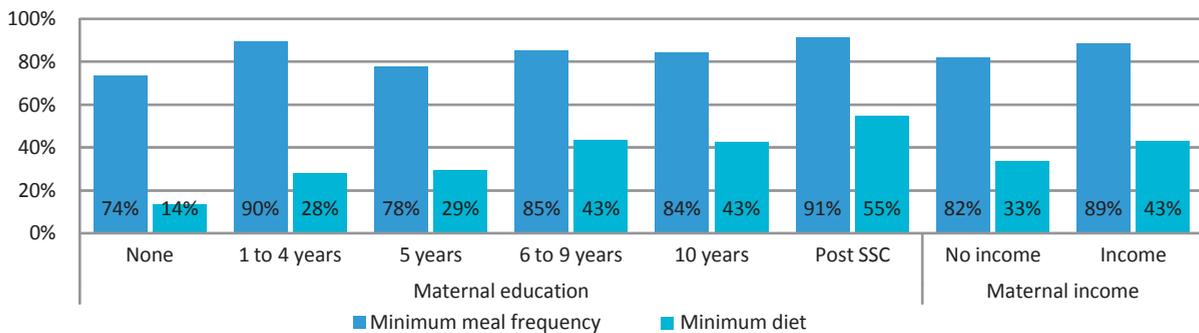
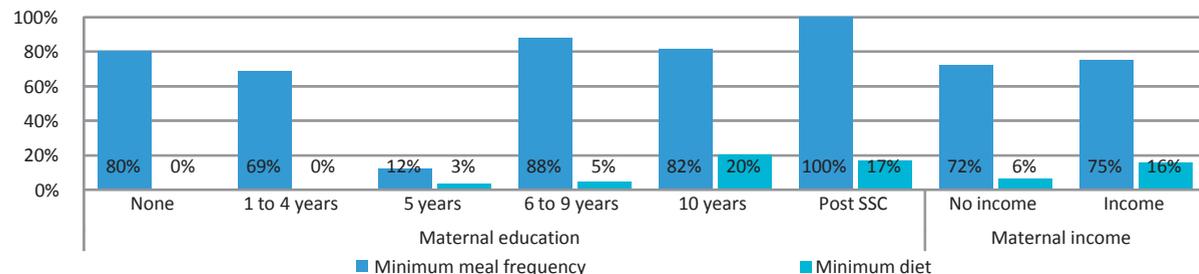
There was much greater variation by division in the proportion of children fed minimally adequate diets than those fed with minimum frequency. In FSNS-NNS 2015, the vast majority of children received meals with minimum meal frequency, and the proportion was largely the same with the exception of Rangpur and Barisal divisions where scores were the lowest. For minimum adequate diet, Sylhet (23%) and Barisal (28%) remained the most vulnerable, with a minimal proportion of children reporting adequate diets compared to all other divisions (Fig. 7.23). Children in urban areas ate an adequate diet more frequently than children in rural areas.

**Figure 7.23: Minimum meal frequency and minimum acceptable diet by area of residence**

**Figure 7.24: Minimum meal frequency and minimum acceptable diet by wealth and food security**

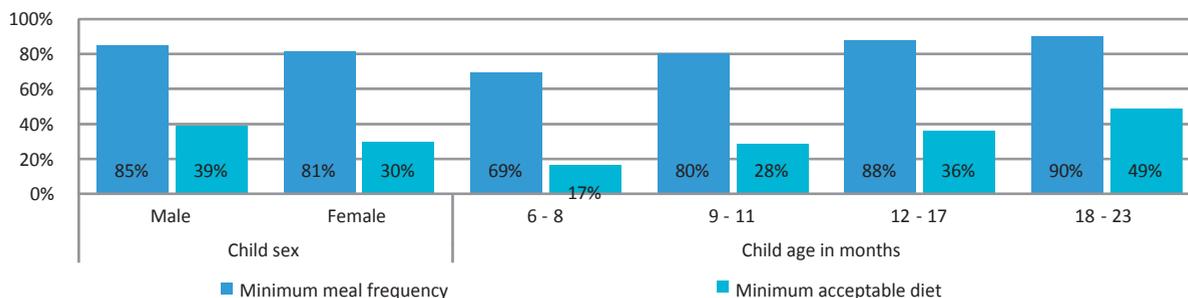
The proportion of children fed with minimum frequency was not associated with wealth, although a step-wise increase in the proportion of children fed with minimally adequate diets with increasing wealth quintile was apparent (Fig. 7.24). However, even in the wealthiest quintile little over half of children received the minimum diet. There was little or no difference in the proportion of children fed with minimum frequency in food secure compared to food insecure households, but there were slight differences in the proportion of children being fed minimum adequate diets.

The proportion of breastfed children fed with minimum acceptable diets was associated with the level of maternal education and income status. On the other hand, among non-breastfed children, maternal education did not seem to play any role in whether children were fed with proper meal frequency and adequate diet (Fig 7.25 and 7.26).

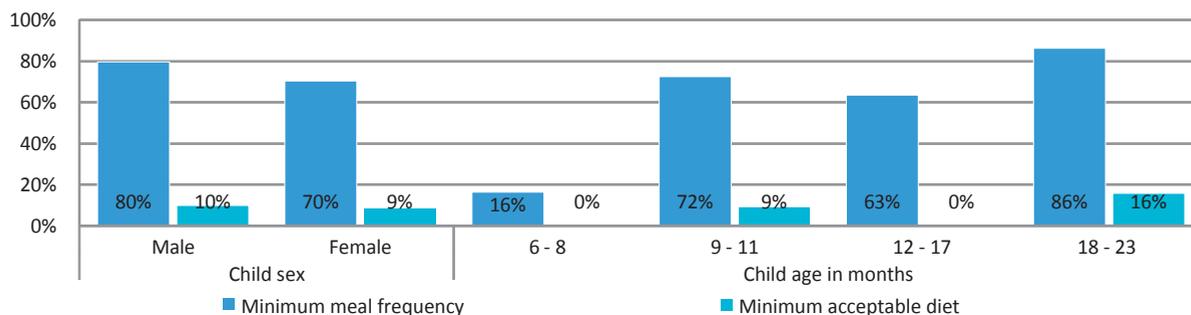
**Figure 7.25: Minimum meal frequency and minimum acceptable diet among breastfed children by maternal characteristics****Figure 7.26: Minimum meal frequency and minimum acceptable diet among non-breastfed children by maternal characteristics**

In FSNS-NNS 2015, a greater proportion of male breastfed children were fed minimally acceptable diets with minimum meal frequency than female children, and the same trends were apparent for non-breastfed children. As with many of the complementary feeding variables, the proportion of breastfed children fed in line with guidelines on minimally acceptable diets, increased with age (Fig. 7.27), but for non-breastfed children, age does not seem to be a factor (Fig. 7.28). While less than one-fifth of breastfed children aged 6-8 months were fed in line with minimum standards, this increased to around half of children in the oldest age group.

**Figure 7.27: Minimum meal frequency and minimum acceptable diet among breastfed children by child characteristics**



**Figure 7.28: Minimum meal frequency and minimum acceptable diet among non-breastfed children by child characteristics**



### Preventative health care

Optimum child nutrition is also essential for the development of strong immune system to fight against infectious diseases. Therefore, appropriate feeding practices are vital for preventing illness in infant and young children. In developing countries, the burden of infectious diseases is substantial, and the majority of child deaths are associated with diarrhoeal disease and acute respiratory tract infection. According to the literature, micronutrient deficiency among younger children can cause developmental delays and chronic health problems later in life (26). Therefore, specific preventive and curative services are necessary to treat infection and to avoid death. Important in this effort is striking a balance between preventive and curative services, has although this has rarely been assessed (27). The present section will focus on two government-led preventative health care campaigns - the national vitamin A supplementation programme and the national deworming programme.

### National Vitamin A campaigns

Vitamin A is essential for proper immune system functioning, visual perception, and cellular reproduction, and its deficiency is associated with increased morbidity and mortality and delayed development of infants and young children (ref). Vitamin A deficiency occurs when body stores are depleted to the extent that normal physiological function is impaired even though at this stage overt clinical deficiency, such as eye signs, may not be evident. However, clinical Vitamin A deficiency is identified by the decreased vision, particularly at night (28).

The Bangladesh government has been implementing a large-scale national Vitamin A supplementation programme since 1973. This programme provides low potency vitamin A supplementation (100,000 I.U.) to children aged 6-11 months and high potency vitamin A capsules (200,000 I.U.) to children aged 1-5 years twice a year on national immunization days and national vitamin A campaign (NVAC) day. In addition, the national Vitamin A policy and WHO encourage Bangladeshis to eat more diverse diets, especially those for whom vitamin A supplementation is not recommended. Bangladesh succeeded in achieving the World Summit Goal to reduce night blindness caused by Vitamin A deficiency among preschool children by 1997, and to reach the target of one percent by the year 2000 (29,30,31).

**Figure 7.29: Vitamin A coverage for children aged 12 to 59 months (FSNSP 2010 to FSNS-NNS 2015)<sup>2</sup>**

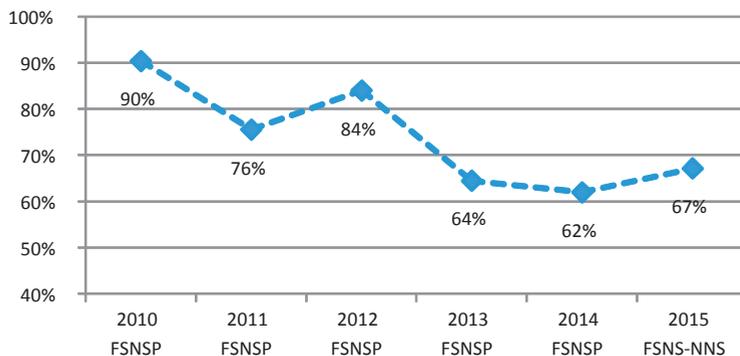
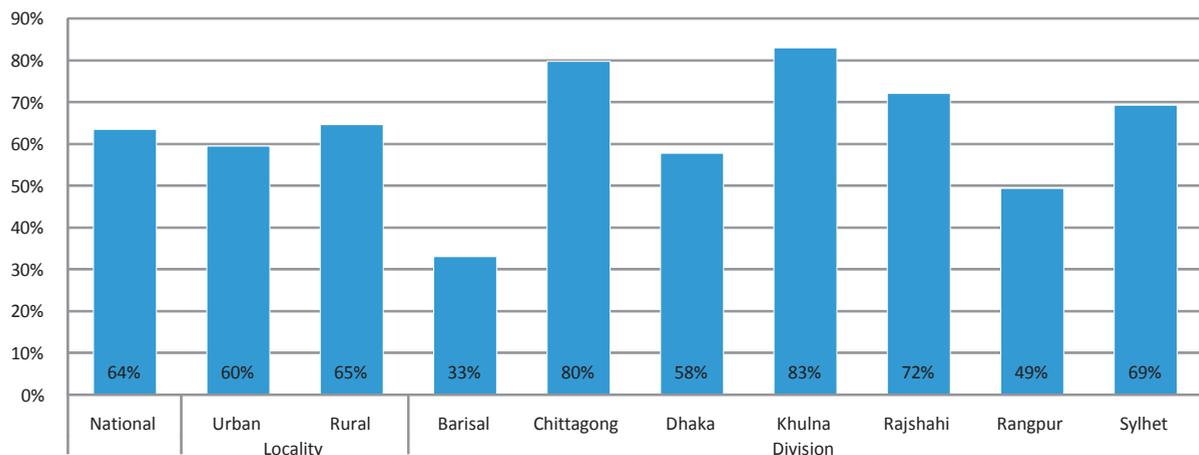


Figure 7.29 shows the proportion of children aged 12-59 months who received vitamin A capsules during the last six months before the interview.<sup>3</sup> The level of coverage has decreased from 90% in FSNSP 2010 to 67% in FSNS-NNS 2015. The low coverage of VAC in recent years was due to gaps in programme schedule and drops in programme coverage since 2010.

**Figure 7.30: Coverage of NVAC by area of residence (6 to 59 months)**

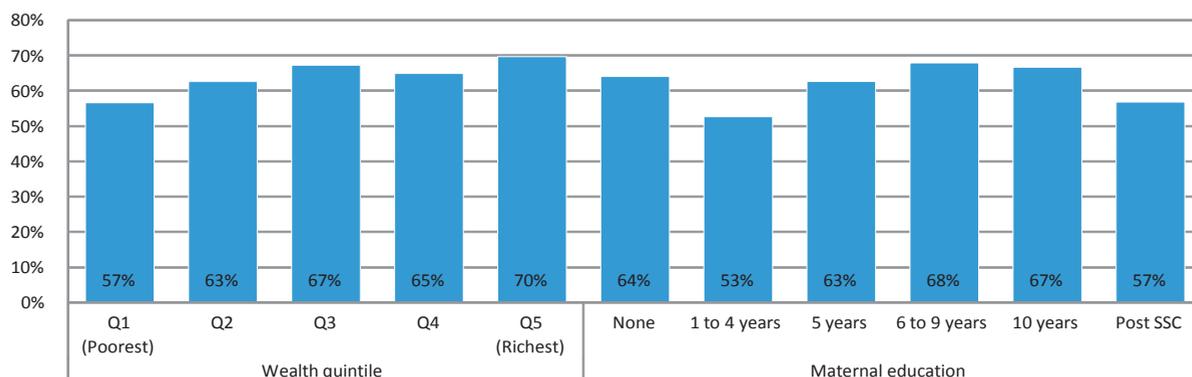


<sup>2</sup> The VAC coverage was lower than the national level due to existence of a gap between two consecutive campaigns in 2015.

<sup>3</sup> The younger age cohort of 6-11 months is not shown in this graph because recommendations for this age group changed in 2011.

Figure 7.30 shows an overall NVAC coverage of 64% coverage among children aged 6-59 months. In FSNS-NNS 2015, rural areas had a higher coverage compared to urban areas such as Chittagong and Khulna divisions, while a lower rate of coverage is found in Barisal and Rangpur divisions. There were small differences in the coverage between children from different wealth quintiles, and mothers education, with slighter larger numbers of children receiving capsules from mothers with 6+ years of education (Fig. 7.31).

