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# State of Food Security and Nutrition in Bangladesh 2013

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## A complex black and white line drawing of a circular mandala. The center features a stylized flower with a spiral core. Surrounding this are concentric rings of various motifs: animals (foxes, rabbits, birds), human figures in traditional attire, and geometric patterns. The outermost ring is a wide band of repeating leaf and branch patterns.



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# Foreword





**Ms. Suraiya Begum**, Secretary, Statistics and Informatics Division  
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The Statistics and Informatics Division of the Ministry of Planning is delighted to work in partnership with "Food Security Nutritional Surveillance Project (FSNSP)" through Bangladesh Bureau of Statistics (BBS). Over the years, this project has played a pivotal role in keeping Bangladesh updated with reliable data on food security and nutrition. This joint venture enabled not only BBS to collect data using new technology but also FSNSP to use data from BBS in this report. BBS officials involved with this project have achieved practical experience in collecting anthropometric data using latest technology which will help in institutionalizing the system of BBS in near future. We are pleased to observe that BBS's data is now used more extensively and efficiently for different purposes and thus looking forward to secure the tie through partnership with other BBS's Wings/Projects to attain the goals of Statistics ACT-2013 and the National Strategy for the Development of Statistics NSDSI.



**Syed Monjurul Islam**, Secretary  
Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh

I feel delighted to know that James P Grant School of Public Health, BRAC University is going to publish its 4th report namely "State of Food Security and Nutrition in Bangladesh 2013". We all know that proper Food and Nutrition is the prerogative for good health which remains at the heart of the personal sense of well-being of entire population regardless of communities and nations. In Fact, Food security and Nutrition are interwoven with each other and both are of serious concern and of top priority now for every country. Nutrition, of course, has long been the main concern in developing countries.

The Food and Agriculture organization of the United Nations (FAO) estimates that 842 million people, 12 percent of the World's population, were under-nourished in 2011/13. To our dismay, children who are stunted are less likely to achieve their physical and mental development. Despite gradual progress being made globally in reducing undernutrition, still, 19 percent of the world population remains under-nourished which is really alarming.

Top health policy experts are striving how best efforts could be made to ensure optimum health and nutrition of the population. Reliable source of data and in-depth studies and survey on food security and nutrition status is of paramount importance to effectively address the related issues. In this perspective, the report, I believe, will be a useful tool of information for public-private organizations for policy interventions required to encounter the challenges of malnutrition and under-nutrition in a coordinated and comprehensive manner for scaling up nutrition programs in Bangladesh.

I do hope and expect that both public and private organizations, researchers and experts shall come forward with more focused data that will help the Government to undertake appropriate policy interventions on Food Security and Nutrition.



**Mushfeka Ikfat**, Secretary  
Ministry of Food, Government of the People's Republic of Bangladesh

The Ministry of Food strives to ensure food security at all times to all people of the country. Food security itself has the dimension to provide nutritious food for the people especially for women and children. Therefore, the Ministry of Food recognises the value of reliable and timely food security and nutrition data in order to take policy decisions and implementation of the programmes which will ensure a safe and nutritious diet for all. The Food Security Nutrition Surveillance Project (FSNSP) has become a vital source of information in the areas of food and nutrition. The data collected by the FSNSP is highly important for FPMU of Ministry of Food for preparing the Food Situation Report every day as well as assisting in monitoring the National Food Policy Plan of Action and the Country Investment Plan for Agriculture, Food Security and Nutrition. In the coming days, I expect that FSNSP data will be made available to the policy makers and food and nutrition security analysts through electronic networks.



**Pierre Mayaudon**  
Ambassador of the European Union to Bangladesh

The European Union-Bangladesh partnership has a broad coverage encompassing human rights, trade and development. Since the 70s the European Union (EU) is a reliable development partner supporting poverty reduction, social development and improved governance, being at the same time Bangladesh's first export market. 'Putting People First' with a safer environment for all, a sustained and inclusive growth and a vibrant society constitutes the core of EU partnership with Bangladesh.

Building on the Government's policies, the EU has consistently supported food and nutrition security contributing to improved livelihoods for the most vulnerable. In our efforts to build human and institutional capacities to fight undernutrition, I am pleased to see that the Nutritional Surveillance Project (FSNSP) produces this new annual report providing fundamental data and analysis for better policy planning and a more informed advocacy environment for food and nutrition security in Bangladesh.



# Executive Summary





The Food Security and Nutrition Surveillance Project (FSNSP) is the only source of seasonal, nationally representative estimates of food security and nutrition in Bangladesh. Using state-of-the-art methods and indicators drawing on the latest technical developments, the FSNSP system provides up-to-date information representative of Bangladesh as a whole, with an additional focus on households at greatest risk of food and nutrition insecurity. The system provides representative information about pregnant women, non-pregnant women, adolescent girls and households with and without children. FSNSP collects multiple measures of nutritional status for women and children, including height, weight and mid-upper arm circumference (MUAC).

In 2013, FSNSP surveyed 22,896 households in 954 communities. In randomly selected households, a total of 19,013 women aged 19 to 49 years of age and 4,263 adolescent girls aged 10 to 18 years of age were interviewed. Additionally, 12,000 children were measured and 9,984 caregivers were interviewed about care and feeding practices for the youngest child in the household. For around two-fifths of households, business and salaried employment were the principal sources of income. Nationally, the proportion of women 15 to 49 years of age earning an income has increased slightly but steadily from one-fifth in 2011 to nearly a quarter in 2013. Around one-fifth of households received remittance nationally in 2013. Across divisions, the highest levels of maternal education (post SSC) were in Barisal followed by Khulna. A greater proportion of people with the lowest level of educational attainment was found in Rajshahi for principal income earners and in Sylhet for mothers.

### ***Food security***

FSNSP's food security indicators include those that quantify gaps in food availability, access, and equitable utilisation of food in Bangladesh. Since its inception, FSNSP has tracked the average market price of several food commodities in local markets nationwide, including rice, the most important staple food in Bangladesh. Following spikes in rice price in 2010 and a decline in price in 2011 and 2012, the price of rice began to rise again in 2013. Although the cost of the average food basket in Bangladesh has gone up over the last few years food security has generally improved across a range of indicators.

The prevalence of behaviors linked to food insecurity (e.g. skipping meals, eating less preferred foods) fell dramatically between 2011 and 2013. The proportion of households with sub-optimal diets fell slightly in 2013, though the proportion of households with poor or borderline food consumption patterns, based on the food consumption score (FCS) methodology, remained the same.

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

While Bangladesh has made tremendous progress in providing improved drinking water and toilet facilities to citizens, much remains to be done. In Bangladesh, children as young as three months of age have been shown to have faltering growth related to chronic and acute infection, and acute illnesses due to these infections result in significant, preventable costs to the health care system.

The percentage of households without access to any toilet facilities has declined incrementally from 7% in 2011 to 4% in 2013. This has been largely due to reductions in open defecation in rural areas. Improved toilet facilities have increased from only a little over half of households in 2011 to almost

two-thirds in 2013. Promisingly, households with children less than five years of age had sanitary latrines in a greater proportion than households without children.

While soap was present in 98% of households and used the day before the interview in 96% of households, only 5% of those managing the kitchen reported washing hands before preparing food and only 7% before eating. In addition, while two-thirds of caregivers reported washing their hands with soap after using the toilet, less than one-tenth of caregivers reported washing their hands before preparing food and feeding their child.

Complementary to having a sanitary toilet facility is proper disposal of children's solid waste. Nationally, in 2013 FSNP found that half of households disposed of children's solid waste in the appropriate manner, but only a little over one-third of households have access to a toilet facility that will contain waste to prevent contamination.

Almost double the proportion of households disposed of child waste appropriately in urban areas compared to rural areas; once sanitary toilet facilities were taken into account this difference increased. Wealthier and more food secure households appropriately dispose of child waste in greater proportions. Thereby, children who are already receiving more limited diets due to food insecurity are also at increased risk of infection.

### ***Nutrition in women and adolescent girls***

In 2013, FSNP interviewed and measured over 23,000 women and girls aged 10 to 49 years throughout Bangladesh. Dietary patterns did not differ much between women/adolescent girls and mothers of children under five years of age. The consumption of flesh foods and dark green leafy vegetables decreased from 2012 whereas the consumption of eggs and other fruits and vegetables increased. In 2013, around 67% of women consumed diets inadequate in micro- and macronutrients, which varied across the seasons, household wealth quintiles and food security status. In households with poor borderline food consumption practices, 93% of women did not consume an adequate diet the day before the interview, a 2% increase from 2012.

Nationally, 29% of adolescent girls were short for their ages and there was little difference between urban and rural areas. Adolescents under 18 years with children under five years of age are shorter than women in that age group without children. Additionally, almost 15% of adult women were at increased risk during delivery due to short stature. Moreover, 12% of adolescent girls had a moderately or severely low body mass index for their age and nearly one quarter of women were chronically energy deficient (CED), indicating a medium severity public health problem.

The nutritional status of adult women is highly correlated with wealth and food security status. As wealth quintile increases, there is a decrease in the proportion of underweight women (poorest, 29% and wealthiest, 8%) and an increase in the proportion of overweight women (poorest, 20% and wealthiest, 61%). Women's overweight is a growing problem; nationally in 2013, more adult women were overweight than CED. Over half of adult women (51%) were overweight and the proportion of women overweight increases as wealth increases. Among adult women, overweight slowly increases in a stepwise fashion at age 30 and 40 years. This trend towards overweight is not yet seen in the adolescent population but this is partially due to the way the adolescent measure is designed.

### ***Maternal care and nutrition***

In Bangladesh, too many girls have children too early. Due to the early age of marriage, over half of first pregnancies occur among adolescent girls (18 years and younger), despite Bangladesh's low fertility rate. Only two-fifths of pregnant women obtained at least four ANC visits though there was a large improvement in this indicator between 2012 and 2013. Moreover, in 2013 only 18% received ANC in line with the guidelines provided by the World Health Organization's Technical Working Group on Antenatal Care (at least four ANC check-ups from a medically trained provider with at least one visit in the first trimester) and follows a six percentage improvement in this indicator compared to the previous year. Additionally, compared to 2012, 10% more women in 2013 had their ANC check-up in the first trimester of pregnancy. In 2013, two-fifths of pregnant women reported never taking iron folic acid (IFA) during their pregnancy. Moreover, IFA supplementation was extremely low during the first trimester (13% daily and 16% in the last week), although this is the period during which folic acid helps to prevent neural tube defects.