**Figure 7.31: Coverage of the NVACs by household wealth quintile and maternal education (6 to 59 months)**



**Figure 7.32: Coverage of NVACs by child's sex and age**

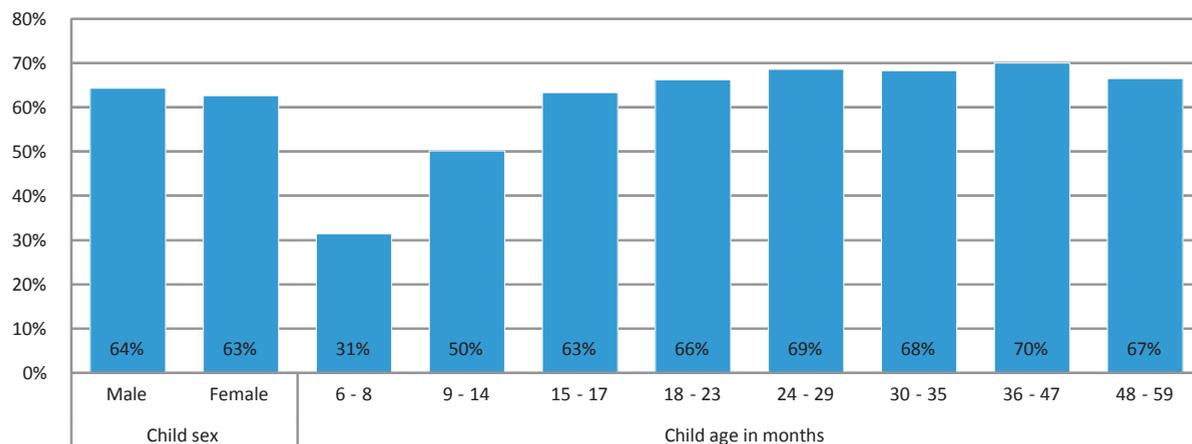


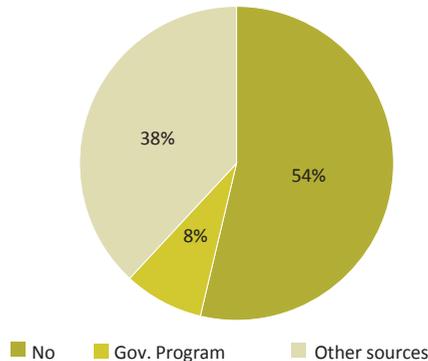
Figure 7.32 shows little variation in the proportion of children who received vitamin A capsules by age. There was no significant gender difference in coverage.

### **Deworming**

Worm infections harm millions of under-five children in Bangladesh. These parasites (e.g. helminths) consume nutrients from the children they infect, and have a highly detrimental impact on their nutritional status. Infant and young children infected by helminths often experience growth faltering, lower immunity, slow cognitive development, impaired learning, anaemia, ulcers and various other health problems (32). The burden of helminth-related infections falls disproportionately on the poor living in areas with inadequate sanitation (33)

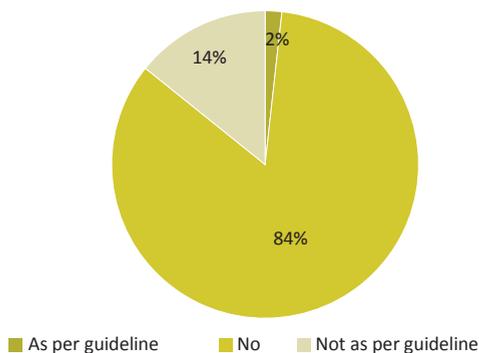
Treating helminth infections is affordable. Multiple effective drugs exist in the market, which are regularly provided through the country's anaemia control programme to children aged 24-59 months (9). The mass provision of allopathic deworming among children is a preventive health care programme of the Bangladesh Government linked to NVAC campaign. The government, however, does not extend the provision of these tablets to children aged 12-23 months as stated in WHO's recommendations (34). These tablets are often distributed at the same time as, or shortly after, NID or NVAC days.

**Figure 7.33: Children aged 12 to 59 months dewormed in the last six months**



Coverage of the deworming programme was measured by the proportion of children aged 12-59 months receiving an allopathic anti-helminthic tablet in the last six months before interview. Among children aged 12-59 months, 8% received allopathic deworming medicine from the government programme and 38% received it from other sources (Fig. 7.33).

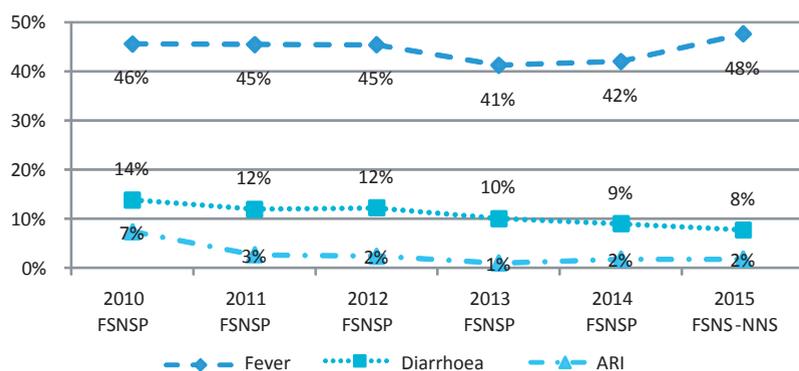
**Figure 7.34: Proportion of children consumed multiple micronutrient powder (6-23 months)**



The greatest prevalence of anti-helminthic tablet consumption was found in Chittagong division while the lowest was in Barisal division (figure not shown). In FSNS-NNS 2015, there was difference in the prevalence of allopathic deworming comparing urban and rural areas (figure not shown). Figure 7.34 shows that 16% of children consumed multiple micronutrient powder, but among them only 2% consumed as per guideline (29).

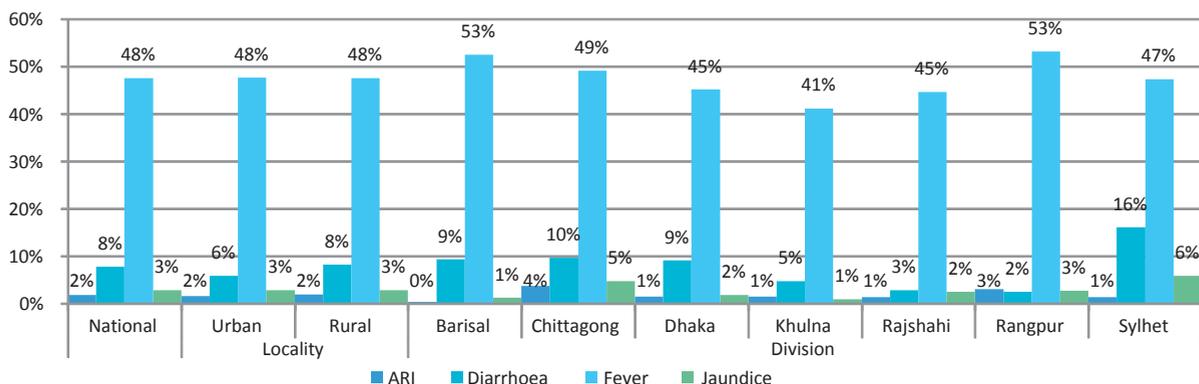
### Illness and recuperative health care

WHO and UNICEF recommend that caregivers should continue feeding (or breastfeeding) the child throughout illness and increase feeding immediately afterwards. Following illness, a child needs increased nutrient intake to compensate the nutrient losses during illness and to allow for catch-up growth, such that any weight lost is regained and the child is growing well again (2). The Bangladesh government has endorsed IYCF practices and included proper recuperative care when children fall ill (35,36,37,38). Counselling for appropriate sick child feeding should be provided to caregivers through integrated management of childhood illness (IMCI) programmes and at every visit of the sick child to a health care facility.

**Figure 7.35: Child Illness two weeks before interview****Childhood illness**

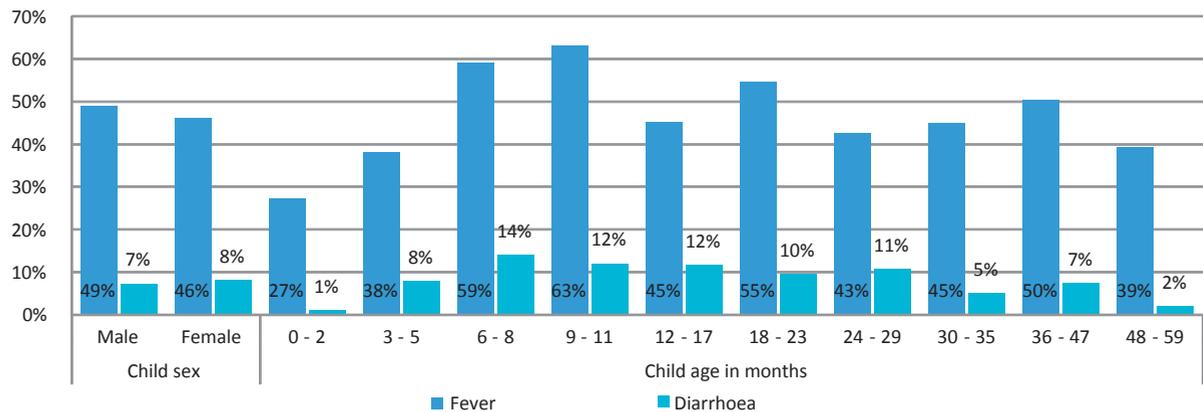
FSNS-NNS includes estimates of the period prevalence rate of three common childhood illness conditions - fever, diarrhoea, and acute respiratory infections (ARI) - two weeks before the interview. FSNSP defines fever based on a caregiver report of elevated temperature, diarrhoea as three or more loose motions in a 24-hour

period, and ARI as a cough coupled with difficulty in breathing. In FSNS-NNS 2015, the proportion of children suffering from fever increased slightly from previous year (Fig. 7.35). Three percent of the children suffered from jaundice during the last six months (figure not shown). In FSNS-NNS 2015, one third of adults in households with under-five children suffered from fever, 7% suffered from diarrhea, and 3% suffered from jaundice (figure not shown).

**Figure 7.36: Sick children by area of residence**

Fever period prevalence was lowest in Khulna and highest in Barisal and Rangpur divisions. Children in rural areas had slightly higher period prevalence rates for diarrhoea. Among the divisions, the prevalence was highest in Sylhet and lowest in Rangpur for child illness from diarrhoea (Fig. 7.36). There was a slight difference in the period prevalence of fever and diarrhoea between girls and boys. The age of the child, however, was significantly associated with the prevalence of recent illness. For fever, the prevalence was highest among 9 to 11 months old children, and for diarrhea the prevalence was highest for children aged 6-8 months (Fig. 7.37).

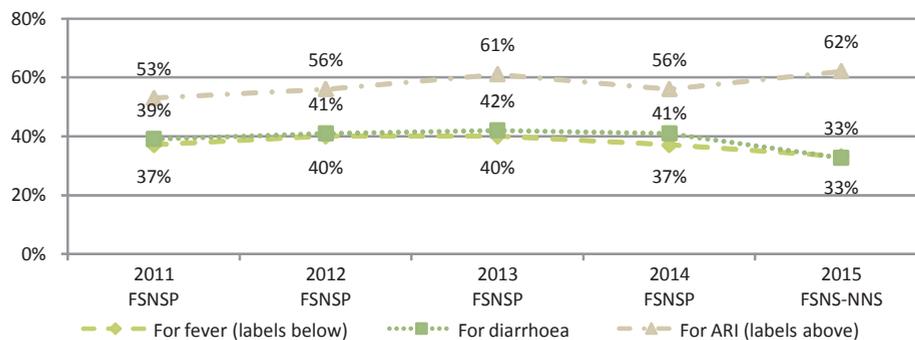
**Figure 7.37: Children sick with fever and diarrhoea by sex and age**



**Clinical care for illness**

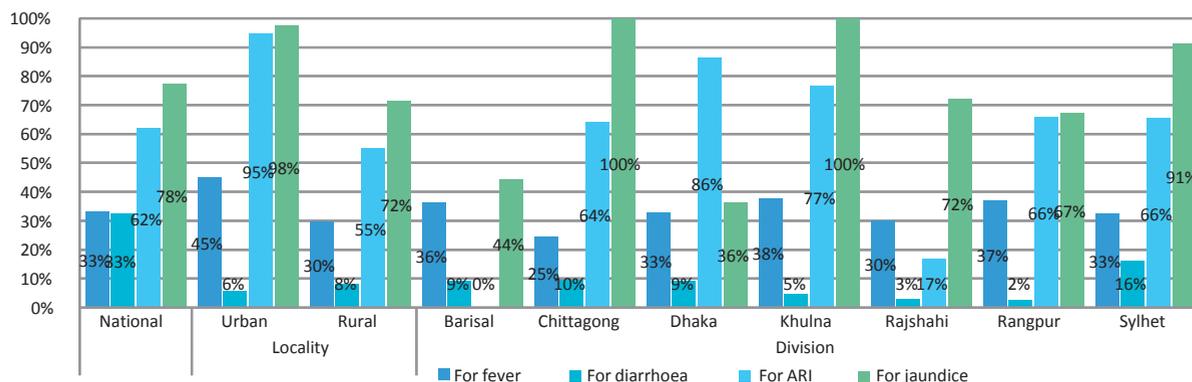
In Bangladesh, under-five mortality has dropped from 144 to 38 deaths per 1,000 live births in 25 years (ref). Diarrhoea, once responsible for 20% of all deaths is now being controlled by use of oral rehydration salts, zinc, support from health care providers, and home care. Encouraging caregivers to bring their sick children to trained providers, improving case management through rational use of antibiotics, and vaccination against haemophilus influenza type b, and pneumococcal illnesses is saving many lives. However, more community interventions are also needed to prevent drowning, which now accounts for more than 40% of all deaths between 1-5 years of age.

**Figure 7.38: Sick children who were taken to a medical provider**

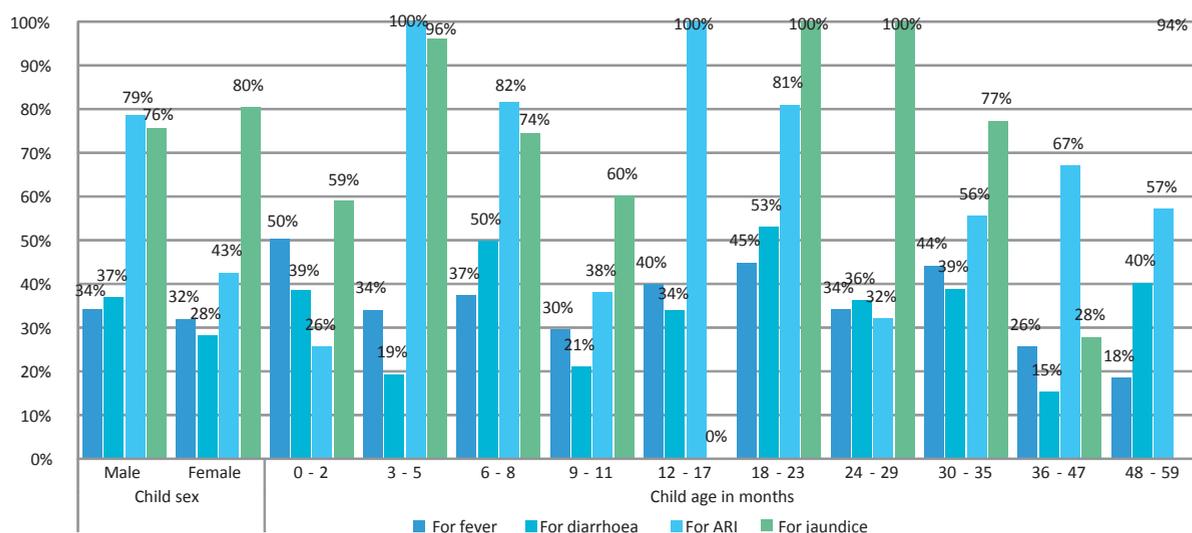


In line with DHS methods, FSNS-NNS records the proportion of children who were taken to a formal health facility or provider, excluding pharmacies, shops, or traditional practitioners (39).