Diets remained extremely poor even during pregnancy. Dietary diversity was similarly low among pregnant and non-pregnant women, and three out of four women reported that food consumption during the third trimester was the same as or less than before the pregnancy. Overall, dietary diversity during pregnancy did not appear to improve between 2012 and 2013. As a result, approximately one in four pregnant women was so thin that their foetuses faced a moderate risk of growth retardation. However, the proportion of women who are severely malnourished (in terms of MUAC) decreased by 2%, and the proportion who are at risk decreased by 5% between 2012 and 2013. Maternal risk factors were highly correlated with low birth weight prevalence. Regarding post-natal care, the proportion of women receiving vitamin A capsule after delivery increased from 35% in 2012 to 42% in 2013, while the proportion obtaining PNC check-up from any medically trained provider remained constant between 2012 and 2013.

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

The overall pattern of child feeding practices was similar between 2012 and 2013. Unfortunately, the prevalence of exclusive breastfeeding among children in their first month of life decreased from 84% in 2012 to 74% in 2013 although the overall prevalence of exclusive breastfeeding was similar between the two years. Additionally, there was a large decrease in the proportion of children who continued to receive breast milk at two years of age in 2013 compared to 2012. Nearly half of newborn children continued to receive pre-lacteal foods and less than half were breastfed within the first hour of life. While 89% of children six to eight months of age were fed complementary foods, only a small minority of them (16%) were fed diets diverse enough to provide adequate micronutrients. Moreover, just over half of children were fed too early, with 51% eating solid foods during the fifth month of life. Overall, among children six to twenty-three months of age, 42% met minimum dietary diversity targets in 2013 indicating a three percentage improvement between 2012 and 2013. Similarly, the proportion of children eating iron rich foods has increased from 44% in 2012 to 48% in 2013 indicating a four percentage improvement between 2012 and 2013. The proportion of children eating with minimum meal frequency has improved dramatically since 2008, from 52% to 89% in 2013. However improvements in minimum adequate diet have been much smaller, from one-fifth to nearly two-fifths. The eating patterns for older children were also slightly less diverse than that for mothers.

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

The numerous shortcomings in child care, protection, and feeding, analysed by FSNSP, have contributed to persistent high rates of child under nutrition. In 2013, FSNSP recorded the height, weight and MUAC measurements of 12,000 children to estimate the nutritional status of children under five years of age in Bangladesh. Since 2010 there have been sizable declines in child stunting. Notably the prevalence of stunting fell from 45% in 2010 to 35% in 2013; the level of stunting in Bangladesh is now below the WHO cut-off for very high prevalence. However, the prevalence of wasting did not change substantially during the period. The highest proportion of stunted (45%) and underweight (35%) children under five years of age were found in the Haor zone; the highest rate of wasting (13%) was in the Northern chars zone. Acute under nutrition peaked during the monsoon season. Children of illiterate mothers, and those living in poor and food insecure households, were more likely to become undernourished.

A photograph of a woman with dark hair, wearing a light-colored shawl, holding a young child. The child is looking towards the camera. The image is overlaid with a semi-transparent purple filter. White text is positioned in the upper left quadrant of the image.

# From vision to reality: Improving nutrition in Bangladesh using FSNSP surveillance





## From vision to reality: Improving nutrition in Bangladesh using FSNSP surveillance

*Improving nutrition, particularly for women and children, has been a priority for the Government of Bangladesh since the country was founded in 1972, as well as an area of significant investment by development partners. Today, Food Security Nutritional Surveillance Project (FSNSP) provides an evidence base to inform field-level program implementation, such as the National Nutrition Services, and policy and strategic discussions which will inform the development of the government's next sector plan.*

On December 16, 1972, nutrition was included in the constitution of the newly formed state of Bangladesh under Constitutional Obligation 18(1): *"The State shall regard the raising of the level of nutrition and the improvement of public health as among its primary duty."* Several years later, the Bangladesh National Nutrition Council (BNNC) was constituted to draft a nutrition policy and plan of action, and the Institute of Public Health Nutrition formed to implement nutrition related activities. Final adoption of the Food and Nutrition Policy and the National Plan of Action for Nutrition (NPAN) occurred much later in 1997. The Bangladesh Integrated Nutrition Project (BINP), a large-scale government led community-based nutrition initiative, was also initiated in the mid 1990's. Subsequently named the National Nutrition Program (NNP), this initiative ran for 15 years alongside health and related sectors. While NNP saw modest improvements in nutrition, progress was slow given its parallel status, and difficulties in nutrition sensitive programming across sectors.

Beginning in 2011, the National Nutrition Services (NNS) was created to steward nutrition mainstreaming into health and nutrition-related sectors. NNS has realized significant accomplishments, including increasing coordination among ministries, and training tens of thousands of government staff on infant and young child feeding, hygiene, micronutrient supplementation, deworming, consumption of nutrient-rich fortified foods, management of acute malnutrition, and maternal nutrition. Most importantly, NNS has led a consensus building exercise to implement a conceptual framework of mainstreaming focused on direct nutrition and nutrition sensitive interventions. Targets have been set in line with this framework related to desired improvements in under nutrition, alleviation of micronutrient deficiencies, birth weight, and enhancement in child and maternal feeding. The Nutrition Information and Planning Unit (NIPU) has subsequently incorporated nutrition indicators into registers and reporting formats at the community clinic level, and integrated management of childhood illness (IMCI) nutrition tools, both online and offline. FSNSP expertise has been engaged in the development of data sharing processes and contributed to discussions on designing an effective facility for nutrition surveillance and research.

Despite this progress, many challenges remain particularly in regards to coordination. The NNS operational plan is largely dependent on the operating plans of multiple ministries, but most implementation occurs through the Ministry of Health and Family Welfare (MoHFW). Strengthening sectoral collaboration regarding nutrition and food safety among the Ministry of Agriculture, Ministry of Women and Child Affairs, Ministry of Industry, Ministry of Fisheries and Livestock, Ministry of Food, Ministry of Education and other relevant ministries requires continued action. Additional efforts are needed to ensure effective integration of priority nutrition interventions at all levels of service delivery under DGHS and DGFP. Further strengthening of human resources and capacity development is necessary nationwide for the provision of nutrition services, and innovation is needed in identifying alternative mechanisms providing nutrition

education at scale. Finally, efforts to engage higher-level policy circles around a broader plan for nutrition programming must occur led by NNS, MoHFW, and other key institutions such as the Food Planning and Monitoring Unit (FPMU) under the Ministry of Food.

Over the last 17 years, FSNSP and its predecessor, the National Surveillance Programme, have sought to quantify important daily behaviours that support a healthy population, and monitor seasonal variations and yearly trends in key nutrition indicators. Over time, FSNSP has become an important resource for Government and practitioners in the area of food security and nutrition, providing a robust evidence base for decision making that complements routine government data collection such as the MIS system of the NNS and annual monitoring reports of FPMU.

In 2013, FSNSP findings highlight a number of critical areas for nutrition improvement that are associated with a society in rapid transition. Urbanization and changes in lifestyle and dietary patterns in society as a whole, are contributing to new and continuing challenges in the areas of hygiene, anaemia, dietary diversity, and the growing problem of overweight. The action points below describe these challenges, and identify key entry points for nutrition improvement:

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

In 2013, FSNSP incorporated a new, robust set of indicators on both behaviors and infrastructure related to water, sanitation and hygiene (WASH). Results indicate that approximately 90% of households have access to an improved source of drinking water. Open defecation is also on the decline across the country, down to 5% in rural areas (from 8% in 2011). However, less than one fifth of households are practicing hand washing behaviors appropriate and effective in decreasing the spread of disease. Among households with young children, only half of caregivers reported using soap after using the toilet and less than one tenth reported washing their hands with soap at other key times, such as before preparing food and feeding children. This is alarming, as global evidence suggests that diarrhoeal episodes, which are caused or exacerbated by poor hygiene, are stubbornly hard to change, FSNSP's findings around hand washing in households with young children suggest that an emphasis on hand washing with soap at critical times is a vital component of nutrition interventions in Bangladesh.

### ***Anaemia***

FSNSP findings also reveal gaps in actions required to overcome anaemia in women and children. Because the serious and long-term functional consequences associated with iron deficiency and anemia lack obvious physical manifestations, they have failed to galvanise the concern they should warrant. FSNSP findings indicate that too few mothers take iron and folic acid tablets (IFA) during pregnancy, especially during the early months. A recent endline survey by the Micronutrient Initiative in two districts of the country found that most women reported taking IFA during pregnancy, however, only one fifth consumed more than 180 tablets and only 2% were in line with guideline of one tablet daily for 270 days (unpublished data). Given the pervasive nature of anaemia and its concerning intergenerational effects, awareness building and effective communication from the community up to ministerial level is a must.

### ***Diversification of diets***

Beyond single micronutrients, more needs to be done to improve nutrition through food-based



approaches. Diversifying diets has been a goal of the agricultural ministry for over a decade, highlighted first in the 1997 National Plan of Action for Nutrition and again in the 2009 National Food Policy Plan of Action. While poverty was initially seen as the bottleneck to diversified diets, it is increasingly clear that many other barriers are at work. Real income growth in recent years has not led to a commensurate change in dietary practices, indeed, FSNP data has shown that even in the wealthiest quintile and among households who report no constraints to food procurement in the month prior to visit, over two-fifths of women are consuming inadequate diets. Lack of diversity in complementary food practices is also apparent, with rice representing the first and only food introduced to children at six months of age irrespective of wealth quintile.

Recognizing that fish consumption is an important source of nutrition for many Bangladeshis, FSNP assessed the consumption of large fish (separate from small fish and other flesh foods) for the first time. Findings reveal that fish are consumed by 65% of women compared with 22% for other flesh foods. However, a concerning reduction in the proportion of women (42% to 33%) eating small fish was noted between 2012 and 2013. This highlights the need for renewed emphasis on promotion of consumption of whole small fish (with head, bones and viscera) which is a rich source of highly bioavailable calcium, phosphorus, iron, zinc and vitamin A.[1] Behaviour change communication on fish preparation and consumption can build on the already prevalent perception in Bangladesh of fish as a nutritious and healthy food.

As fish is a well-accepted food in Bangladesh, is affordable, can be purchased in small amounts, emphasis should be given to increase production, access and utilisation of small fish. FSNP found that the proportion of women consuming small fish was highest in Sylhet division, the area with the highest prevalence of stunting in children and underweight in women. Thus, there is potential to address under nutrition in this area through further promotion of consumption of fish, especially small fish. Clearly, as this one example shows, there is room to change dietary preferences in Bangladesh to increase nutrition, health, and well-being.

### ***Non communicable diseases and the problem of overweight***

The global epidemic of non-communicable diseases (NCDs) is a significant threat to achieving internationally agreed developmental goals. Almost two-thirds of global deaths are caused by NCDs. The World Health Organization has identified major risk factors for NCDs, including poor diet, sedentary life style, high cholesterol level and hypertension, which are also underlying causes of overweight and obesity. While challenges related to under-nutrition continue to pose a significant challenge to development in Bangladesh, FSNP has documented a growing problem of overweight among adults (FSNP only weights and measures women but it is likely that similar trends hold true for men). According to the WHO, "coronary heart disease, ischaemic stroke and type 2 diabetes mellitus increase steadily with increasing body mass index (BMI)," and population-level obesity rates are a modifiable risk factor which should be monitored and addressed as part of public health

<sup>1</sup> WHO Library Cataloguing-in-Publication Data

Global status report on noncommunicable diseases 2010

1.Chronic disease - prevention and control. 2.Chronic disease - epidemiology. 3.Chronic disease - mortality. 4.Cost of illness. 5.Delivery of health care.. I. World Health Organization.

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measures to reduce the burden of non-communicable disease (NCDs).<sup>1</sup> In 2011, FSNSP found that for the first time in the history of national surveillance, the number of overweight women surpassed the number of underweight women. These trends continued through 2013, with the proportion of urban women in the most severe category for obesity increasing by three percentage points between 2012 and 2013. The prevalence of obesity is rising in nationally representative data as well, indicating that the problem is not limited to urban areas or well-off populations. The proportion of overweight women does correlate with wealth (over three-fifths of the wealthiest women are overweight), but even among the poorest overweight is alarmingly high, with one-fifth of women currently overweight. Reduction of NCDs is included in the NNS operational plan, but the majority of donor and government investment has targeted issues related to under nutrition and there are few examples of effective interventions to reduce obesity in Bangladesh. Drawing on FSNSP data suggests that, in the upcoming sector plan, new strategies and approaches should be developed to prevent and manage overweight, including among poor women.

### ***Food Security and Nutrition Surveillance***

In support of the Government's declared commitment to make the nutrition of women and children a national priority, the Food Security and Nutrition Surveillance Program (FSNSP) provides timely and accurate monitoring of the nutrition situation in Bangladesh. FSNSP builds on more than 17 years of nutrition surveillance programming in Bangladesh, making it one of the longest running nutrition and food security surveillance systems in a low-income country. Like the Nutrition Surveillance Program (NSP), managed by HKI and IPHN, which preceded it, FSNSP provides data and information about the level and distribution of food insecurity and malnutrition in Bangladesh to policy-makers, development partners and implementing agencies.

FSNSP covers an extensive sample (22,896 households and 12,000 children in 2013) and implements rigorous quality control systems to ensure data precision and validity. It is the only source of seasonal, nationally representative data on food security and nutrition in Bangladesh.

As depicted in the FSNSP conceptual framework (Figure 1.1), the surveillance system's central objective is to detect changes in household vulnerability to nutrition and food insecurity by directly monitoring indicators of food insecurity and malnutrition, examining related variations in household-level factors and establishing links with data sources that measure change in the external factors listed outside the circles in the framework.<sup>2</sup>

Additionally, while keeping methodologies sufficiently stable to enable comparison of data across time, FSNSP continues to evolve with changing national priorities and a deepening understanding of the factors which impact nutrition, such as those highlighted in the new Lancet nutrition series released in 2013. For example, recognising the importance of nutrition-sensitive practices such as water and sanitation, in 2013 FSNSP incorporated data collection around hand washing points in the home and observational methodologies to assess hand washing practices. Similarly, FSNSP considered the Lancet findings on the importance of early stimulation and began including some indicators of children's cognitive development in 2014.

<sup>2</sup> External data sources identified include 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 news media and regular health surveys like Bangladesh Demographic and Health Survey (BDHS) that capture cultural and policy changes, and associated health effects.

Figure 1.1: Conceptual framework



External data sources identified include 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 news media and regular health surveys like Bangladesh Demographic and Health Survey (BDHS) that capture cultural and policy changes, and associated health effects.

### Structure of This Report

This report on the ***State of Nutrition and Food Security in Bangladesh: 2013*** presents selected annual and seasonal findings from three rounds of surveillance conducted during the third year of FSNSP surveillance. Its structure is similar to past reports. Sections of this report, particularly in the description of the indicators used, are taken directly from the 2011 and 2012 report.

The report reviews FSNSP's data collection methods, followed by surveillance results organised around seven thematic headings: 1.) Household characteristics, 2.) Food security, 3.) Water and Sanitation, 4.) Nutritional status of women and girls, 5.) Maternal care and nutrition, 6.) Child feeding and care, and 7.) Nutritional status of children. The report presents national, divisional, and urban/rural estimates under each theme based on data collected in 2013. Seasonality is captured by comparing estimates from three rounds of data collection in surveillance zones and the nation as a whole.

Aggregates from more recent surveillance rounds can be found at the recently updated FSNSP website: [www.fsnsp.net](http://www.fsnsp.net)





# Methodology

FSNSP collects data representative of Bangladesh as a whole, of each division, and of agro-ecological zones at the greatest risk of food and nutrition insecurity.

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

In 2013, FSNSP interviewed individuals from 22,896 households in 954 communities.

FSNSP collects multiple measures of nutritional status for women and children, including dietary diversity, height, weight and MUAC.

This year, FSNSP was unable to sample as many households as planned due to political turmoil leading up to the tenth parliamentary elections.

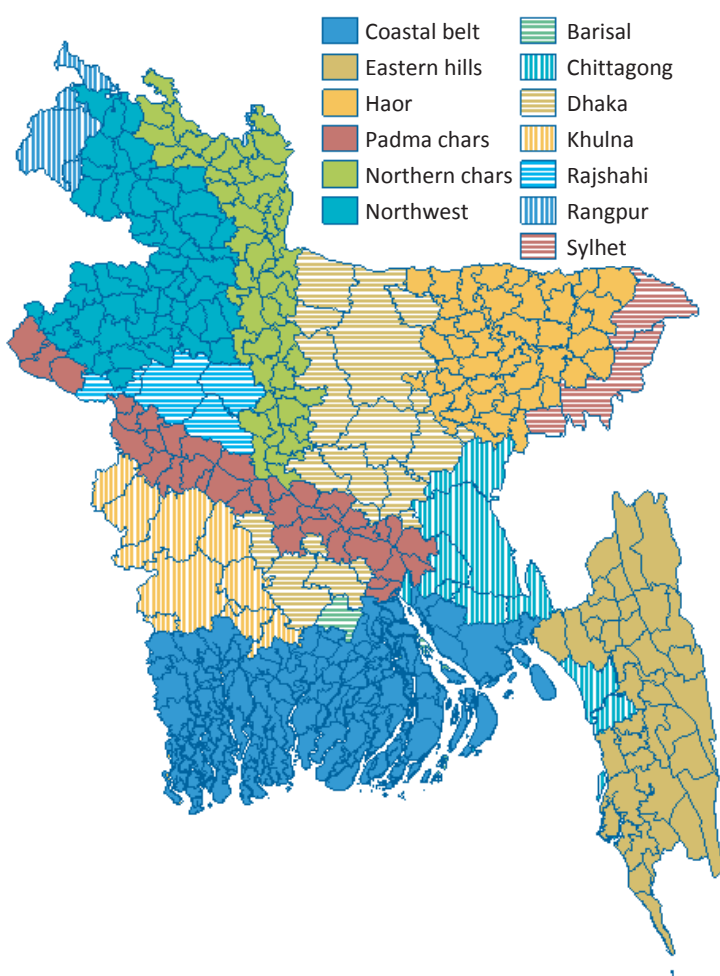
FSNSP's methodology has not changed substantially since 2011.





Since its inception, the Food Security and Nutrition Surveillance Project (FSNSP) has implemented a nationally representative surveillance system that tracks variation in indicators of food security and nutrition over three seasons in Bangladesh: the post-aman harvest period (January-April); the height of the monsoon (May-August); and the post-aus harvest season (September-December) (1). While FSNSP has consistently provided nationally representative data, sampling methods have been refined over time, most notably between the first and second rounds of data collection in 2010, and between Round 3, which ended in December 2010, and Round 4, which began in February 2011 (2). Details on the first year of implementation and initial sampling system can be found in *State of Food Security and Nutrition in Bangladesh: 2010* while additional details on the revised sampling system can be found in the subsequent annual reports (2; 3). In the fourth year of implementation, 2013, there were no changes in sampling structure, however political unrest led to a shortened twelfth round of data.

**Figure 2.1: FSNSP surveillance zones (2013)**



## Sample selection

By identifying vulnerable zones for targeted surveillance, FSNSP maintains its commitment to identifying households at greater risk of food and nutrition insecurity, the large majority of which are clustered in specific geographic areas. The rationale behind and process of defining the surveillance zones was provided in the 2011 report (2).

Since 2011, FSNSP has used a three-stage sampling design to reduce travel time and provide a representative sample per zone. For the first stage of sampling, the country was divided into 13 strata as depicted in Figure 2.1. Six strata correspond to the six surveillance zones, while the remaining seven strata, which contain all the upazila not included in a surveillance zone, correspond to the seven divisions of Bangladesh. From each stratum, a set number of upazila were selected with replacement. For each of the six surveillance zones, in each round, twelve *upazila* were selected, while 22 *upazila* were selected from the

other areas of the country. The number of upazila from non-surveillance zone strata varied depending on the number of upazila in the zone, ranging from one to eight.<sup>1</sup> From each of the surveillance zones, *upazila* were selected by rotation into the sampling frame in order to reduce random variation in estimates between rounds, as has been recommended for surveillance systems by the United Nations Statistical Division and is commonly done in labour participation surveillance (4; 5; 6; 7; 8). This process is detailed in the 2011 report (1).

As in 2012, in 2013 the list of villages/*mohalla* in each upazila were broken into units of equal size before communities from this list were selected.<sup>2</sup> There was no stratification of rural and urban areas during the second stage of selection; four communities were chosen at random and without replacement from all the communities in each selected upazila. The third stage of sample selection was done in the field and has not changed since 2011. The team approached the assigned community starting from the first eligible house from a randomly assigned approach road (North, South, East, or West) as determined by a random number generator. The next and subsequent households for interview were chosen systematically by skipping four households from the previously interviewed household and, in a "zigzag" fashion, selecting households from both sides of the road until 24 households were selected systematically and interviewed. In situations where the identified household was not eligible for inclusion or refused participation, the next household that met the inclusion criteria was selected. Households were considered eligible for surveillance if there was at least one woman in the household aged 10 to 49 years or a child less than 5 years of age.

The system of selecting caregivers, women, and children in each household for questionnaire administration and anthropometric measurements has not changed since 2011. In every household sampled, one non-pregnant woman or adolescent girl (10 to 49 years of age) was randomly selected for height/weight/mid-upper-arm-circumference (MUAC) measurement and asked a series of questions about dietary consumption. In addition, all currently pregnant women had their MUAC measured and were asked about their dietary patterns and care they received during pregnancy. All children less than five years of age in the household were weighed and measured, but only the caretaker of the youngest child in each household answered questions about child feeding and morbidity relevant to that child. See the 2011 and 2012 reports for further details on the implementation of the sampling system (1; 2).