For ARI, the proportion of children taken to a medical provider has increased since FSNSP 2011. In line with past results, parents take children sick with ARI to a medical provider more frequently than children sick with diarrhoea or fever (Fig. 7.38). In FSNS-NNS 2015, the proportion of children taken to a medical provider when ill with jaundice was 78% (Fig. 7.39).

**Figure 7.39: Sick children who were taken to a medical provider by area of residence**

There was little congruence between care-seeking by type of illness across divisions; areas with relatively high rates of care-seeking for one illness did not have elevated rates of care-seeking for other illnesses. The proportions of children taken to a medical provider when ill with fever, ARI or jaundice were significantly higher in urban areas compared to rural areas, but there was no difference for diarrhoea. The prevalence of being taken to a medical provider when ill with fever, diarrhoea or ARI were slightly higher for boys than girls, and almost no variation between children of different ages (Fig. 7.40).

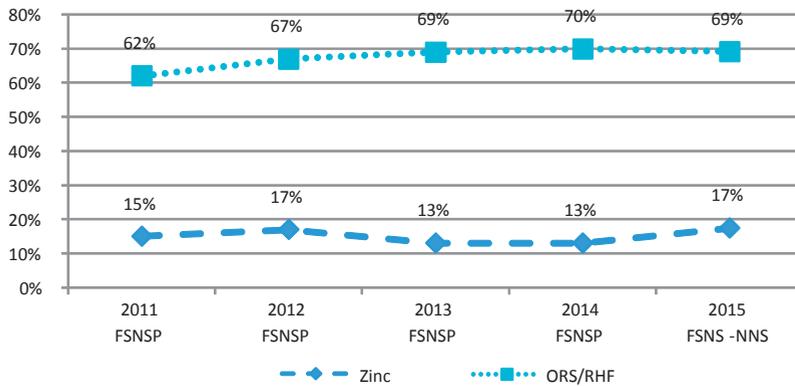
**Figure 7.40: Sick children taken to a medical provider by child age and sex**

### Home care for diarrhoea

In addition to medical and facility-based care, care at home can greatly improve recovery time for children, particularly those suffering with diarrhoeal illness. Effective treatment of children during diarrhoea can prevent over 90% of diarrhoea related deaths (40). While ORS is effective at saving lives due to dehydration, zinc has been shown to reduce the frequency of loose motions among children aged over six months suffering from diarrhoea (40). Zinc is currently available free of cost from governmental health care providers and at a fixed cost through the Social Marketing Company's distribution channels (41). Focusing on home care for diarrhoea, FSNS-NNS records the

proportion of the youngest children aged 6-59 months among those ill with diarrhoea in the two weeks before the interview who were treated with zinc or oral rehydration therapy (ORT).

**Figure 7.41: Zinc and ORT for diarrhoea**



ORT includes both liquids prepared from commercial oral rehydration salts (ORS packets) and rehydration liquids prepared with homemade ingredients such as salt, sugar, and rice starch. Nationally, nearly one-fifth of children who had diarrhoea diagnosed by their caregiver were given zinc supplementation - a slight increase from past years - while over two-thirds of children were provided with ORT-which has remained steady across previous surveillance rounds (Fig. 7.41).

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**Figure 7.42: Zinc and ORT for diarrhoea by area of residence**

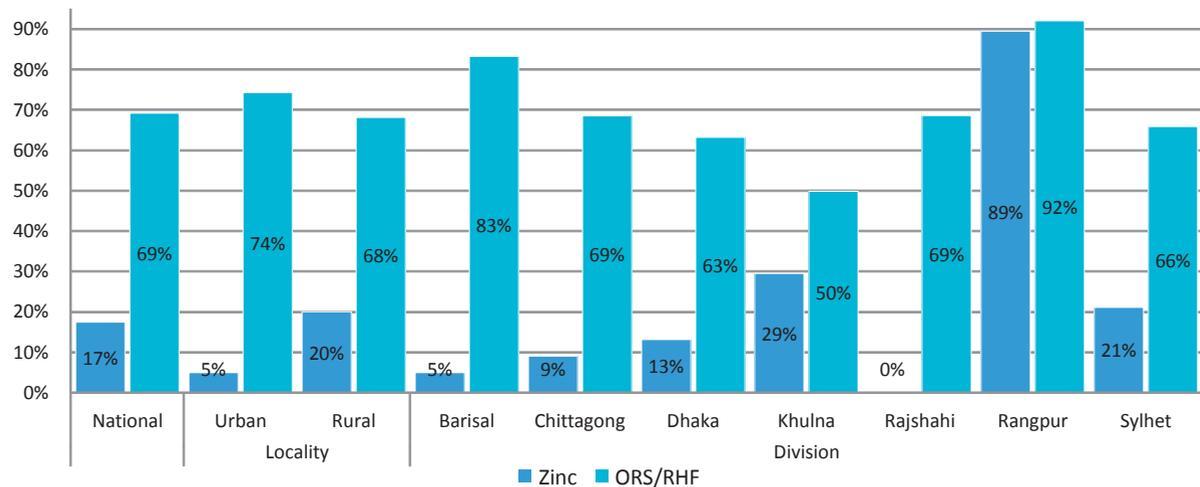
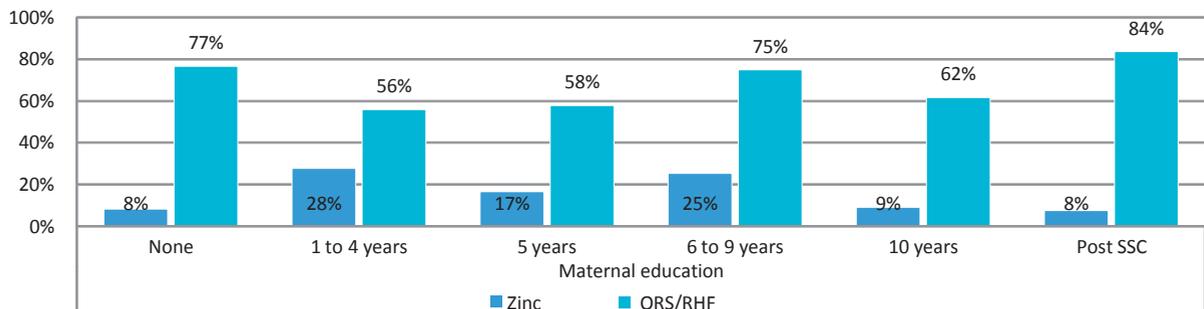


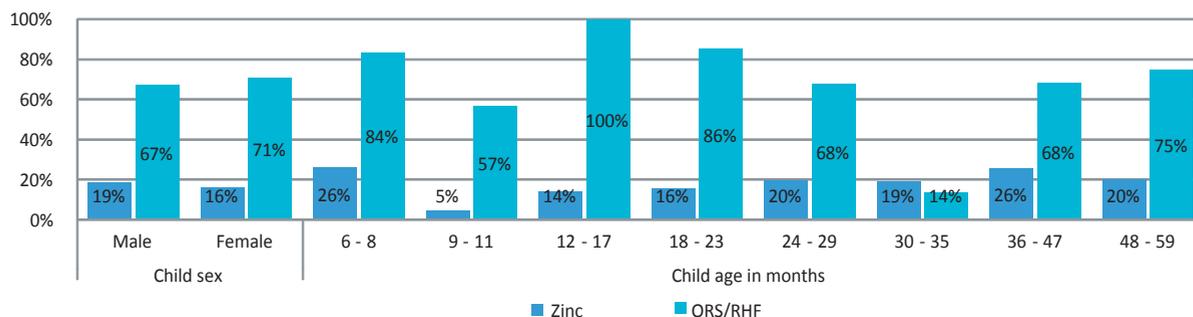
Figure 7.42 shows that Rangpur had the highest proportion of children treated in line with recommendations. The proportion of children treated with ORT was higher in urban areas compared to rural areas.

**Figure 7.43: Zinc and ORT for diarrhoea by maternal education**



There was no systematic pattern in the educational attainment of mothers and whether or not children were treated with zinc or ORT when recently ill with diarrhoea (Fig. 7.43). The proportion of children under five years of age treated with both zinc and ORT for diarrhoea was very small (Figure not shown).

**Figure 7.44: Children with diarrhoea given zinc or ORT by age and sex**



A greater proportion of sick children aged 12-17 months were fed ORS than other age groups. Male children were fed zinc in a slightly greater proportion than female children, but the difference was not statistically significant. By contrast, male children were fed ORS in a slightly lower proportion than female children, but again the difference was not statistically significant (Fig. 7.44).

FSNS-NNS also includes more general indicators of child feeding during illness. The caregivers of children aged 6-59 months who had diarrhoea were asked to provide a comparative assessment of the amount of food and liquids that had been given to the child during the illness compared to usual practice. If caregivers reported giving children increased liquids or ORT during their illness, they are classified as having received increased liquids. On the other hand, children recently sick with diarrhoea are classified as having received continued feeding if their caregivers reported giving them the same or more food during their illness compared to normal practice. Finally, children recently sick with diarrhoea are classified as having received adequate home care if they received both increased liquids and continued feeding.

**Figure 7.45: Children with diarrhoea given increased fluids and continued feeding by division**

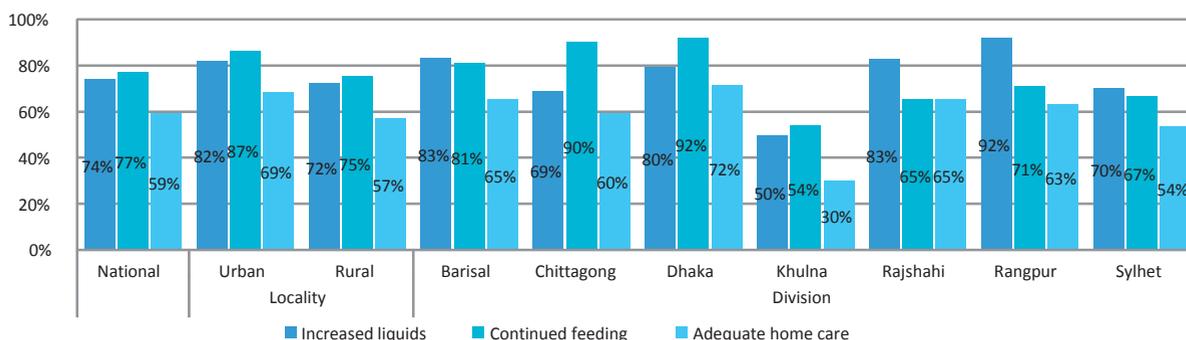


Figure 7.45 shows that almost three quarters of children recently ill with diarrhoea were given increased liquids and continued feeding during their most recent illness, and only a little under

three-fifths of recently ill children received both of these care practices. In FSNS-NNS 2015, only 1% of children aged 6-59 months were identified as moderately (MAM) or severely (SAM) malnourished, and among these children, only 18% were taken to a health care provider for SAM or MAM treatment.

# Nutritional status of children

The prevalence of stunting (35%), wasting (11%) and underweight (31%) did not change between FSNSP 2013 and FSNS-NNS 2015.

The highest prevalence of stunting and underweight was found in Sylhet whereas Rajshahi division had the highest prevalence of wasting.

Children of illiterate mothers and those living in poor and food insecure households were undernourished in higher proportion to wealthier and food secure households.

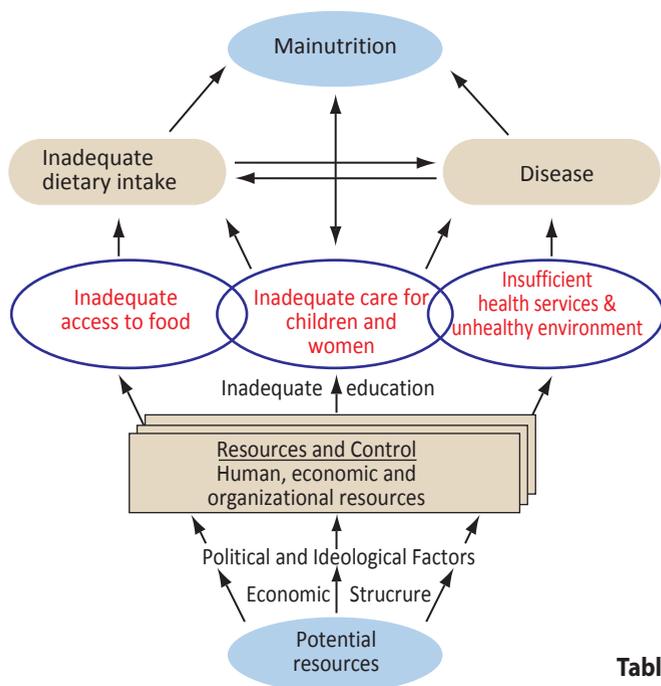
The prevalence of overweight children in urban areas rose two-fold within the last four years (2.3%) while among divisions, Rangpur posted the highest rate of overweight children.

The prevalence of stunting among under-five children did not vary according to IYCF practices.



Lack of comprehensive child care and protection, poor feeding practices, and limited resources are critical determinants of child malnutrition as described by UNICEF (Fig. 8.1). Globally, around 6.9 million children die every year before reaching their fifth birthday, and two-thirds of them (4.4 million) die due to conditions that could be prevented or treated with access to simple and affordable measures (1). According to the Lancet Maternal and Child Nutrition Series, in middle-income countries, under-nutrition is the cause of 3.1 million child deaths annually, which is 45% of all child deaths (2). But unfortunately, death is the tip of the iceberg. To effectively address this crisis, it is essential to identify the causes of under-nutrition, and the populations that are most vulnerable (3).

**Figure 8.1: UNICEF conceptual framework of child under-nutrition**



long-term effects of malnutrition, may result in significant lifetime losses in terms of health and productivity (5).