### **Sample size**

The sample size of the system is verified before data collection each year. The system is designed to obtain representative prevalence estimates for indicators of food insecurity and child and women's malnutrition by surveillance zone. Sample size calculations were based on the estimated prevalence of fourteen key indicators:

1. Round-wise estimation of acute childhood under nutrition based on weight for length/height from the 2006 WHO Growth Reference (9; 10; 11)
2. Round wise estimation of child underweight based on weight for age from the 2006 WHO Growth Reference (9; 11)
3. Annual estimation of child underweight based on weight for age from the 2006 WHO Growth reference (9; 11)

<sup>1</sup> The 22 upazila were stratified as follows: 8 upazila from Dhaka; 4 from Chittagong; 3 from Khulna; 2 each from Sylhet, Rangpur, and Rajshahi; and 1 from Barisal.

<sup>2</sup> For further details see the 2012 report *State of Food Security and Nutrition in Bangladesh: 2012* (3).



4. Annual estimation of chronic childhood under nutrition based on length/height for age from the 2006 WHO Growth reference (9; 11)
5. Round-wise estimation of the 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 (12; 13)
6. Annual estimation of the proportion of women with CED, which is defined as a BMI of less than 18.5 among women 19-49 years of age (12; 13)
7. Round-wise estimation of the proportion of women who are overweight or obese based on the WHO-endorsed Asian cut-off, which is defined as a body mass index of greater than 23.0 among women 19-49 years of age (13)
8. Annual estimation of the proportion of women with overweight, which is defined as a BMI of greater than 23.0 among women 19-49 years of age (13)
9. Round-wise estimation of the proportion of households with food insecurity as defined using the Household Food Insecurity Access Scale (HFIAS) (14)
10. Annual estimation of the proportion of households with food insecurity as defined using the HFIAS (9)
11. Round-wise estimation of the proportion of households with "food deficits" as defined using the Food Deficit Scale (FDS) (10)
12. Annual estimation of the proportion of households with "food deficits" as defined using the FDS (10)
13. Round-wise estimation of the proportion of households with poor or borderline food consumption patterns as defined using the Food Consumption Score (FCS) methodology and cut-offs designed for Bangladesh from the Household Food Security and Nutrition Assessment (HFSNA) (16)
14. Annual estimation of the proportion of households with poor or borderline food consumption patterns as defined using the FCS methodology and cut-offs designed for Bangladesh from the HFSNA (11)

Sample sizes for each round were calculated using the formula for calculating a 95% confidence interval for a single population proportion (given below). A 5% precision was used in the calculation of all annual estimates and for the seasonal estimate of acute child under nutrition. Less precise estimates (7.5%) were deemed sufficient for all other seasonal estimates. The formula used to calculate sample size  $n$  is as follows (17):

$$n = [1 + \delta(c - 1)] \times \left[ \frac{Z_{\alpha}^2 \times P \times (1 - P)}{E^2} \right]$$

where

$n$  = required minimum sample size

$\delta$  = the inter cluster correlation

$c$  = the number of households sampled in each village (24 in this survey)

$P$  = the estimated prevalence of an indicator, and

$Z_{\alpha}$  = the z-score corresponding to the degree of confidence with which it is desired to be able to conclude that an observed change of size ( $P_2 - P_1$ ) would not have occurred by chance ( $Z_{\alpha}$  - the level of statistical significance)

$E$  =  $P_2 - P_1$

Estimates of the prevalence and inter-cluster correlation (ICC) of indicators which were used in calculating sample size were drawn from the 2012 FSNSP dataset.<sup>3</sup> Based on the 2012 data, it was assumed that children would be in 48% of the households sampled, and women over the age of 18 years would be in 77% of the households sampled. These proportions were used to convert the sample size requirements for individuals (7th column in Table 2.1) into estimates of the number of households that would have to be visited to reach that many individuals (8th column in Table 2.1).

**Table 2.1: Estimated sample size**

<i>Indicators</i>	<i>Estimated Prevalence</i>	<i>Desired Precision</i>	<i>Desired sample</i>	<i>ICC</i>	<i>Design effect</i>	<i>Required sample (each round)</i>	<i>Required households</i>
<b>Child Indicators</b>							
Acute (wasting, seasonal)	22%	5.0%	264	0.07	1.753	463	963
Underweight (seasonal)	50%	7.5%	171	0.06	1.668	285	594
Underweight (annual)	44%	5.0%	379	0.06	1.611	610	424
Chronic (annual)	50%	5.0%	384	0.10	2.019	775	538
<b>Women's Indicators (19-49 years of age)</b>							
Women's CED (seasonal)	39%	7.5%	162	0.11	2.879	466	602
Women's CED (annual)	34%	5.0%	347	0.09	2.584	897	386
Women's overweight (seasonal)	50%	7.5%	171	0.13	3.233	553	714
Women's overweight (annual)	45%	5.0%	380	0.13	3.191	1213	522
<b>Household Indicators</b>							
Food insecurity (HFIAS, seasonal)	50%	7.5%	171	0.22	6.014	1028	1028
Food insecurity (HFIAS, annual)	50%	5.0%	384	0.22	5.957	2287	762
Food deficit (FDS, seasonal)	37%	7.5%	158	0.27	7.275	1149	1149
Food deficit (FDS, annual)	31%	5.0%	329	0.25	6.635	2183	728
Food consumption (FCS, seasonal)	40%	7.5%	164	0.25	6.829	1120	1120
Food consumption (FCS, annual)	29%	5.0%	317	0.26	7.021	2226	742

The largest sample size required by these indicators was the number of households needed to estimate food deficit seasonally, which was calculated to be 1, 149 households per zone per round. This requirement was met by including 12 upazilas in each zone and interviewing 96 households per upazila (24 households in each of four communities). In keeping with these minimum requirements, the final sample size was 1,152 households per surveillance zone. Total target sample size per round was 9,024 households.

## Measurement

Surveillance data were collected through structured interviews by means of paper questionnaires and proprietary survey software (Surveymaster v2.0, HKI) administered using commercially available personal digital assistants (PDAs) (Hewlett Packard, HP iPAQ 112, USA). The questions were the same on the paper questionnaire and the PDA. More than half of the data were collected using PDAs. Data collected on PDAs were imported using the Surveymaster software, while data collected using paper questionnaires were entered into a custom-made data entry screen. To the extent possible, surveillance questionnaires and protocols employed by FSNSP are based on existing global standards and guidelines. Surveillance instruments are available on the FSNSP

<sup>3</sup> For these measures, estimated prevalence estimates were obtained by looking at all the food insecure zone wise estimates from all three rounds of data collection and using the estimate closest to 50% for each indicator. The ICC estimates were obtained by regressing the indicator of interest from the annual dataset over the village identifiers (using the xtlogit command in Stata) (19).

website ([www.fsnsp.net](http://www.fsnsp.net)), and key indicators are described in the relevant sections of this report. The questionnaire used in the fourth year of FSNP closely matches the format and structure of the questionnaire used in previous years, details of which can be found in past reports (1; 2). The questionnaire did not change between the three rounds of surveillance in 2013.

### ***Enumeration team training***

Data collection officers received two weeks of initial training on how to interview, use PDAs for questionnaire administration, conduct anthropometric measurements, and maintain anthropometric instruments. Before each surveillance round, a one-week refresher training was conducted to share lessons learned from the field and discuss any changes in the questionnaire. Mid-way through each round of data collection, a one or two-day refresher training was organised to reinforce skills and knowledge.

### ***Anthropometric measurement***

In each selected household, the weight of children, women, and adolescent girls was measured to the nearest 0.1 kg using a portable electronic weighing scale (TANITA Corporation Japan, model HD-305). The height of women, adolescent girls, children older than two years of age, and the recumbent length of children younger than two years of age were measured to the nearest 0.1 cm using a locally made height and length board. The MUAC of children, women (both pregnant and non-pregnant), and adolescent girls was measured to the nearest 0.2 mm using a numerical insertion tape produced by Teaching Aids at Low Cost (TALC). All anthropometric measurements were performed according to WHO guidelines as specified in the FANTA anthropometry manual (18).

### ***Consent and ethical clearance***

To obtain informed consent, FSNP field coordinators explain the objectives and procedures of the surveillance system to the leaders of the selected districts, upazilas, and communities. At the beginning of each interview, the data collection officers give details about the purpose of surveillance and read a statement which informs them that participation is completely voluntary and that respondents who grant consent have the right to refuse to answer any questions and to discontinue the interview at any time. Consent for measuring children less than five years of age is obtained from their caretaker.

## **Field work**

In 2013, data were collected by 36 two-member teams which consisted of one female and one male data collector who shared responsibility for interviewing and anthropometric measurements. This is the same management structure as was used in the last two surveillance rounds of 2012. Monitoring officers supervised the activities of every team, and two field managers provided oversight of the data collection process.

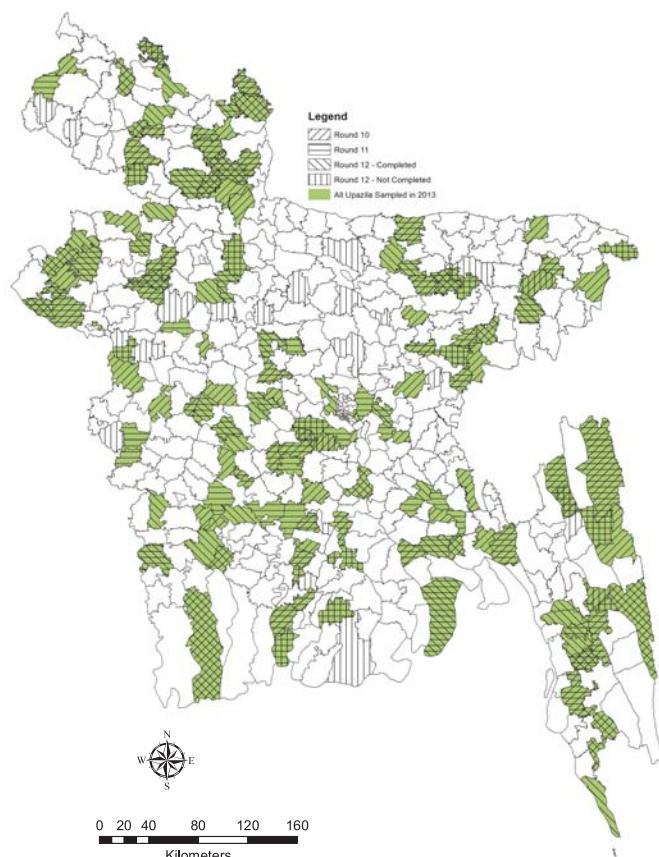
All rounds of data collection were divided into two phases with a break between data collection periods, except for the twelfth round which was shortened to one phase due to the political unrest during the lead up to the tenth parliamentary elections. The data collection teams spent four to six weeks at a time in the field. The monitoring officers visited each data collection team at random at

**Table 2.2: Dates of data collection**

Round	Dates
10	February 19 - May 15
11	June 15 - September 22
12	October 24 - November 23

least once a week to check questionnaires and ensure adherence to the questionnaire protocol in the field.