Even if a child's health and diet improve later in life, damage done during this period is largely irreversible (6,7). Increasing the quality and effective coverage of nutrition-specific interventions through investment in delivery systems, and more effective targeting of vulnerable and marginalized groups, are therefore actions to address the malnutrition problem (7). This report has described some of the causal factors of child under-nutrition including hygienic practices, sanitation,

The effects of malnutrition are long-term and trap generations of individuals and communities in a vicious circle of poverty. Nutritional improvement is therefore essential in efforts to eradicate poverty and accelerate the economic growth of low and middle-income countries. It has been estimated that the economic cost of malnutrition ranges from 2 to 3% of GDP of any country (4). The most damaging effects of malnutrition occur during pregnancy and early childhood from conception to two years of age, i.e. the first 1000 days. During this vulnerable period, malnutrition can weaken a child's immune system, and increase risk for infectious diseases. In addition, delayed motor and cognitive development which figure among the

**Table 8.1: Children measured by age**

Age group in months	Number Surveyed	Weighted proportion
0 to 5	239	9%
6 to 11	262	10%
12 to 17	260	11%
18 to 23	282	11%
24 to 29	289	11%
30 to 35	278	10%
36 to 41	286	11%
42 to 47	282	10%
48 to 53	291	11%
54 to 59	241	7%
<b>Total</b>	<b>2,710</b>	<b>100%</b>

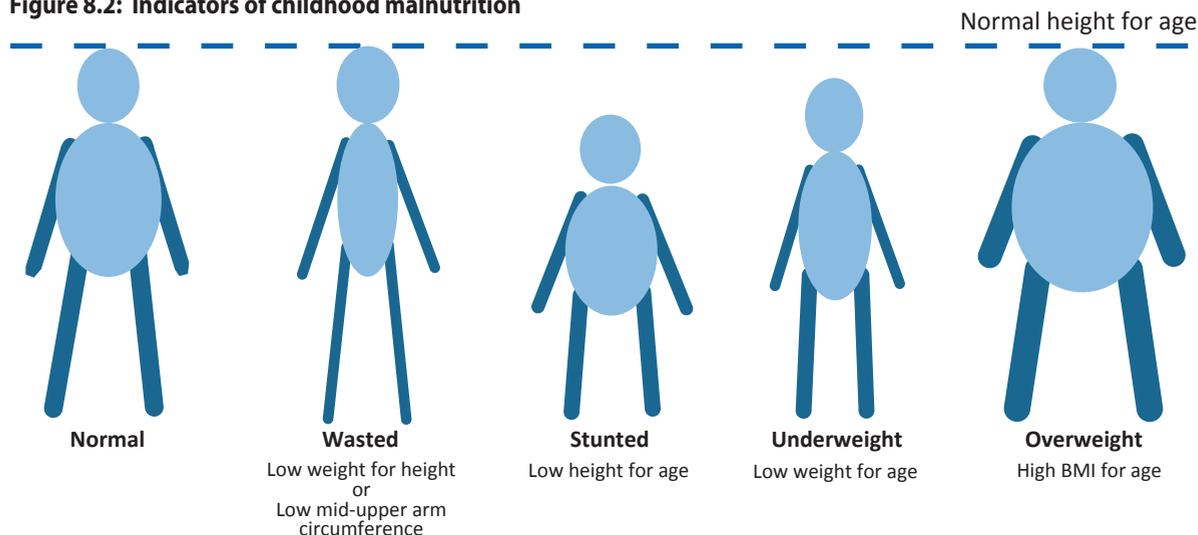
household food insecurity, and inadequate care practices for pregnant mothers, women, and under-five children. In this chapter we discuss the prevalence and distribution of child malnutrition in Bangladesh in 2015. In order to estimate the nutritional status of children, FSNS-NNS records the height/length, weight, and MUAC measurements of all children of sampled households. In 2015, FSNS-NNS measured over 2,500 children across the country (Table 8.1). Child nutritional status is calculated by comparing multiple measures from Bangladeshi children with those of a reference population of children from both developing and developed countries experiencing recommended feeding and care conditions (8,9).

WHO recommended indicators are used to measure nutritional imbalance resulting in under-nutrition. The percentage of children with a low height/length for age (stunting) reveals the cumulative effects of under-nutrition and infections since and even before birth. This measure can, therefore, be interpreted as an indication of poor environmental conditions or long-term retardation of a child's growth potential. The percentage of children who have low weight-for-age (underweight reflects wasting (i.e. low weight-for-height/length), acute weight loss, stunting, or both). As such, underweight is more difficult to interpret as it not distinguish between children who are stunted or wasted, but may include children who are only mildly undernourished based on both of these indicators (9,10). Acute under-nutrition is estimated using the circumference of a child's upper arm, or a measure of weight for height, which are compared against a reference population or against a static international standard.

For all anthropometric indicators, children who fall between negative two standard deviations (-2 SD) and negative three standard deviations (-3 SD) from the mean of the reference population are classified as moderately undernourished. Children who are below -3 SD are classified as severely undernourished. Taken together, all children who fall below -2 SD are classified as globally undernourished (10).

In order to classify the percentage of obesity in children, which denotes a high ratio between their weight and length, BMI scores by age are compared with a WHO reference population.<sup>1</sup> Children are classified as moderately overweight if their measurements indicate that they are between +2 SD and +3 SD from the mean of the reference population. Children who are above +3 SD are classified as severely overweight (10). Figure 8.2 depicts these indicators.

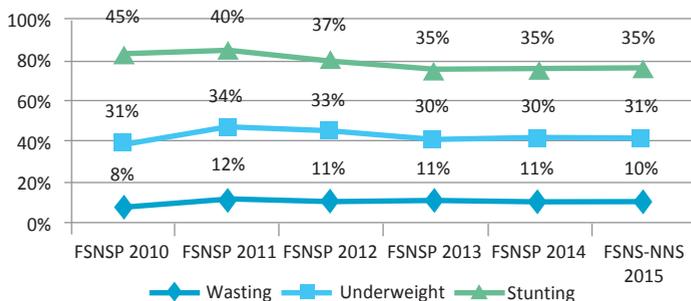
**Figure 8.2: Indicators of childhood malnutrition**



<sup>1</sup> BMI for age is the recommended indicator for determining childhood overweight and obesity according to the WHO (38,8).

Children grow with slightly different trajectories, even among well-fed children (11,12). As such, nutritional status measures are expressed in population terms and only have a limited value in assessing malnutrition in an individual child. Even in a healthy, well-nourished population, approximately 2% of children would naturally be short enough to be classified as stunted, light enough to be considered underweight, or thin enough to be considered wasted.

**Figure 8.3: Trends in the prevalence of child under-nutrition (0 to 59 months) <sup>2</sup>**

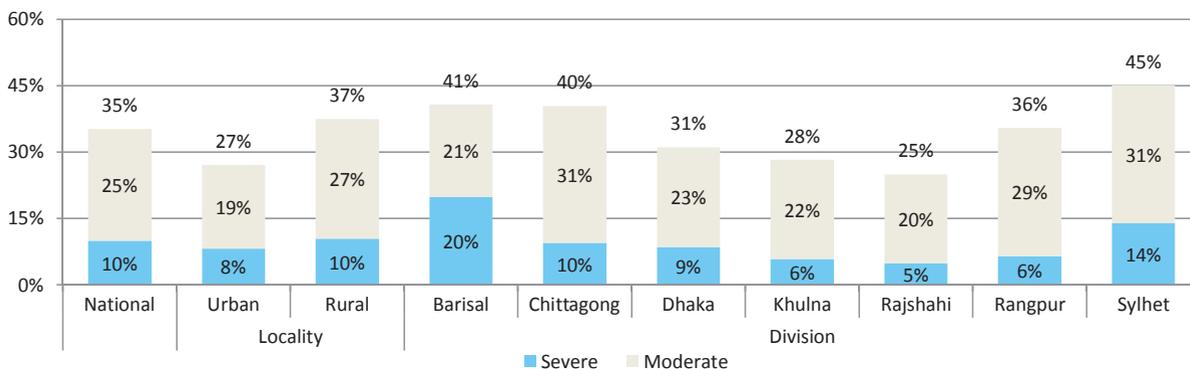


During the last two decades, Bangladesh has achieved substantial reductions in levels of child under-nutrition. Since FSNSP 2010 an incremental reduction in child stunting has occurred from 45% in FSNSP 2010 to 35% in FSNS-NNS 2015, which is less than the WHO cut-off for very high prevalence (9). However, levels of wasting and underweight have remained comparatively static during this period.

### Chronic child under-nutrition

Chronic child under-nutrition continues to be a challenge for many developing countries. Multiple factors including poor maternal nutrition during pregnancy and micronutrient inadequacy due to poor diet or infection, are associated with chronic child under-nutrition (13,14,15). Stunting or linear growth retardation is associated with a weaker immune system and higher risk of infectious diseases that increases the child's possibility of death. Moreover, an undernourished child may be more prone to develop high blood pressure, diabetes, heart disease, and obesity in adulthood (16). In short, the effects of under nutrition are not limited to the edge of childhood, but rather persist into adulthood - and silently destroy the future productivity of the nation (17).

**Figure 8.4: Chronic child under-nutrition by area of residence**

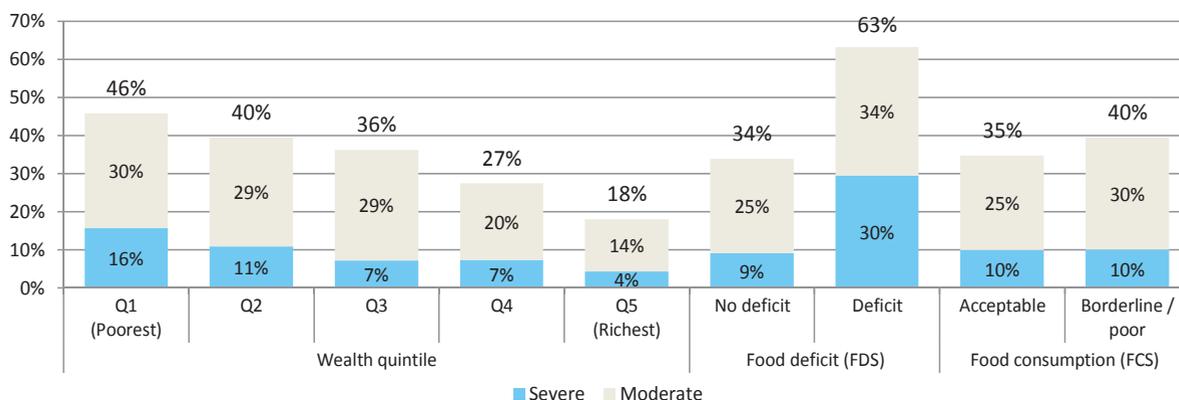


Because stunting prevalence does not change rapidly and only adjusts slowly after changes in dietary intake, this section will only present annual estimates of chronic under-nutrition. The prevalence of chronic child under-nutrition varies substantially by area of residence. Across divisions, Sylhet had the highest rates (45%) of childhood stunting. Substantial improvements were

<sup>2</sup> Estimated proportion for different nutritional indicators of Bangladeshi children between the years of FSNSP 2010 to FSNSP 2014 are obtained from the previous reports of FSNSP (39,40,41,42,43)

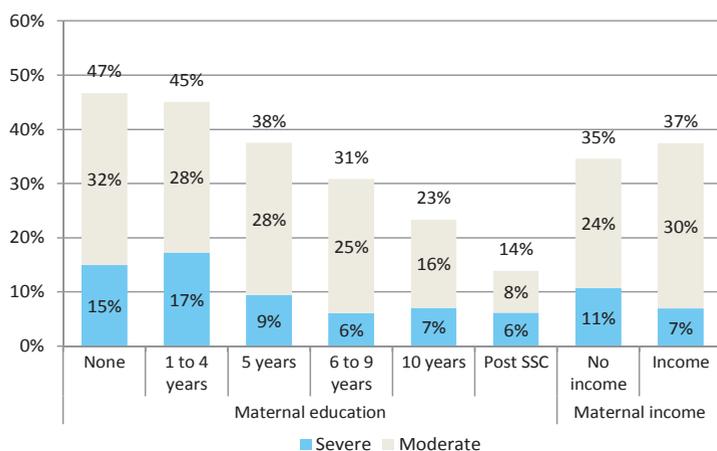
observed in Rajshahi division, with prevalence of stunting declining from 33% in 2014 to 25% in FSNS-NNS 2015. Unfortunately, the prevalence of stunting in Chittagong division increased from 2014. On average, urban areas had much lower rates of stunting than rural areas (Fig. 8.4).

**Figure 8.5: Chronic child under-nutrition by household wealth and food security**



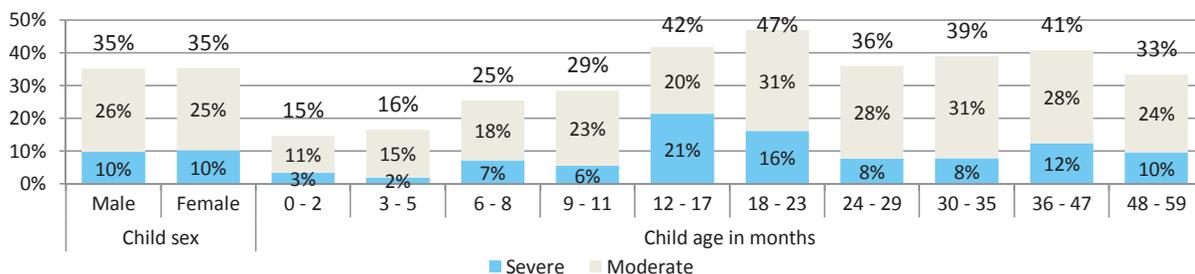
Figures 8.5 and 8.6 show that children of less educated mothers and children living in poor and food-insecure households were more likely to become stunted, with a substantial proportion of falling into the severely stunted category. On the other hand, even wealthiest and food-secure households possess a large proportion of stunted children. Maternal employment does not play any significant role on child's stunting.

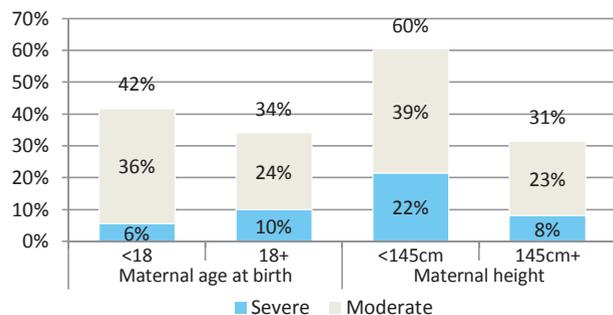
**Figure 8.6: Chronic child under-nutrition by maternal education and earning status**



In Bangladesh, there is no difference between the proportion of chronic under-nutrition between male and female children. Chronic under-nutrition could be emergence from the womb as a result of inadequate maternal feeding and care but showed hugely increment after first year of life (Fig. 8.7). In FSNS-NNS 2015, child stunting has become picked to around half (47%) among the children aged 18-23 months but highest (21%) rates of severe under-nutrition has been seen at the age between 12 and 17 months.