**Figure 2.2: Sampled upazilas by round**



During 2013, 22,896 households were interviewed in 858 rural communities and 96 urban communities (954 communities in total) of 150 upazilas (2). The targeted number of 27,072 households in 1,128 communities was not obtained in 2013 due to political unrest that reduced the length of the twelfth data collection round. Overall, refusal rates remained very low, with only 306 households declining to participate in the survey (1.3%). As expected, refusal rates in urban areas were greater than in rural areas (rural: 1% and urban: 4.7%). In selected households, a total of 19,013 women aged 19 to 49 years of age and 4,263 adolescent girls aged 10 to 18 years of age were interviewed. Of these 23,276 women and girls, 1,433 were pregnant (6.2%). Additionally, 12,000 children were measured and 9,984 caregivers were interviewed about the care and feeding practices of the youngest child in the household. Table 2.3 breaks these aggregate figures up by surveillance round.

**Table 2.3: Number of communities, households, and individuals sampled**

	Round 10	Round 11	Round 12
<b>Communities</b>	376	376	202
<b>Households</b>	9,024	9,024	4,848
<b>Women and girls</b>	9,158	9,185	4,933
<b>Young children</b>	4,600	4,860	2,540

could be corrected in the field. Quality control officers revisited a randomly selected sub-sample (around 10%) of interviewed households within 48 hours of the initial visit by the data collection team to verify the quality of data collected. For all three rounds conducted in the third field year of FSNP, internal FSNP quality control operations were supplemented by Bangladesh Bureau of Statistics (BBS) staff performing a 10% post-enumeration check using a third questionnaire.

### **Quality control**

Data quality was ensured through multiple procedures of review and cross-checking. Monitoring officers reviewed all questionnaires on the same day of completion so that any errors or inconsistencies identified



Quality control data were compared to the surveillance data collected by data collectors. Inconsistencies were reviewed by the project manager, project coordinator, training officer, and field managers to identify possible reasons for the discrepancy and to implement appropriate solutions, such as a review session on selected indicators during the refresher training or a revision of the questionnaire.

## Data management

Data entry or importation was done concurrently with data collection. Data obtained using paper questionnaires were entered on two computers using a data entry programme developed in FoxPro software (v2.6) while PDA data were imported using Surveymaster (HKI, v2). One senior data management officer supervised data entry and cleaning, including the transfer of data from PDAs to computer and merging the data from paper questionnaires and PDAs using SPSS Statistics (IBM, v19).

Data management officers reviewed, edited, and cleaned the data by performing a series of logic, frequency and data range checks.<sup>4</sup> Any inconsistencies identified were checked visually by comparing the electronic entry to the entry on the original questionnaire or to the data collectors' notebooks. If required after this further examination, the senior data management officer made necessary corrections. The data management officers consulted with field managers and monitoring officers to understand any discrepancies during the data cleaning process.

### *Statistical analysis*

Data analysis was done using Stata (StataCorp, v13.0). In this report, the data are described using proportions and means. Whenever statistical significance is referred to in the text, the tests employed were an Adjusted Wald (for proportions) or a t-test (for means) with a 95% confidence level. Estimates were weighted using sampling weights that were constructed based on each household's probability of selection. These weights were constructed using the same sampling frame used for sample selection (2011 census community series). All analysis and estimations were performed utilising the svy commands in Stata, to take into account the complex sampling design.

## Strengths and limitations

Revisions to the design and sampling strategy of FSNP in its second and third years of implementation have added to its strength and credibility as a nationally and sub-nationally representative surveillance system. Moving forward, FSNP will continue to learn, adapt and adopt the latest surveillance strategies and technologies. The major challenge confronting the system is to maintain comparability to previous years of data even when system improvements are taking place. In this report, systematic efforts are made to overcome this challenge by linking and/or reanalysing past and present datasets using common indicators, and displaying national and regional estimates. The limitations of the system in 2013, as was the case in 2012, are mainly with regards to the way the sampling system is collected at the field level. Though the on-the-spot, field sampling method has resulted in a low level of absent households, to date, this may change in the future. Moreover, though every effort was made to visit the randomly selected sample of communities, it was not always possible for the surveillance team to visit the most remote locations. This was particularly

<sup>4</sup> The manual which guides these routine operations is available upon request.

true in the Chittagong Hill Tracts, due to government regulations and security concerns. In the coming years, the FSNSP system will carefully monitor these risks to ensure that they do not compromise data quality. In 2013, the second phase of round 12 data collection was not possible due to political unrest. For this reason, the weights are adjusted in the analysis to accommodate the missing information from targeted households on the 2nd phase of round 12.

# Household characteristics

A young child with dark skin and hair is looking directly at the camera. They are holding a large, light-colored stuffed animal with a dark face and a long, dark, braided or beaded necklace. The child is wearing a light-colored, patterned garment. The background is a soft, out-of-focus green, suggesting an outdoor setting. The entire image is overlaid with a semi-transparent olive-green filter.

The proportion of households with children was around 40% in 2013 (similar to 2012), with the fewest children under five in Khulna division and the most children under five in Chittagong division.

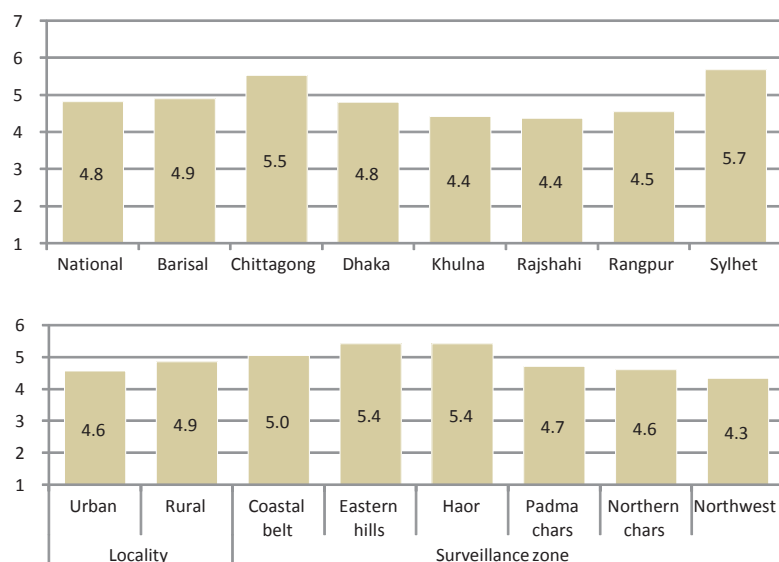
Business and salaried employment were the principal sources of income for almost 40% of households nationally; however prevalence of salaried income was generally much lower in the food insecure agro-ecological zones.

Across divisions, the highest levels of maternal education (post SSC) were in Barisal division followed by Khulna and Dhaka division. The lowest levels of maternal education were in Rajshahi division.

Nationally, the proportion of women 15 to 49 years of age earning an income increased slightly but steadily from 20% in 2011 to 24% in 2013.

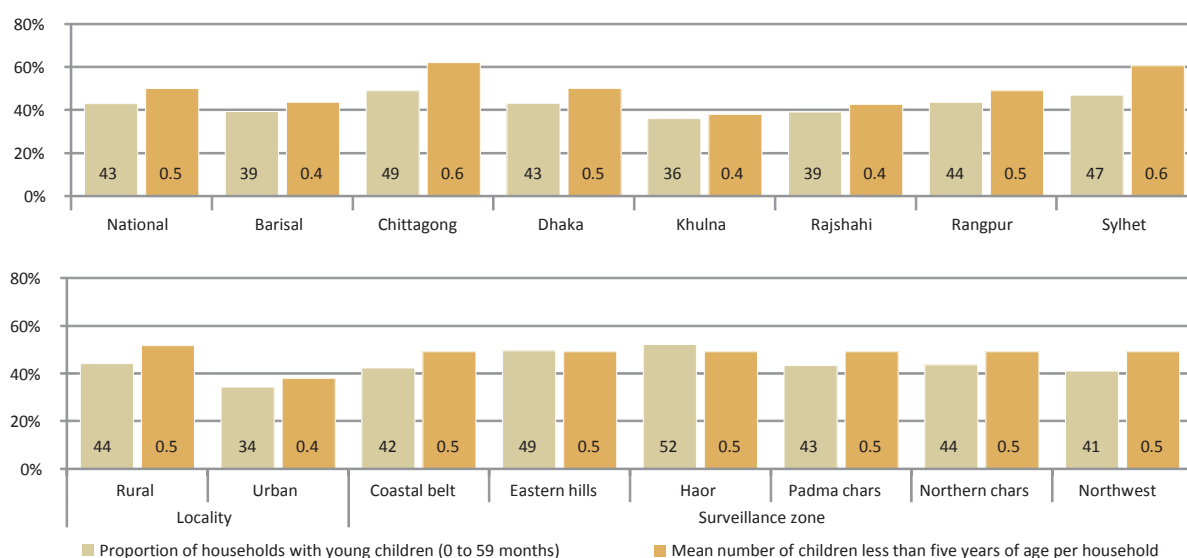
Nearly one-fifth of households received remittances in 2013. Those living in Chittagong, followed by Sylhet and Dhaka, received the most remittances; those living in Rajshahi and Rangpur received the least.



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

Similar to 2012 estimates, in 2013, the mean household size estimated through the FSNP system was 4.8 members—slightly larger than the 2011 Census and the 2011 BDHS (1; 2). The difference between these results and FSNP is likely due to the exclusion of households without a woman 10-49 years of age in the FSNP system (and thereby the de facto exclusion of single member households) and/or the de jure definition of households employed by FSNP. Estimates of household size have been consistent since FSNP began (3; 4; 5).

Additionally, the ranking of divisions by household size is similar between FSNP estimates and the 2011 census (1), with the largest average household size found in the eastern divisions of Sylhet and Chittagong, and the smallest in the western divisions of Khulna, Rajshahi and Rangpur. Average household size was higher in rural areas compared to urban areas but the largest household size was found in the Eastern hills and Haor (Figure 3.1). As expected, no differences in household size were observed across seasons (graph not shown).

**Figure 3.2: Proportion of households with children and the mean number of children per household**

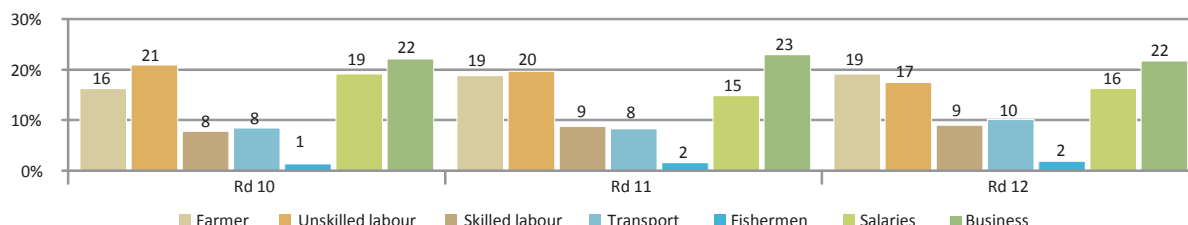


In line with past results, fewer than half of households included a child younger than five years of age. Around 20% of households with children under five had more than one child in this age range, leading to an overall average of 0.5 children less than five years of age per household, roughly the same since 2011. The number of children under five and the proportion of households with young children varied greatly across different regions of Bangladesh. Divisionally, in 2013, the fewest children under the age of five were found in Khulna, where only 36% of households had young children, and the average number of children under five per household was 0.4. In contrast, Chittagong had the highest proportion of households with young children, 49%, while the greatest number of children under the age of five per household was found in Chittagong and Sylhet. Comparing 2011 and 2013 Figures, the average number of children under age five in Sylhet seems to be dropping.

### Household income

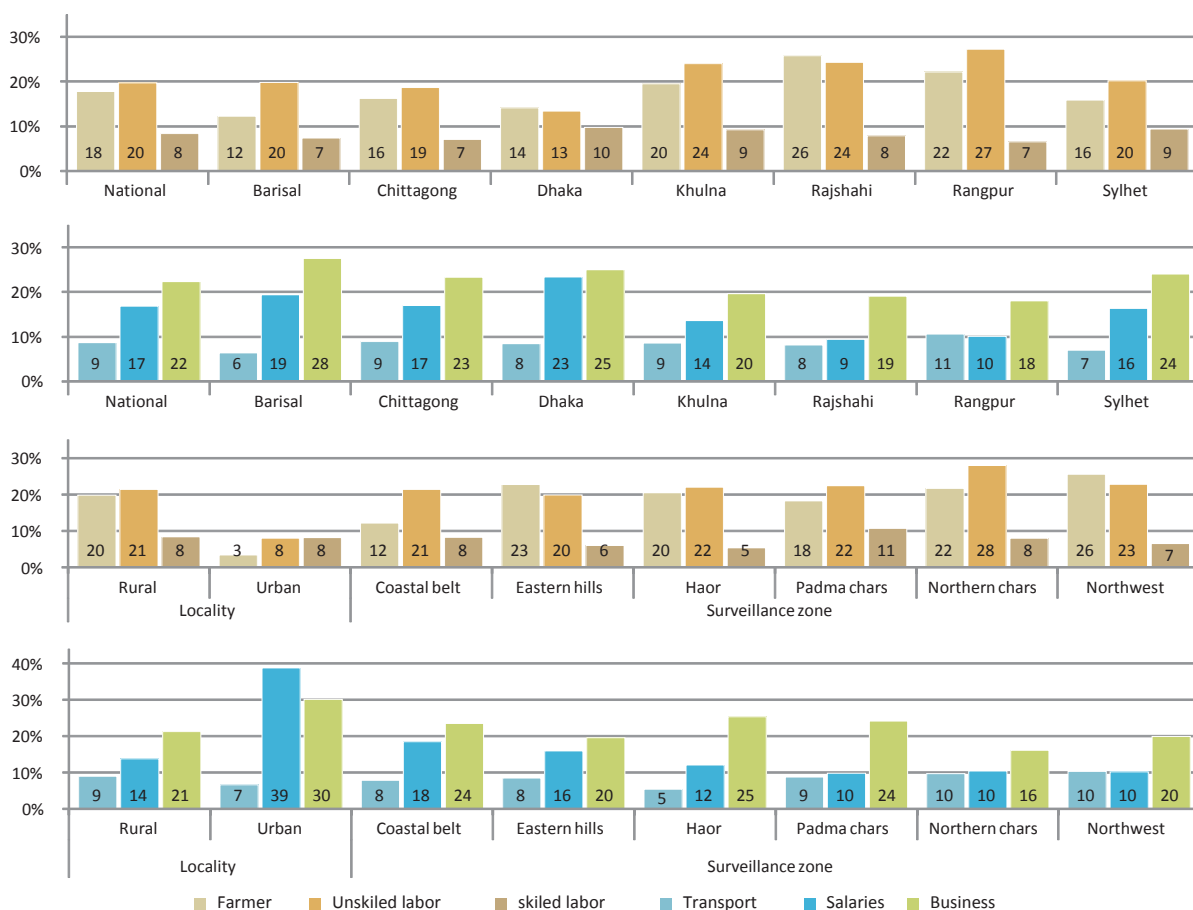
FSNSP classifies the occupation from which every member of the household earned income in the two months prior to the interview into 20 categories. Additionally, FSNSP records which member of the household is the principal income earner.<sup>1</sup> Using these two pieces of information, FSNSP can categorise households by the main occupation of the principal income earner. For reporting purposes, occupational data was further grouped into seven occupation types: 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 labour - 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 good, including petty trading.

**Figure 3.3: Occupation of principal income earner by season**

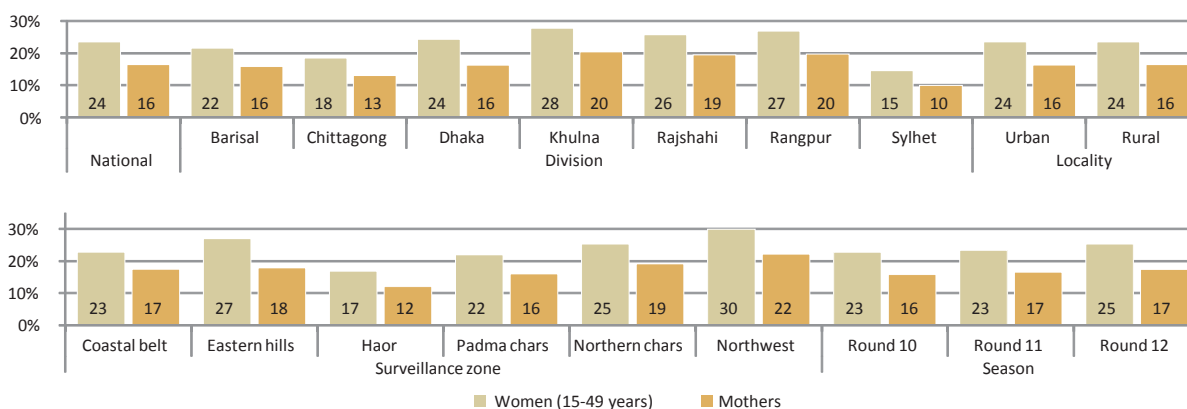


Only the proportion of households with main income earners primarily earning income from farming and unskilled labour changed substantially across seasons. In addition, distinct occupational patterns were apparent for some occupations across the regions of Bangladesh. Reliance on skilled labour was similar across areas but rates of unskilled labour varied from around 25% in the three western divisions of the country (Khulna, Rajshahi, and Rangpur), to only around 13% in Dhaka. The sharp decline in the proportion of households primarily earning income from farming in Barisal between 2012 and 2013 merits further examination if the trend continues in 2014 (2012: 19%; 2013: 12%). Nationally, business and salaried employment (combined) constituted the principal source of income for almost 40% of households, and this proportion went up to nearly 70% in urban areas. As expected, the proportion of households earning income from farming and unskilled labour was much greater in rural compared to urban areas, though the proportion earning income from skilled labour was roughly the same.

<sup>1</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.

**Figure 3.4: Occupation of principal income earner by area of residence**

FSNSP also captures women's contributions to household income even if these women primarily identify as housewives. Nationally, the proportion of women 15 to 49 years of age earning an income increased slightly and not significantly from 20% in 2011 to 22% in 2012 to 24% in 2013. In contrast, the proportion of mothers with a child younger than five years of age earning income declined slightly from 18% to 16%. The proportion for both of these indicators was the same in rural and urban areas. The increase in the proportion of women earning an income was highest in Khulna (22% in 2012 and 28% in 2013) and Rangpur (22% in 2012 and 27% in 2013). Overall, the highest proportion of women earned income in the Northwest zone.

**Figure 3.5: Proportion of women and mothers earning income by area of residence and season**

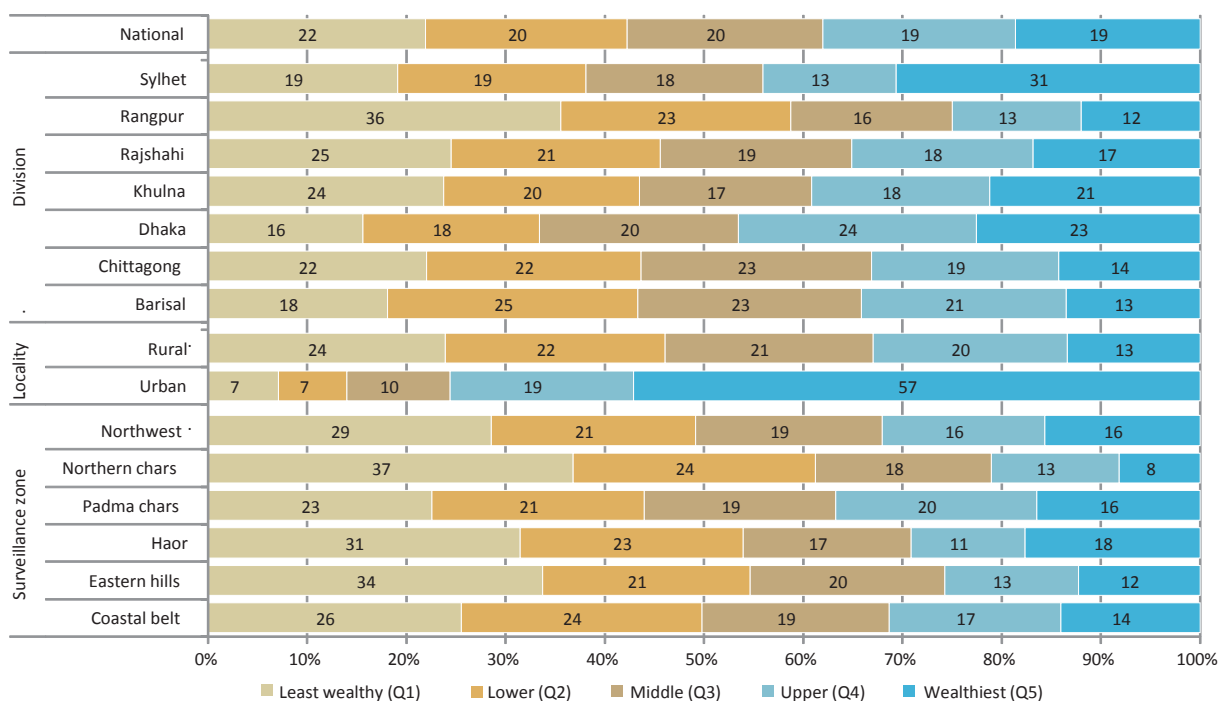
### Household relative wealth

The surveillance system collects information on the quality of household structures, cooking, water and sanitation systems, and asset ownership. These household characteristics are typically associated with overall health and nutritional outcomes and the ability to weather periods of crisis. Additionally, using standard methodology, these assets can be used to determine the relative wealth status of households (6; 7; 8). There has been a steady increase in the number of households with access to electricity, with 58% of households with access in 2011, 62% in 2012 and 68% in 2013. By contrast, there has been little change in the construction material used to construct dwellings (e.g. floor and roofing material), with most households constructed of unfinished materials (only 22% of households live in a dwelling where the floors, walls, and roofs are made of finished materials).