**Figure 8.7: Chronic child under-nutrition by child's characteristics**



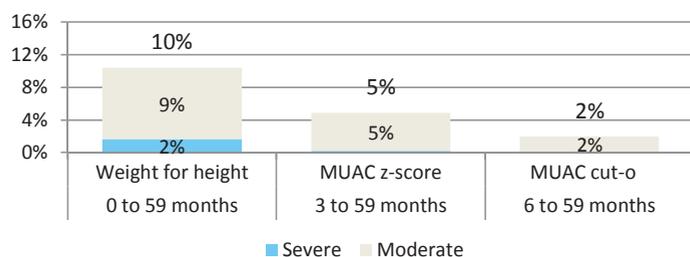
**Figure 8.8: Chronic child under-nutrition by maternal characteristics**

In the line with past results, childhood stunting was associated with early pregnancy, and mother of short stature (Fig. 8.8). No sizable and significant differences in the rates of stunting among children aged <6 months were found for early initiation of feeding, pre-lacteal feeding, exclusive breastfeeding, predominant breastfeeding, and bottle feeding (results not shown). In addition,

significant differences were found in wasting and underweight between children who had experienced illness in the previous two weeks and those who had not been ill (graph not shown).

### Acute child under-nutrition

Acute malnutrition, a short-term indicator of malnutrition, is often associated with severe food shortage, inappropriate child feeding practices, and infectious diseases which impede the supply of nutrients to the body (18,19). Acute malnutrition, defined by weight-for-height z-score (WHZ) <-2 (i.e., wasting) in under-five children continues to be a major health problem in low-income countries, particularly Bangladesh. A child with severe under-nutrition has a risk of death up to 20 times more than that of a healthy child. Once acute under-nutrition develops, it is treated in line with WHO protocols that have been implemented and regulated by the government of Bangladesh.

**Figure 8.9: Acute child (0-59 months) under-nutrition according to different measures**

Acute under-nutrition can be measured in three ways: 1) weight and height converted to weight-for-height z-scores; 2) MUAC measurements converted to MUAC-for-age z-scores; and 3) MUAC measurements expressed by standard cut-offs, with moderate under-nutrition defined as MUAC <125mm and acute under-

nutrition defined as MUAC <115mm (17,19). The level and prevalence of acute under-nutrition captured by these measures varies considerably depending on the type of classification system that is used (9).

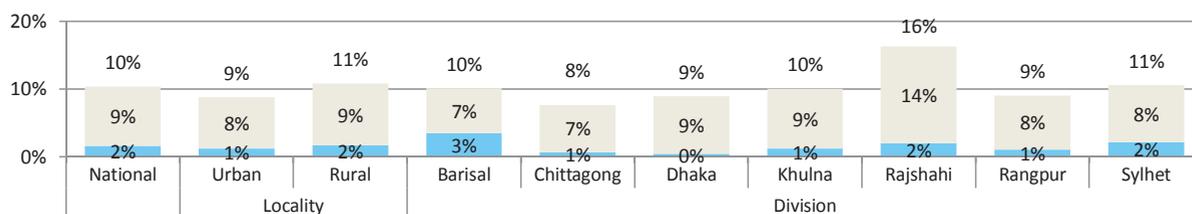
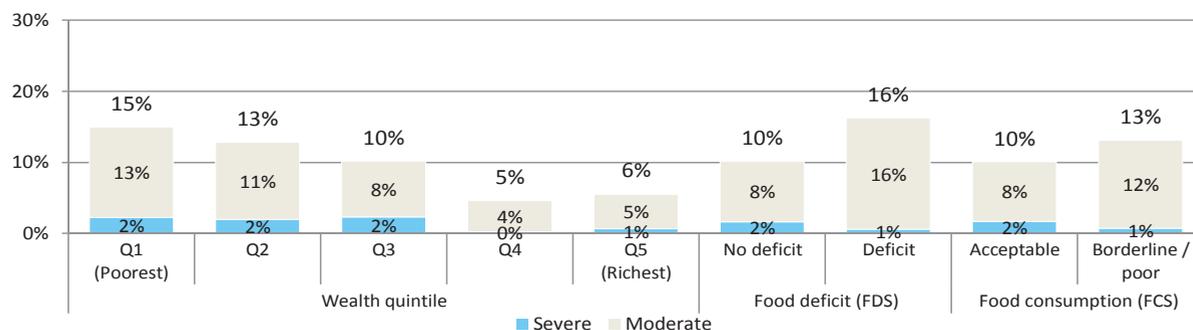
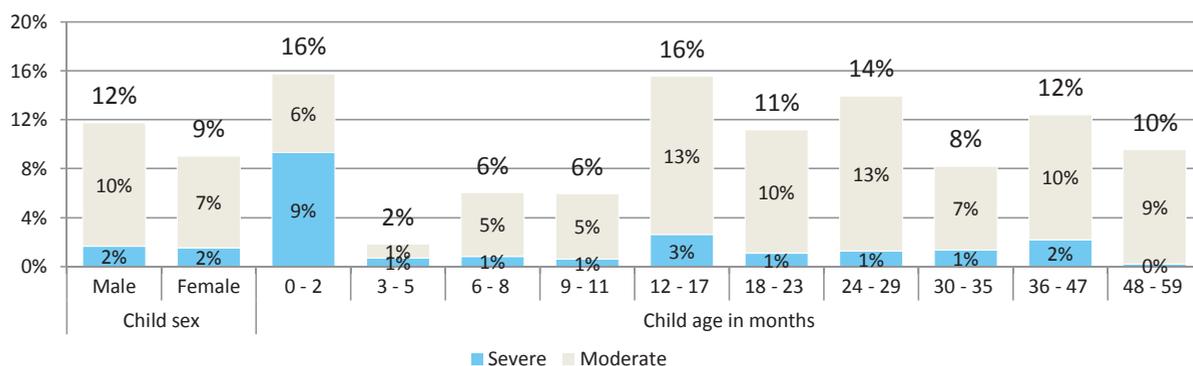
**Figure 8.10: Acute child under-nutrition by area of residence**

Figure 8.10 shows the rates of wasting nationally (10%), and across the seven administrative divisions of Bangladesh in line with the national estimates (10%). Across divisions, Rajshahi had the highest rate (16%) of wasting among under-five children followed by Sylhet division (11%).

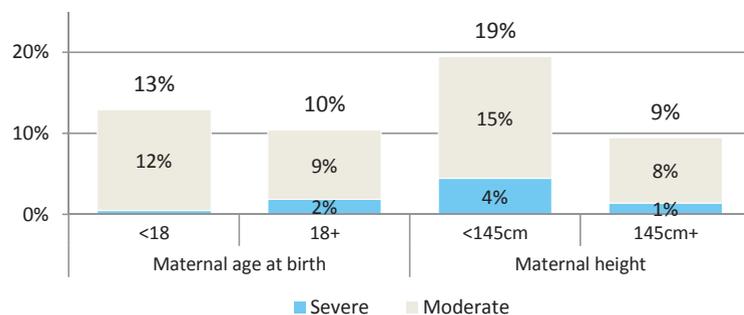
**Figure 8.11: Acute child under-nutrition by household wealth and food security status**



**Figure 8.12: Acute child under-nutrition by child sex and age**



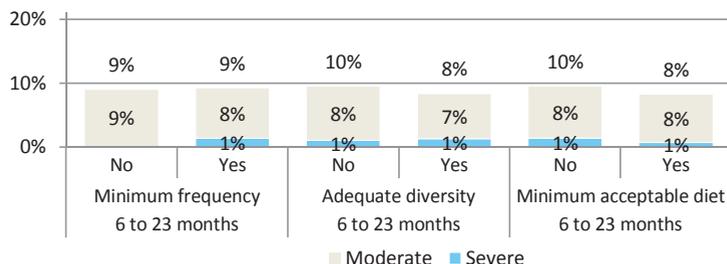
**Figure 8.13: Acute child under-nutrition by maternal characteristics**



Similar patterns were observed for acute and chronic under-nutrition according to household and maternal characteristics. Children from poorer households had highest rates of wasting than those from wealthier households. Similarly, households with food insecurity and sub-optimal food consumption had higher rates of wasting than food-secure households (Fig. 8.11). In line with past results, children of more

educated mothers were wasted in a lower proportion than those of less educated mothers, and no association was found based on the mother's income earning status (graph not shown). Boys were more vulnerable to wasting than girls (Fig. 8.12). In addition, there was considerable variation of wasting across ages. The prevalence of wasting appears greater from birth to two months and after one year of age, and much lower between 3-11 months of age. Wasting was also associated with early pregnancy, and mothers of short stature (Figure 8.13).

**Figure 8.14: Acute child under-nutrition by complementary feeding**



Acute under-nutrition did not appear to be related to IYCF indicators such as minimum meal frequency, minimum dietary diversity, and minimum acceptable diet of children aged 6-23 months (Fig. 8.14). However, evidence elsewhere suggests that proper IYCF practices can reduce

the prevalence of malnutrition (< -2 SD) at 12 months of age by 1% to 19% and deaths due to malnutrition by 2% to 13% (20).

### Child underweight, overweight, and obesity

Children who have low weight for age are underweight, which could result from stunting or wasting or a combination of the two. Nationally, in Bangladesh the rate of child underweight is 31%, which compares to around 16% for South-East Asia. Based on WHO cut-off values for public health significance, prevalence rates for underweight indicate a critical situation (9).

Increasingly, underweight and overweight people are found within the same household (often called dual burden households); posing an interesting challenge for nutrition interventions (21).

**Figure 8.15: Child underweight by area of residence**

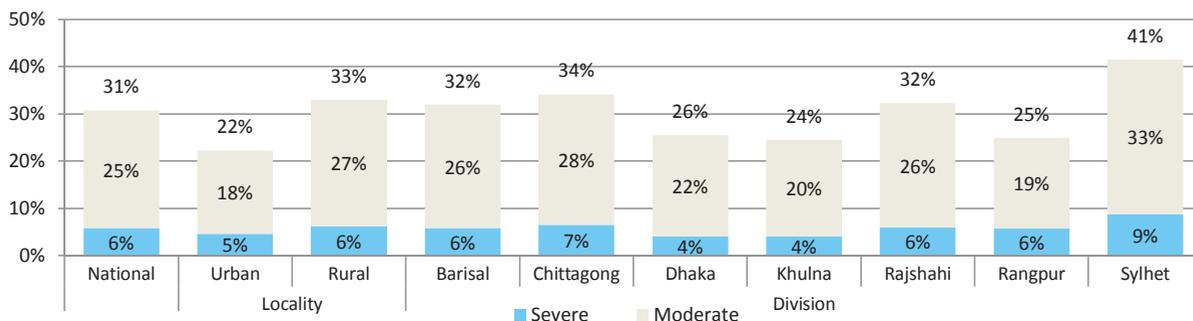
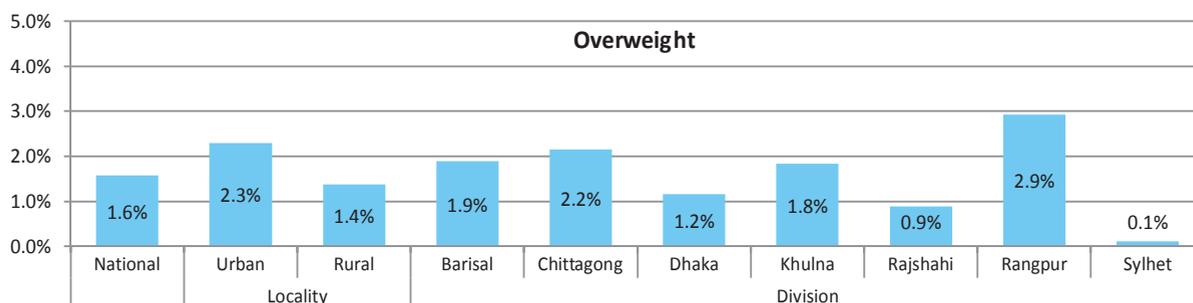


Figure 8.15 shows the prevalence rates of child underweight by area of residence. Rates of underweight are greater in rural areas (33%), and reach 41% in Sylhet division, which is the highest level of underweight recorded in Sylhet since 2011. The associations between underweight and different household characteristics were similar to those observed for wasting and stunting, and therefore, separate tables are not presented.

**Figure 8.16: Overweight among under-five children by area of residence**



In FSNS-NNS 2015, 1.4% of under-five children were overweight, a small increase over FSNSP 2014 (Fig. 8.16). The proportion of overweight children in urban areas was 2.3%, which is a doubling of what was recorded in 2011 (1.2%) 1.2% in FSNSP 2011. Among the divisions, Rangpur had the highest rate of overweight children.

### Tracking global development targets

The systematic monitoring of global development targets with measurable indicators was a hallmark of the Millennium Development Goals (MDG) (22,23). As the 2016 target date for the MDGs has been reached, new goal setting processes are being rolled out that embrace a broader sustainability agenda, and go much further than the MDGs in addressing the root causes of poverty and the need for development that works for all people. These new goals and targets will stimulate action in the decades that come (24), however, for the purposes of tracking nutritional progress during the last 15 years, estimates are presented according to MDGs.

#### ***MDG 1 - Child hunger***

Given that the MDG goal to reduce child underweight was set in 2000 with the base year of 1990, long before the 2006 WHO child growth standard reference population was established, the older NCHS/CDC/WHO reference population was used. Therefore, the prevalence of under-nutrition based on the NCHS/CDC reference population does not correspond with earlier estimates based on the WHO reference population. Of particular note, the application of NCHS references results in a higher levels of underweight and lower levels of child stunting than if WHO reference groups were employed (25,11). Figure 8.17 tracks Bangladesh's progress toward the MDG 1 child underweight goal across different nutrition surveys including FSNSP, until the present (26,27,28,29,30,31,32,33,34,35,36,37). Results indicate a reduction of >1.5 percentage points per year between FSNSP 2011 to FSNS-NNS 2015.

**Figure 8.17: Trends in child under-nutrition (6-59 months) in Bangladesh using WHO child growth standards**





# Food security and nutrition in Dhaka slums

The average household size in Dhaka slums was 4.4 members—slightly lower than the national scenario. Transport such as rickshaw pulling (28%) was the principal source of income for Dhaka slum dwellers.

Almost all the households had access to safe drinking water. On the other hand, only 3% had access to sanitary toilet facilities.

A small proportion of caregivers used soap for washing hands before feeding children (1%), before eating (1%), and for washing children's hand (2%). The proportion of caregivers not exhibiting appropriate hand washing behaviour was more than three times the proportion of caregivers with appropriate hand washing behaviour.

In Dhaka slums, 47% women were over-nourished (obese and overweight) and 80% women gained 5kg weight during their last pregnancy. Less than one-third of lactating women living in Dhaka slums took IFA.

Households in Dhaka slums were largely (97%) free of hunger and displayed minimal levels of poor and borderline food consumption.

The proportion of exclusive breastfeeding was comparatively low (25%) in Dhaka slums than other areas of Bangladesh, with educated mothers tending to provide greater exclusive breastfeeding to their children than uneducated mothers.

For complementary feeding, the proportion of children in Dhaka slums fed with minimum meal frequency is 83% and the rate of acceptable diet was found to be higher among educated mothers.

The prevalence of stunting among under-five children of Dhaka slums was much higher (45%) compared to other areas of Bangladesh and did not vary according to whether or not proper IYCF practices were followed.