### Wealth index

Based on these characteristics and the assets that households owned, a composite wealth index was derived using the DHS method which consists of area specific indexes that are combined into a national model (8).<sup>2</sup> The wealth index was then divided into five quintiles, each containing an equal population of household members. Overall, richer families had slightly larger households, resulting in slightly lower proportions of households in the upper wealth quintiles. Dhaka division had the lowest proportion of households in the poorest wealth quintile and Sylhet had the greatest proportion in the wealthiest quintile. In contrast, Rangpur had the highest proportion of households in the least wealthy quintile, over one-third of households, and the fewest numbers of households in the wealthiest quintile. Rural areas were much poorer on average than urban areas, in line with the findings from 2012 which also used the new wealth index creation method. All surveillance zones excepting the Padma chars were less wealthy on average than the nation as a whole.

<sup>2</sup> This wealth index was constructed using the same methodology that the DHS system has used from 2010 (8; 2) and used in FSNP starting with the 2012 report (5). The 2010 and 2011 reports used the previous wealth index methodology initially outlined in Filmer and Pritchett, article and subsequently adopted by the DHS system (7; 6). 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 # on page #.

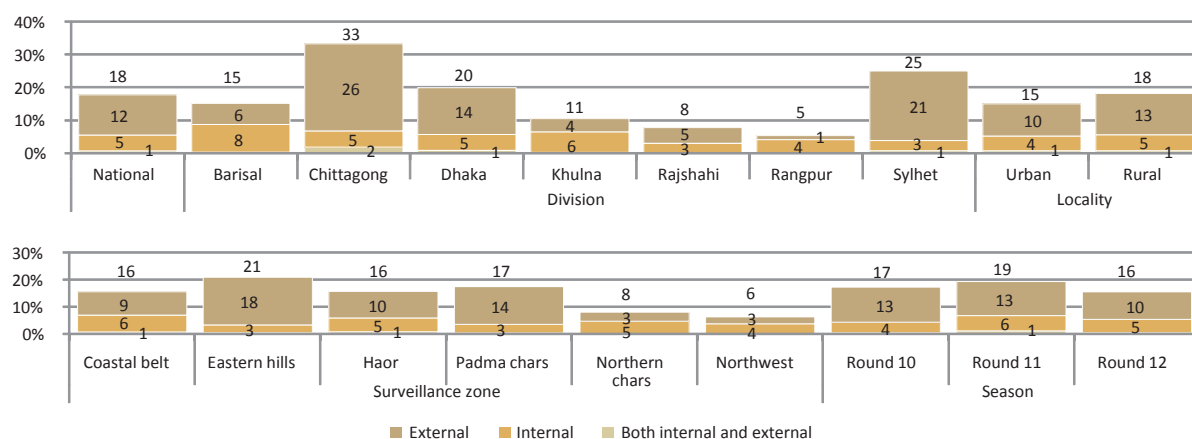
**Figure 3.6: Proportion of households in each wealth quintile by area of residence**

### Remittance

Workers' international remittances-transfers from national and international migrants to family members in their country of origin-represent one of the largest sources of financial flows to developing countries. Because remittances are generally spent on consumption necessities -food, clothing, medicine, and shelter- they help lift huge numbers of people out of poverty by supporting a higher level of consumption than would otherwise be possible (9).

In 2013, FSNP estimated the relative flow of remittances nationwide. Figure 3.7 indicates that around one-fifth households received remittances in 2013. Chittagong, followed by Sylhet and Dhaka was the highest receiver of remittance whereas Rajshahi and Rangpur were the lowest. The variation in the proportion of households who received remittances was largely due to differences in foreign remittances. The Northern chars and Northwest received the least flow of remittances while the Eastern hills were the largest remittance receiver. Seasonally, a greater share of remittances was received in Rounds 10 and 11 compared to Round 12.

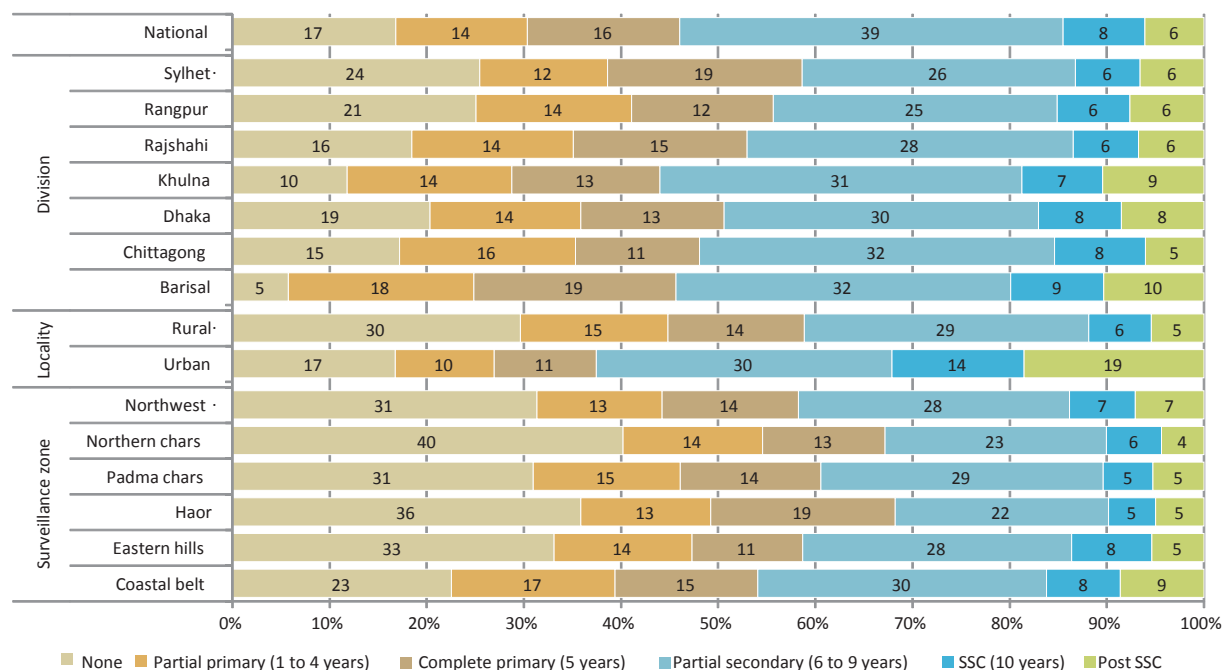
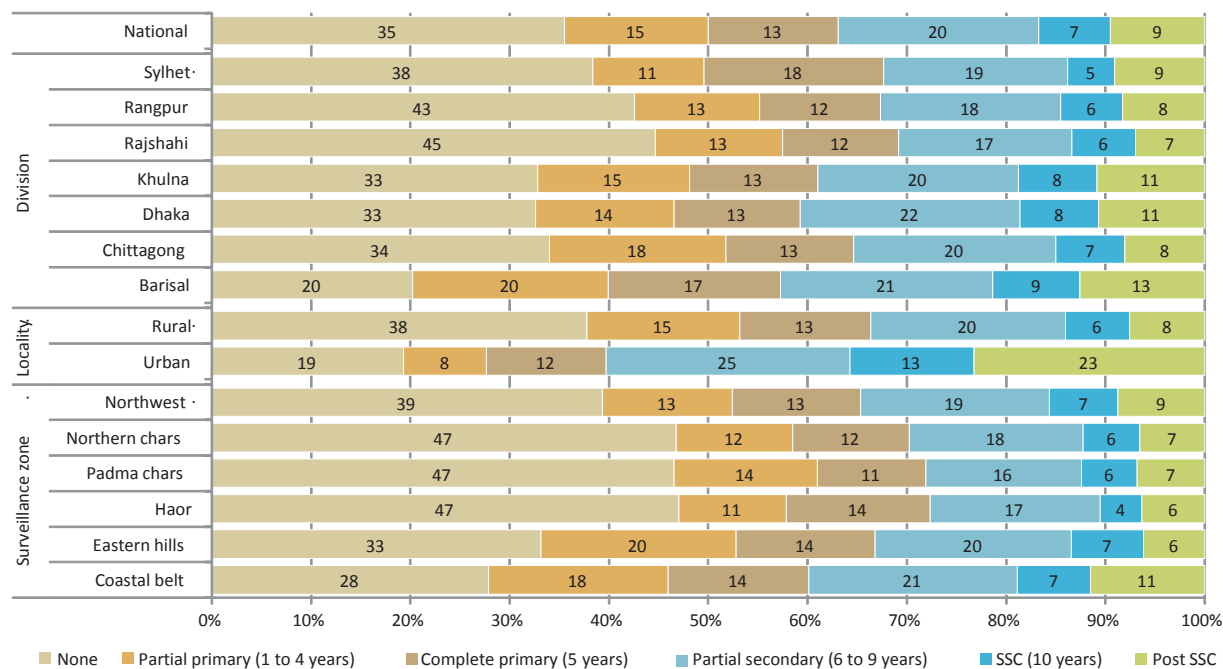


**Figure 3.7: Source of remittance by type and area of residence**

### Education levels

The educational attainment of all household members is recorded in years of education passed and later categorised into six groups as follows: 1) none - 0 years; 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. This report uses two household indicators to summarise education levels in different areas of the country and for households with different structures and sizes. The educational attainment level of the mother is used to examine childcare and feeding practices, given the known importance of maternal education as a protective factor against childhood malnutrition and illness; while educational attainment of the household's principal income earner is used for most other analyses. Additionally, indicators reflective of the situation of adult women are presented against female educational attainment.