A slum is a complex cluster of households that develops haphazardly and unsystematically on public or private land. Living conditions tend to be poor, with inadequate available sanitation and hygiene, poor housing materials, and over-crowding evidenced in high proportions of household members living in the same room (1).

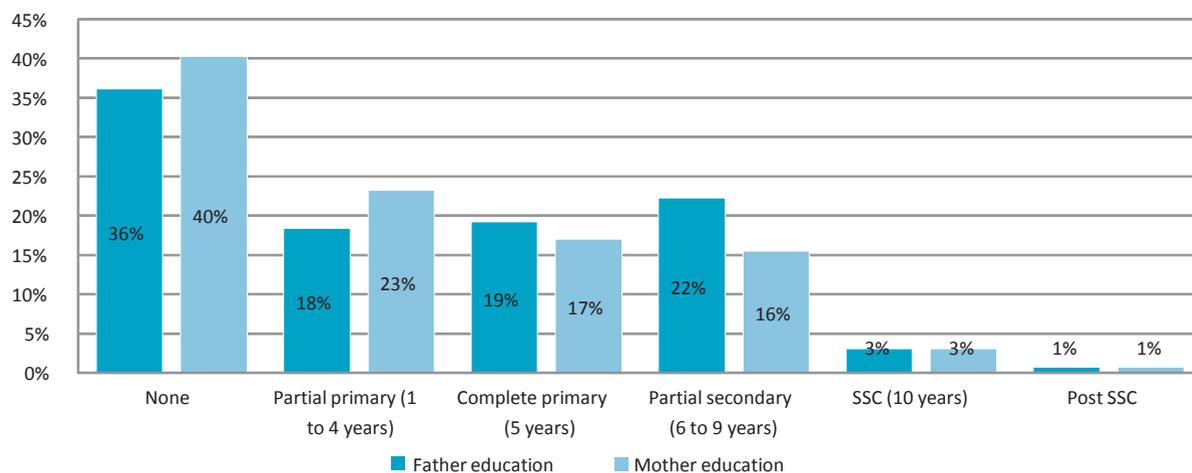
Dhaka city has grown considerably over recent years largely due to rural-urban migration provoked by pull and push factors ranging from employment and education opportunities, to poverty, familial tensions, and livelihood stress associated with climate change. Today almost 15 million people reside in Dhaka, almost a third of which live in slums (2). Overcrowded and unhealthy living conditions together with poverty make slum dwellers vulnerable to various health-related problems (3). Food insecurity and malnutrition further exacerbate the vulnerability of slum dwellers, given their link to heightened risks of morbidity, mortality, poor cognitive development and reduce productivity (4,5,6, 7).

### Characteristics of households in Dhaka slums

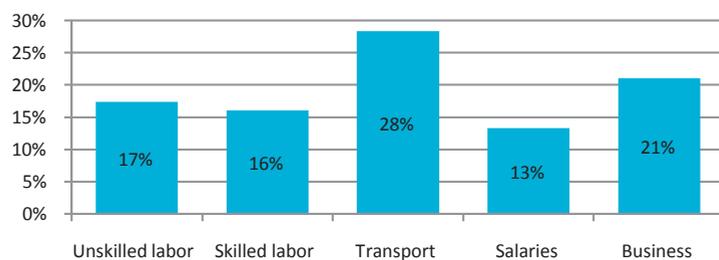
The mean size of households in Dhaka slums was 4.4—slightly lower than the national average. Forty-four percent of slum households had an under-five child.

A greater proportion of mothers were completely uneducated compared to fathers. As expected, the proportion of parents living in slums who reported having attained SSC or post SSC diplomas was very low in. No significant difference was found in the extent of higher educational attainment comparing fathers and mothers (Fig. 9.11).

**Figure 9.1: Educational attainment of parents in Dhaka slums**



**Figure 9.2: Occupation of principal income earner of Dhaka slum**



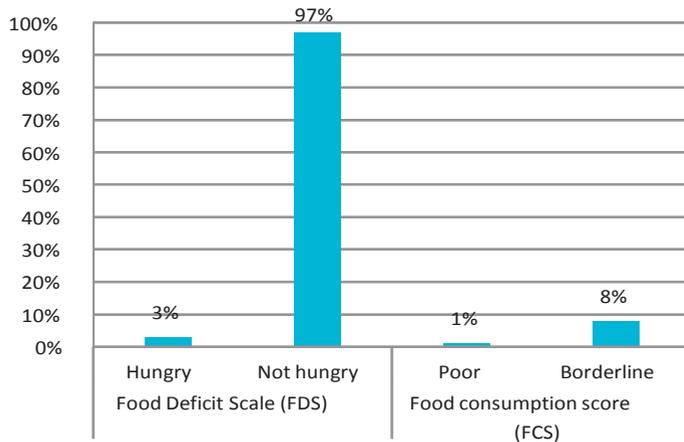
In Dhaka slums, almost a third of principal income earners were involved in the transport sector, whereas 13% were engaged in salaried employment. The proportion of households earning income from skilled and unskilled labour was similar (16 and 17% respectively) (Fig. 9.2).

FSNS-NNS also collects information on the consumption of iodized salt in Dhaka slums. Almost four-fifths of slum households consumed iodized salt, which is greater than the national figure (72%). In Dhaka slums, only 4% of the households consumed vitamin A fortified oil.

### Food security status in Dhaka slums

According to Shaw (2007), food security occurs when access to sufficient, safe, and nutritious food is secure and supports a healthy and active life. Evidence suggests that food security is closely related with human and economic development outcomes (8). As such, the Sustainable Development Goals prioritize food security as a basic human right which should be realized (9). However, in low and low-middle income countries, millions of people continue to experience extreme hunger and malnutrition (7). Household food insecurity is one of the underlying causes of stunting, wasting and malnutrition (10) and is linked to a host of negative consequences related to health, development and productivity later in life (6). According to WFP (2007), food insecurity in urban areas is greatest among slum dwellers due to lack of income for food purchases. (12).

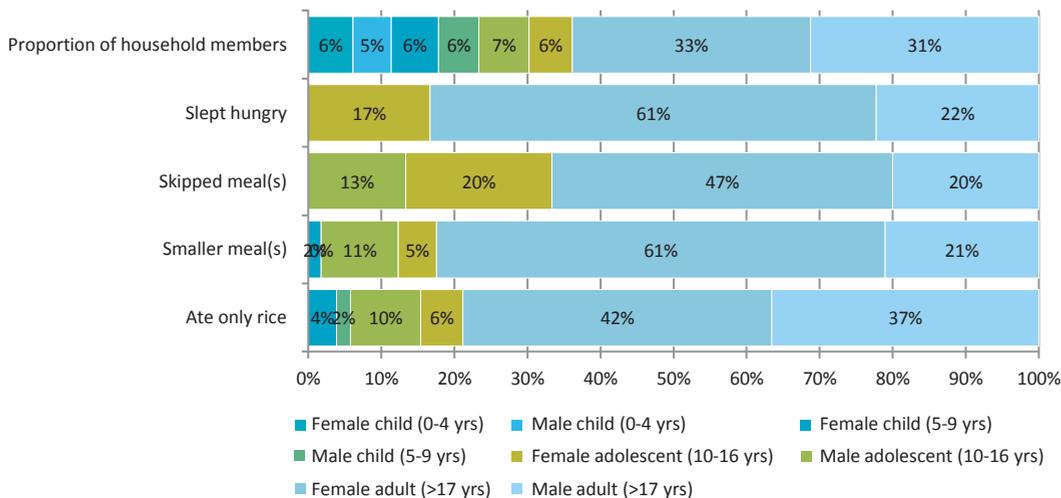
**Figure 9.3: Status of food insecurity indicators in Dhaka slums**



In terms of food security indicators, most households in Dhaka slums (97%) do not experience hunger as measured by the Food Deficit Scale (FDS). Levels of poor or borderline food consumption in urban slums were also very low (Fig. 9.3).

Figure 9.4 shows the proportion of household members by age and sex who adopted coping behaviours by reducing consumption or skipping meals in response to household food shortages. In Dhaka slums, it has been seen that adults mostly female sacrificed their food more frequently than other male members.

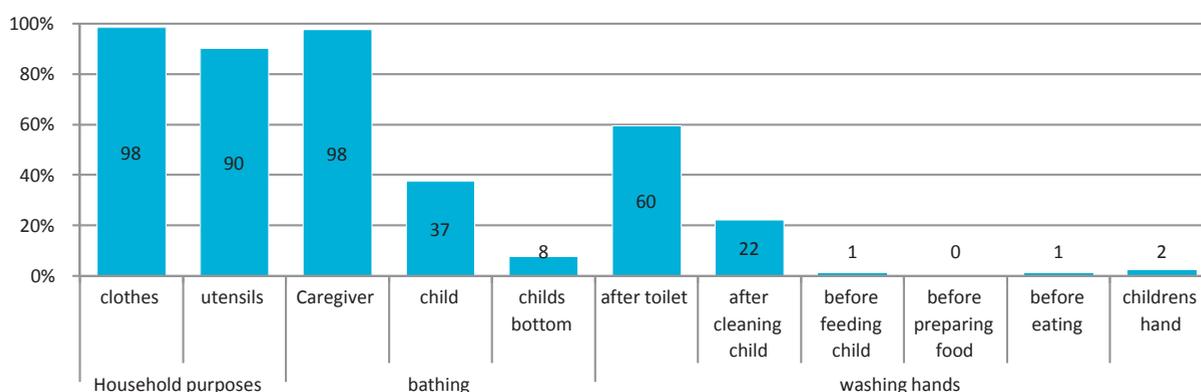
**Figure 9.4: Coping strategies of members in food insecure households in Dhaka slums**



## Water, sanitation and hygiene in Dhaka slums

Although the MDGs have encouraged development of water and sanitation sectors in Bangladesh, millions of children continue to be born every year in environments that make them vulnerable to health-related risks. Repeated infections and nutritional insults related to environmental conditions can have grave consequences (5,13). Unsafe drinking water, sanitation and hygiene commonly cause diarrhoea, hepatitis A, hepatitis E, typhoid fever, dengue, arsenicosis (1). In Bangladesh, the quality of water supply is lacking, especially in slum areas, with many households sharing a single water source. Sanitation conditions are similarly poor, with 15 or more people sharing one toilet. Data from this study suggest that almost all households in slum areas of Dhaka had access to improved drinking water (Figure not shown), however only 3% households reported access to improved toilet facilities (Figure not shown).

**Figure 9.5: Caregivers using soap for different purposes in Dhaka slums**



Almost all the caregivers (98%) reported that they used soap for bathing as well as for washing clothes. However, only a very small proportion of caregivers used soap for washing hands before feeding children (1%), before eating (1%) and when washing children's hands (2%). By contrast, 60% of caregivers used soap for washing their hands after using the toilet (Fig. 9.5). Overall, the proportion of caregivers not demonstrating appropriate hand washing behaviour was more than three times than the proportion of caregivers with appropriate hand washing behaviour (Figure not shown). Among the caregivers who practiced appropriate hand washing behaviour, 23% did not have any education, 35% had five years of education, and 20% had 6-9 years education (Figure not shown).

## Women's nutrition and care in Dhaka slums

In developing countries, maternal malnutrition is closely linked with Low Birth Weight and intrauterine growth retardation of the baby (14). According to Haque et al, malnutrition can affect generation after generation through as poor nutritional status is passed from mother to baby (15). Previous analysis revealed that trends in malnutrition are very similar comparing urban and rural areas of Bangladesh, with decreasing rates of chronic energy deficient (CED) and rising rates of overweight and obesity (16,17). This type of nutritional transition is an inevitable outcome of economic growth and development (18). In this section we will discuss the overall nutritional conditions of women and pregnant mothers living in Dhaka slums.

**Figure 9.6: Proportion of women consumed inadequately diverse diets in Dhaka slums**

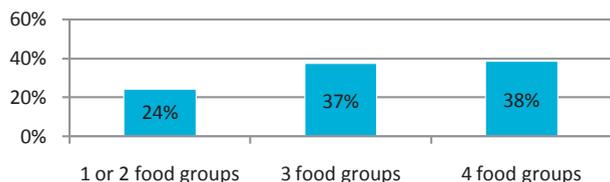
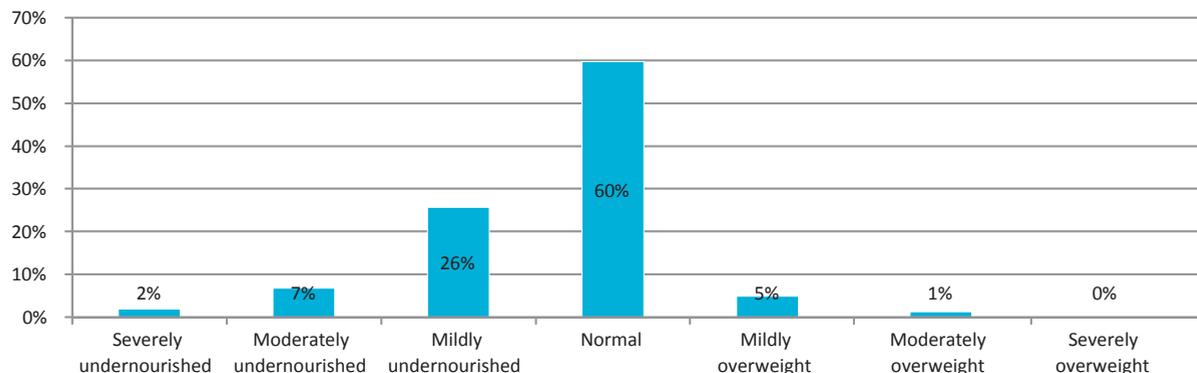


Figure 9.6 shows that 24% women consumed one or two food groups in the day before interview. Among households with poor and borderline food consumption habits, this percentage more than doubles (59% of women) (figure not shown). Women's income earning does not make a difference to dietary diversity (figure not shown).

**Figure 9.7: Nutritional status (BMI) of adolescent girls aged 10 to 18 in Dhaka slums**



**Figure 9.8: Nutritional status (BMI) of women in Dhaka slums**

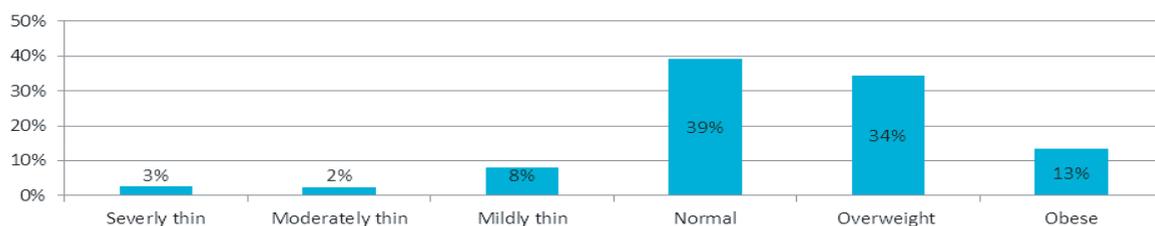
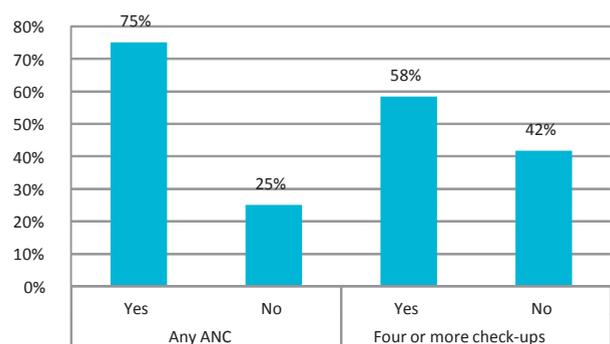


Figure 9.7 presents national level data for adolescent girls' nutritional status. Over a third of girls were underweight and nearly one-tenth were overweight. This compares with only one-tenth of adult women measuring as underweight and nearly half as obese and overweight (Fig. 9.8). In Dhaka slums only 3% women were <140cm in height (Figure not shown).

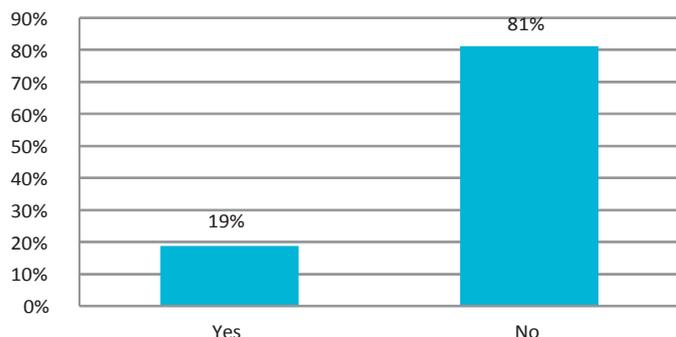
Figure 9.9 shows that two-thirds of women in Dhaka slums received at least one ANC visit when they were pregnant, and more than a half received four or more check-ups.

**Figure 9.9: Women receiving ANC during their last pregnancy in Dhaka slums**



Regular consumption of IFA post-partum was less promising. Almost three-quarters of lactating mothers (73%) did not consume IFA up to three months, and among those who did, the large majority consumed IFA weekly. Among weekly consumer, a much smaller proportion reported daily consumption (Figure not shown). Virtually no adolescent girls living in slums took IFA weekly (figure not shown). Child care and feeding in Dhaka slums

**Figure 9.10: Women taking 100 IFA during their last pregnancy in Dhaka slums**

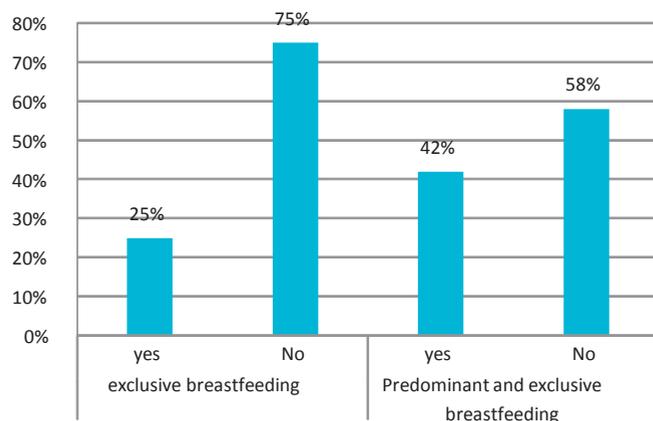


Only nineteen percent of women in Dhaka slums took 100 IFA during their last pregnancy (Fig. 9.10). In slums, 53% of women consumed extra food during their pregnancy. Among lactating women this decreased to 45% (Figure not shown), however 80% of women reported gaining at least 5kgs during their last pregnancy (Figure not shown).

### Child care and feeding in Dhaka slums

Child feeding practices are important for child nutrition (19) yet are very difficult promote given the complexities of behaviour and access to nutritious food. Given these complexities, it is difficult to quantify and measure these behaviours, and explore their relationship with child nutrition. A common practice, therefore, is focus on a single behaviour like exclusive breastfeeding, which is the practise of feeding only breast milk to an infant or child for the first 6 months of life (20).

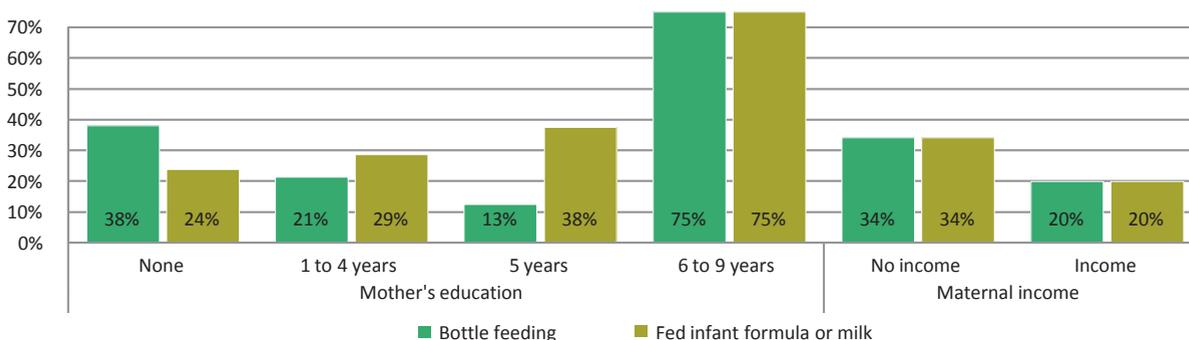
**Figure 9.11: Exclusive, and predominant and exclusive breastfeeding rates in Dhaka slums**

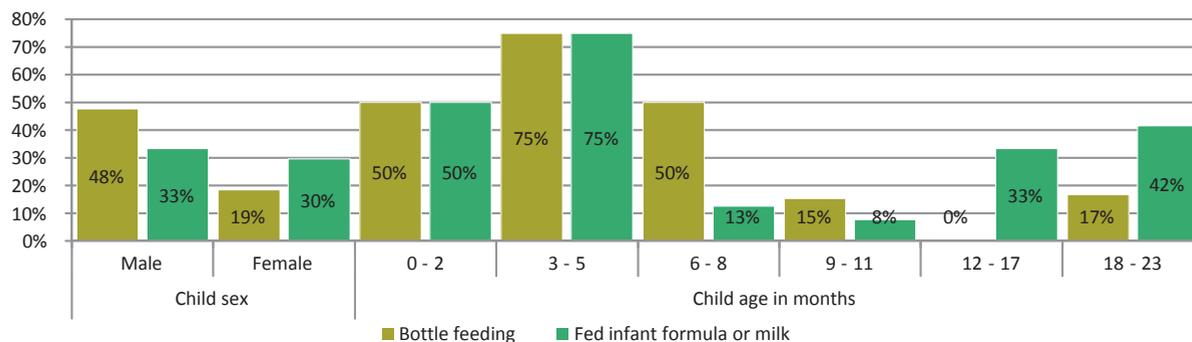


In Dhaka slums, exclusive breastfeeding was practiced by one-quarter of among mothers, whereas the rate of predominant and exclusive breastfeeding rates was 42% (Fig. 9.11). Among mothers who had completed 5 years of study and those earning income, this proportion rose to 100%. Predominant and exclusive breastfeeding rates among female children were greater than male children (figure not shown). By contrast, rates of continued breastfeeding for children at one and two years of age were the same

irrespective of maternal education, maternal income and child sex (figure not shown).

**Figure 9.12: Threats to breastfeeding by maternal education and income in Dhaka slums**



**Figure 9.13: Indicators of threats to breastfeeding by child sex and child age category in Dhaka slums**

Although few mothers with over 6 years of education were found in the slum, those who were more educated fed their children with breast milk substitutes to a larger extent than less educated mothers (Fig 9.12). Mothers' earning status had no significant association with these practices (Fig. 9.12). The proportion of bottle-feeding and use of infant formula or milk was greater in male children compared to female children. This proportion was highest among children 3 to 5 months of age (Fig. 9.13).

**Table 9.1: Compliance with complementary feeding in Dhaka slums**

Complementary feeding indicator	Compliant	Not compliant
Minimum dietary diversity	33%	67%
Iron rich foods	39%	61%
Minimum meal frequency	83%	17%

In Dhaka slums, one-third of the children were fed with complementary food with minimum diversity, whereas about two-fifths (39%) of children were fed with iron-rich food and more than four-fifths (83%) received daily meals with minimum meal frequency (Table 9.1). Educated mothers fed their children with adequate diverse diets and iron-rich foods more than less or non-educated mothers. The proportion of mothers reporting some form of income fed their children a minimum diverse diet and iron-rich foods more than mothers without income (figure not shown).

The proportion of male children fed with minimally acceptable diets was greater than female children during the day before interview, however, minimum meal frequency was greater in female children than male children (figure not shown). The proportion of children who were fed with minimum meal frequency was highest in the 18 to 23 months age group (Figure not shown). Increasing maternal education was associated with a greater proportion of children fed with minimum acceptable diet (Figure not shown).

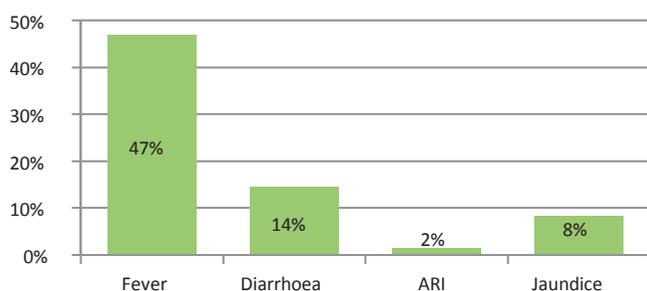
### **Child care in Dhaka slums**

In Dhaka slums, more than two-thirds of children aged 12-59 months received vitamin A capsules during the six months before interview, and 48% took allopathic anti-helminthic (deworming) tablets from non-government (47%) and government (1%) sources.

**Table 9.2: Preventive nutritional care for under-five children in Dhaka slums**

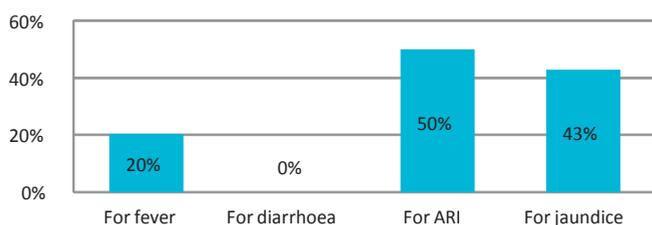
Nutritional care	Received	Not received
Vitamin A capsule	67%	33%
Deworm	48%	52%
Multiple micronutrient powder (MNP)	14%	86%

A relatively small proportion of slum children in this age group (14%) consumed multiple micronutrient powder (Table 9.2), and among them, few consumed this powder as per guidelines.

**Figure 9.14: Illness among under-five children in Dhaka slums**

In 2015, almost one-half of children under five years of age suffered fever in Dhaka slums two weeks prior to interview. The lowest proportion was found among those with Acute Respiratory Illness (ARI) (2%) (Fig.9.14). The reported prevalence of jaundice among under five children was 8% compared to 3% nationally. Nearly two-fifths of adults in slum households with

under-five children also suffered from fever, and about one-tenth suffered from diarrhoea (11%) and jaundice (9%) (Figure not shown).

**Figure 9.15: Under-five children suffering illness who were taken to a medical provider**

The highest proportion of under-five children taken to a medical provider was found for ARI (50%), compared to jaundice (43%) and fever (20%). Children were not taken to a medical provider for diarrhoea (Fig. 9.15), however, 5% of those diagnosed with diarrhoea by their caregivers, were given ORS (Figure not shown).

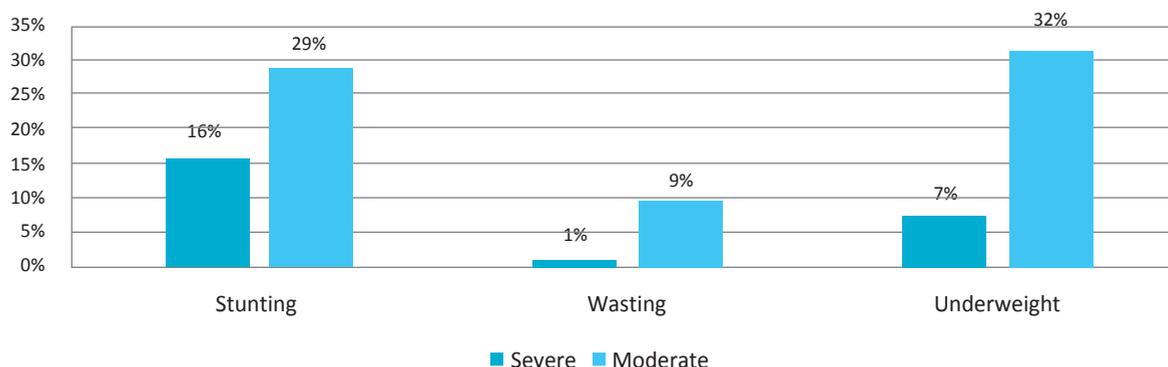
### Nutritional status of children in Dhaka slums

Child malnutrition, defined as deviation from minimal or optimal nutritional requirements, is an urgent public health concern in Bangladesh (21). In developing countries, rapid urban growth has been identified as a leading risk factor for child under-nutrition (22), especially among the poor. The extent of child under-nutrition has been shown to be more widespread and severe in slums compared to wealthier city areas, and sometimes even compared to rural populations of similar socioeconomic status (23). Additionally, over-crowding and frequent migration within urban areas, pose challenges to the smooth implementation of nutritional programmes launched by government, the UN and other NGOs.

**Table 9.3: Children measured by age in Dhaka slums**

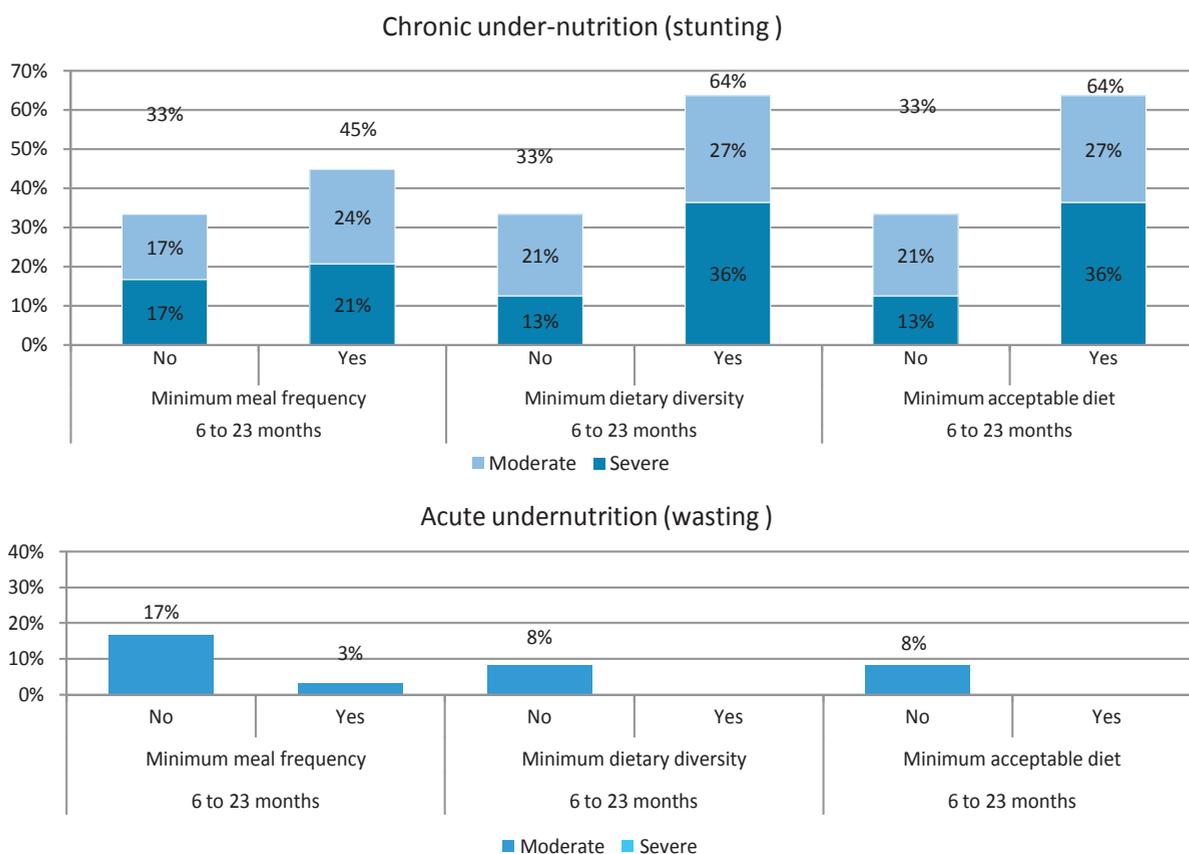
Age in months	Number surveyed	Weighted proportion
0 - 5	13	9%
6 - 11	16	11%
12 - 17	8	5%
18 - 23	13	9%
24 - 29	19	13%
30 - 35	13	9%
36 - 41	17	11%
42 - 47	23	15%
48 - 53	13	9%
54 - 59	15	10%
<b>Total</b>	<b>150</b>	<b>100%</b>

FSNS-NNS recorded the anthropometric measurements of 150 under-five children living in Dhaka slums (Table 9.3). Rates of stunting (45%) and wasting (10%) were much higher than other population groups in Bangladesh, with a considerable number of severely stunted children being identified (Figure 9.16).

**Figure 9.16: Acute and chronic child under-nutrition**

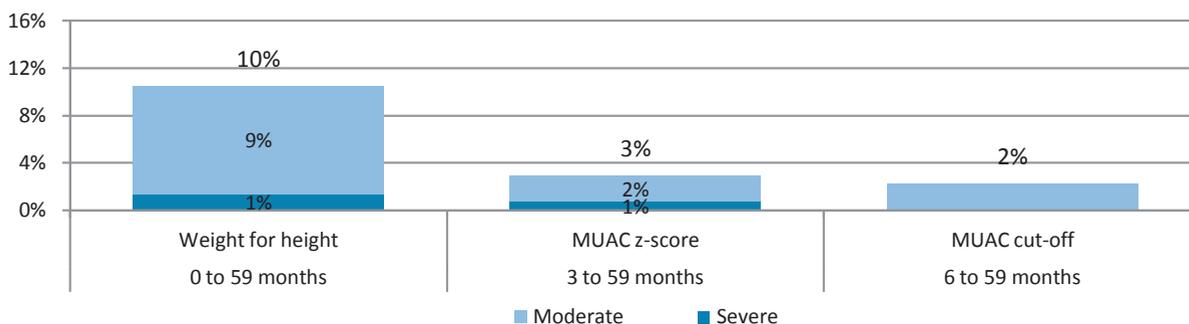
Children of mothers who were not engaged with any income earning work were more likely to be moderately and severely stunted and wasted. Low levels of maternal education were also associated with stunting, but not wasting (Figure not shown). Interestingly, there was no significant variation between acute and chronic under-nutrition and whether proper IYCF practices were employed among children aged 6-23 months (Fig. 9.17).

**Figure 9.17: Acute and chronic child under-nutrition by complementary feeding indicators**



Stunting is most prevalent around the age of two years, while for wasting the 3-5 month age group is the most affected. The proportion of acute under-nutrition in Dhaka slums did not vary according to sex (Figure not shown). Results for wasting differed quite substantially depending on the type of classification system used (Fig. 9.18).

**Figure 9.18: Prevalence of acute and chronic child under-nutrition by child's and age**



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## Appendix A: Composition of surveillance areas

**Table A1: Administrative Division wise Upazila**

<b>Division</b>	<b>Upazila (Subdistrict)</b>
<b>Barisal</b>	Bamna, Bakerganj, Barisal Sadar (Kotwali), Bhola Sadar, Char Fasson, Daulat Khan, Rajapur, Pirojpur Sadar, Zianagar
<b>Chittagong</b>	Brahmanbaria Sadar, Faridganj, Panchlaish, Comilla Sadar Dakshin, Kutubdia, Maheshkhali, Pekua, Chatkhil, Naniarchar
<b>Chittagong</b>	Brahmanbaria Sadar, Faridganj, Panchlaish, Comilla Sadar Dakshin, Kutubdia, Maheshkhali, Pekua, Chatkhil, Naniarchar
<b>Dhaka</b>	Badda, Motijheel, Sutrapur, Kaliakair, Bakshiganj, Karimganj, Sreenagar, Sakhipur
<b>Khulna</b>	Kaliganj, Kotchandpur, Shailkupa, Dacope, Dighalia, Koyra, Khoksa, Magura Sadar
<b>Rajshahi</b>	Shibganj, Akkelpur, Badalgachhi, Lalpur, Bera, Faridpur, Rajpara, Shah Makhdum, Sirajganj Sadar
<b>Rangpur</b>	Ghoraghat, Chilmari, Kurigram Sadar, Patgram, Domar, Kishoreganj, Nilphamari Sadar, Kaunia, Pirganj
<b>Sylhet</b>	Nabiganj, Kamalganj, Kulaura, Dakshin Sunamganj, Dowarabazar, Sunamganj Sadar, Tahirpur, Beani Bazar, Bishwanath

## Appendix B: WealthIndex construction

Following FSNSP, FSNS-NNS used the updated methodology the DHS System has used since 2010 to construct the wealth index (1).<sup>1</sup> The DHS System method requires dividing households' assets and facilities into urban and rural areas before constructing separate wealth indexes for each area and then combining these location specific indexes with an index based on nationally relevant indicators. The overarching methodology for wealth index construction is available in the 2008 report, The DHS Wealth Index: Approaches for Rural and Urban Areas, but this document lacks specific guidelines on how to assign assets to urban or rural areas (1). Analysts at FSNS-NNS used the guidance given in this report to construct the specific guidelines described below.

FSNS-NNS determined to which setting assets and facilities were applicable by examining the distribution of assets across localities. As Bangladesh has two categories of urban areas, municipalities and city corporations, and these two are quite different from one another in the types of assets owned, FSNSP assigned assets and facilities to four categories: national, rural, municipality, and City Corporation. Assets which were available in all areas were assigned to the national category, while assets which were only available none or more of the rural or urban localities were assigned to that area. Table B.1 provides listing of index assets and household facilities, and assigns those as appropriate to these four categories. From these groups of assets, separate indexes were created for urban, rural and municipalities; a national model was then composited from all the three indexes.

**Table B.1: Assets and household facilities used in the construction of the wealth index**

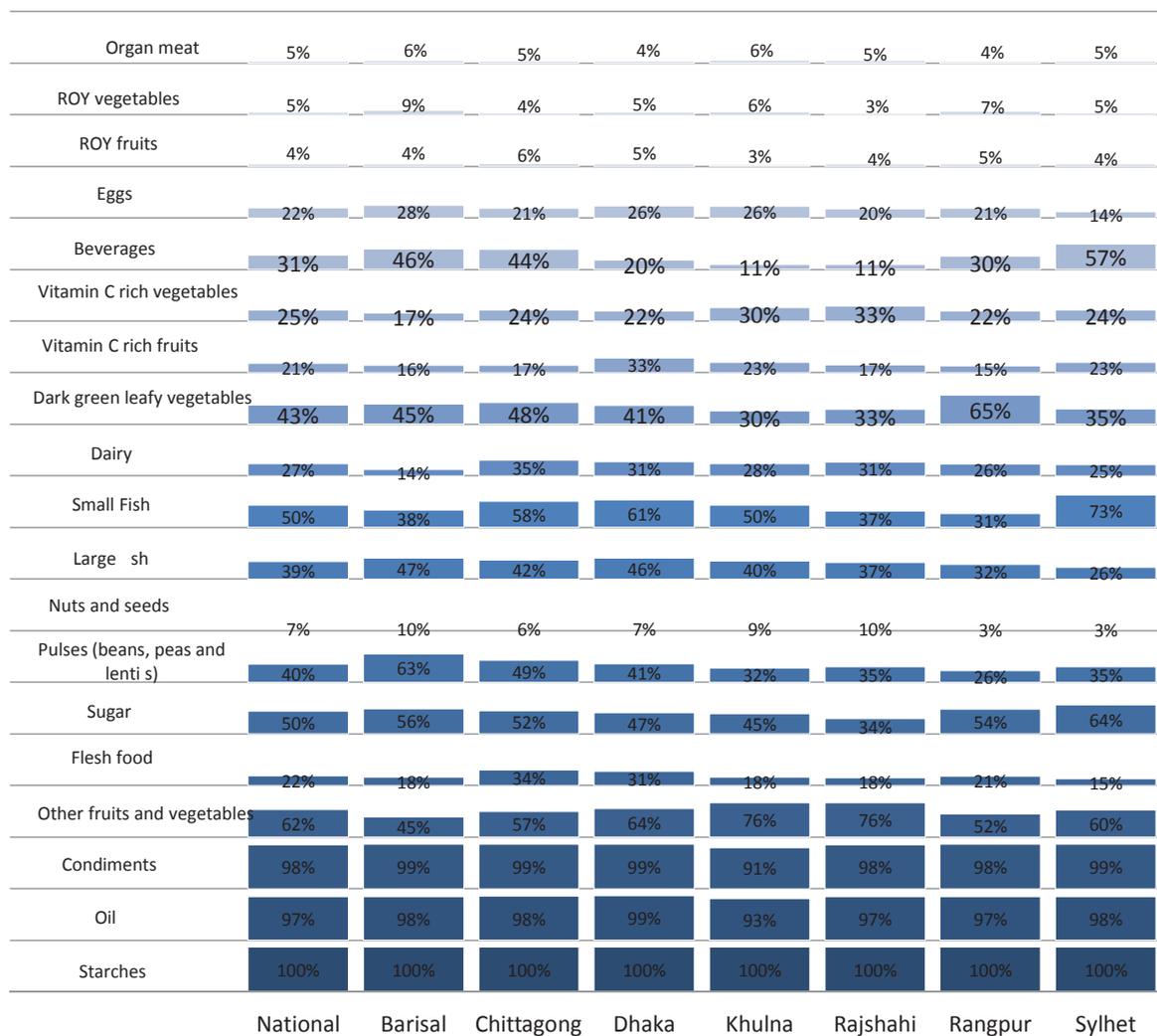
Item		National	Rural	Municipality	City Corporation
Floor material	Earth/sand				
	Ceramic tiles/Mosaic				
	Cement/Bricks/Stone (omitted)				
	Wood planks/Palm/Bamboo				
Wall material	Cement/Bricks/Stone with lime/cement				
	Cane/palm/trunks				
	Bamboo with mud				
	Wood planks/shingles				
	Tin (omitted)				
	Dirt				
Roof material	Cement/bricks/stone with lime/cement				
	Tin (omitted)				
	Thatch/palm				
House characteristics	Electricity				
	Only one room in the house				
	House constructed of permanent materials				
	Number of rooms per household member				

<sup>1</sup> In 2010 and 2011, FSNSP used same methodology as the DHS system had from 1998 to 2009 (2).

Latrine type	Household piped sewer system				
	Shared piped sewer system				
	Shared ring with water seal				
	Shared ring without water seal				
	Household ring with water seal				
	Household ring without water seal				
	Household pit latrine with slab				
	Household pit latrine without slab				
	Shared pit latrine with slab				
	Shared pit latrine without slab				
	Hanging				
	No facility				
	Septic toilet- share				
	Septic toilet- own (omitted)				
	Water source	Piped to dwelling			
Piped to yard/plot					
Public tap					
Household tube well					
Shared tube well (omitted)					
Dug well (protected/unprotected)					
Surface water					
Fuel source	Liquefied petroleum gas tank (LPG)				
	Piped natural gas				
	Wood/Straw/grass/dung (omitted)				
Assets	Plough				
	Solar panel				
	Country boat				
	Power tiller				
	Shallow machine				
	Fishing net				
	Car/truck				
	UPS/Generator				
	Radio/TV				
	Telephone/mobile Phone				
	Fan Bed				
	Cabinet				
	Refrigerator				
	Table/chair				
	Watch/clock				
	Bicycle				
	Motorcycle/scooter/tempo				
	Rickshaw/van				
Homestead land					
Land ownership	Agricultural land				
	Total decimals of land owned				
	Any livestock owned				
Livestock	Large ruminants (cow/buffalo)				
	Small ruminants (sheep/goat/pig)				
	Poultry (chicken/duck/geese)				
	Small game (rabbits/pigeons)				

## Appendix C: Additional figures and tables

Figure 1: Divisional variation in dietary patterns among women aged 10 to 49 years



## Past Reports and Bulletins:

### Reports

State of Food Security and nutrition in Bangladesh 2014  
State of Food Security and nutrition in Bangladesh 2013  
State of Food Security and nutrition in Bangladesh 2012  
State of Food Security and nutrition in Bangladesh 2011  
State of Food Security and nutrition in Bangladesh 2010

### Bulletins

FSNSP- Bulletins- round 1	FSNSP- Bulletins- round 9
FSNSP- Bulletins- round 2	FSNSP- Bulletins- round 10
FSNSP- Bulletins- round 3	FSNSP- Bulletins- round 11
FSNSP- Bulletins- round 4	FSNSP- Bulletins- round 12
FSNSP- Bulletins- round 5	FSNSP- Bulletins- round 13
FSNSP- Bulletins- round 6	FSNSP- Bulletins- round 14
FSNSP- Bulletins- round 7	FSNSP- Bulletins- round 15
FSNSP- Bulletins- round 8	FSNSP- Bulletins- round 16



### Implemented by:

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