Maternal education and the education of the household's principal income earner were strongly correlated across regions but only weakly within households ( $r=0.30$ ). Interestingly, a greater proportion of principal income earners, compared to mothers, were highly educated (more than ten years) and completely uneducated (zero years). Nationally, around 17% of mothers had never gone to school compared to over 35% of principal income earners. Across divisions, the highest level of maternal education (post SSC) was found in Barisal and Khulna. A somewhat similar scenario was found for principal income earners, with the highest level of education reported in Barisal followed by Khulna and Dhaka. A greater proportion of people with the lowest level of educational attainment was found in Rajshahi for principal income earners and in Sylhet for mothers. As expected, people in urban areas were much more educated than those in rural areas. On average, educational attainment in the surveillance zones was around the national average.

**Figure 3.8: Educational attainment of mothers by area of residence****Figure 3.9: Educational attainment of principal income earners by area of residence**





# Food security

Overall, while the cost of the average food basket in Bangladesh has gone up over the last few years, food security has improved across a range of indicators.

In 2013, the proportion of households that contained a member or multiple members who were reduced to eating a meal of only rice declined from nearly half in 2011 to only one-fifth in 2013.

Although domestic food production rose significantly from 2007 to 2013, production of fruits and vegetables in Bangladesh remains less than half that needed to promote optimal nutrition and health.

Bangladesh has seen real wage growth in the past five years but food price spikes place balanced diets beyond the reach of many, particularly the urban poor and rural landless.

Sacrifices in consumption of food, particularly in times of scarcity, is highly gendered. When only one person in a household must make a sacrifice in their diet it is almost always an adult woman. Adults, including men, tend to make consumption sacrifices in favour of children.



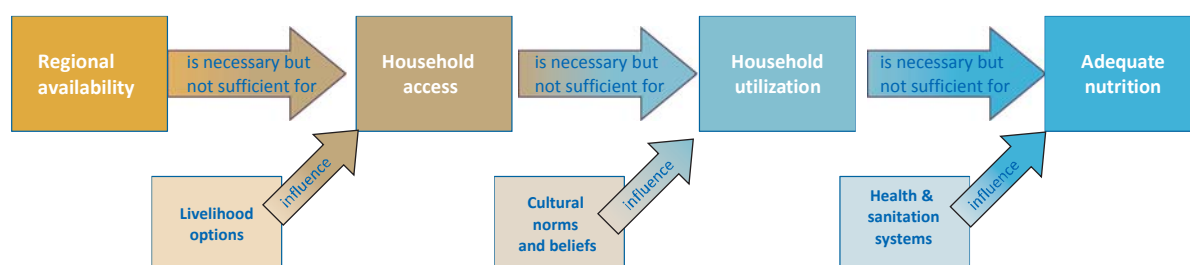




FSNSP links food and nutrition security through the conceptual framework depicted in Figure 4.1. Under this definition, food and nutrition security exists when: 1) food is present nationally, regionally, and locally (availability); 2) food can be purchased or produced by households (access); 3) diverse and nutritious foods are consumed equitably within the household as per nutritional needs (intra-household utilisation); 4) the health of the environment and individual allows for adequate absorption of nutrients (nutrient uptake); and 5) safeguards are in place to ensure that this situation will not deteriorate in the near future (vulnerability) (1). The unit of reference for these components of food security becomes smaller over these conditions - moving from national to regional to household to individual - and each of these components is a necessary, though not sufficient, condition to achieve the subsequent aspect of food security.

Non-food conditions also play a major role (bottom row of Figure 4.1). Livelihood options provide households with income from which food can be purchased and/or skills to produce food directly. The cultural norms and beliefs of an area impact both what foods are demanded by households and who eats what from the household's food basket. Finally, adequate absorption of nutrients is dependent upon the health and immune system of each individual. Without adequate sanitation and healthcare, frequent infections will rob individuals of adequate nutrition no matter how sufficient their diet (2).

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



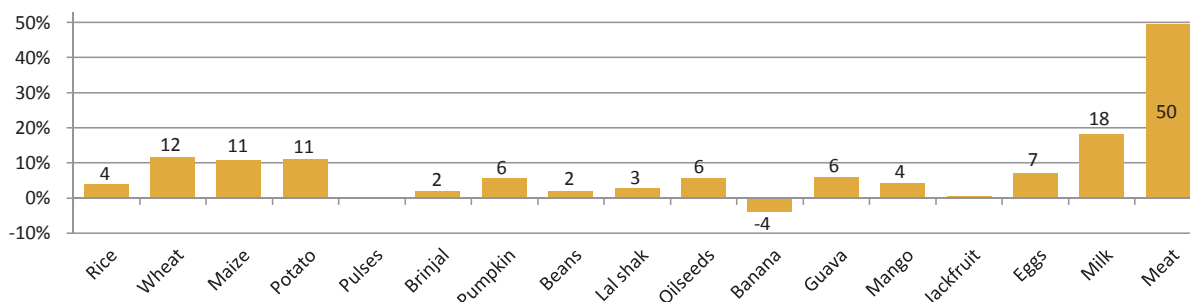
FSNSP continues to be the only source of seasonal information on the food security status of the country at the household level. FSNSP estimates the prevalence of food insecurity in Bangladesh using internationally standardised questions that assess respondents' perceptions of household access to food. Following the diagram above, this section will focus on indicators that 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 examination of seasonal variation, trends over time will be assessed using data from 2011 to 2013 FSNSP.

### Availability

In line with the goals laid out in the *National Food Policy: Plan of Action* and of *Country Investment Plan*, the Government of Bangladesh is committed to increasing and diversifying the foods available through improved agricultural production and maintenance of trade relations (3;4). As shown in Figure 4.2, the only crops which have not increased in production over the six years between 2007 and 2013 are pulses, banana, and jackfruit (5). For animal source food, the growth has been even larger: the average annual production increase from 2007/2008 levels has been 7% for eggs, 18%

for milk, and 50% for meat (5). In spite of these gains, domestic production is increasingly unable to meet the consumer demand for a more diversified diet, leading to a surge in imports since 2006 (6; 7). Overall, production of fruits and vegetables in Bangladesh need to be increased as well as storage and processing facilities of fruits and vegetables need to be strengthened to promote optimum health and nutrition (8).

**Figure 4.2: Annual growth rates for selected crops (2007 to 2013) and animal source foods (2008 to 2013)<sup>1</sup>**



Because food availability through markets, barter-systems, and/or subsistence agriculture is adequate to meet current levels of demand in most areas of Bangladesh (9; 10), FSNP focuses mainly on household level rather than market indicators. Nevertheless, the surveillance system monitors differences in food prices across regions of the country and over time, recording the price at which common food items are available in every community visited.<sup>2</sup> The vast majority of these items were found to be ready for purchase in over 97% of markets. Notably the proportion of markets in which fresh milk is available has increased from 87% in 2011, to 88% in 2012, to 99% in 2013.

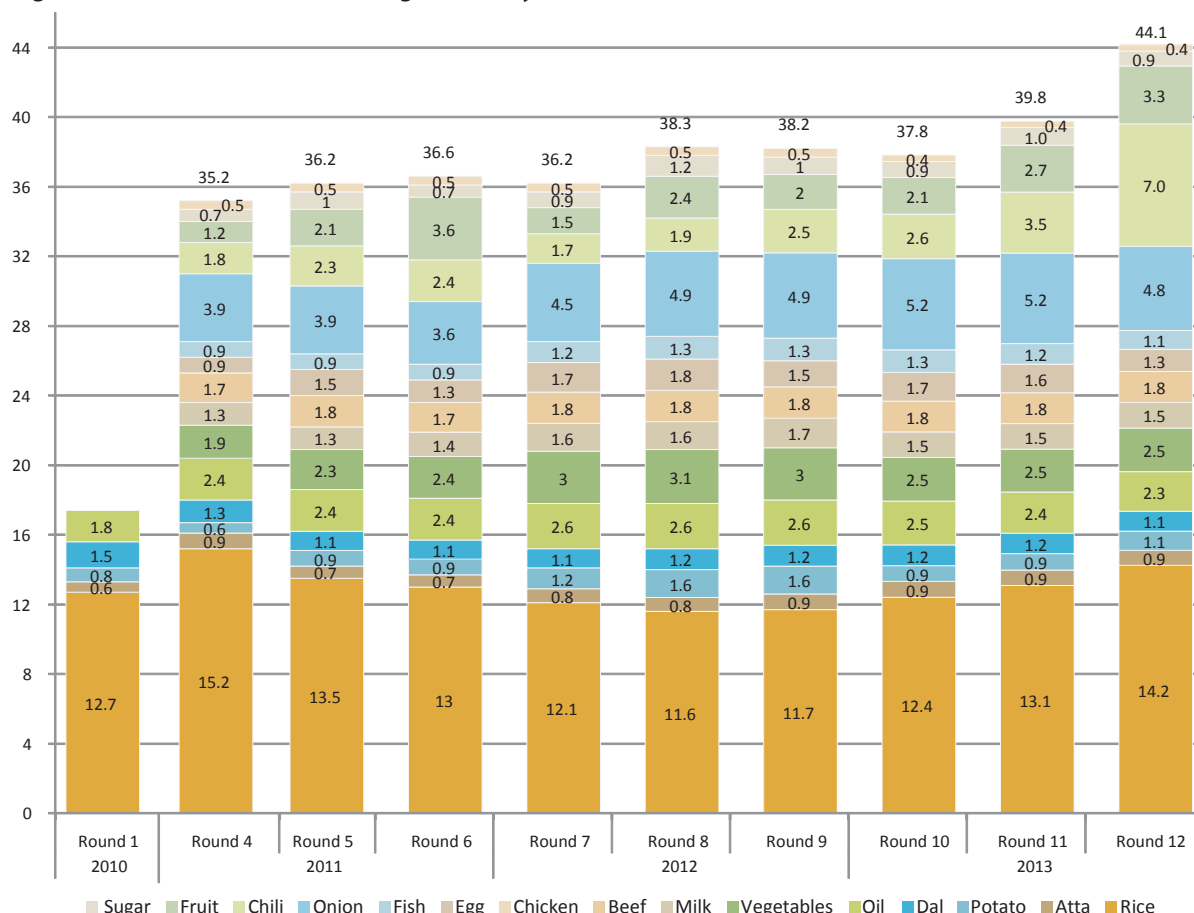
### Economic access

As noted at the outset of this chapter, availability of foodstuffs in markets does not ensure household access; cost of food items and purchasing capacity of households must be considered. Since 2007, global food prices have become increasingly volatile. In early/mid 2010 the price of many food commodities increased worldwide and remained high until mid 2011, which elevated levels of food insecurity in 2011. Sharp increases in the cost of food disproportionately affect household food security in South Asia, where food spending typically comprises 50% of household income (11). Fortunately, the price of rice and other commodities declined during late 2011, resulting in an improvement in food security during 2012. Bangladesh has seen real wage growth in the past five years - between 2005 and 2010 the proportion of Bangladeshi households in poverty fell from 40% to 31.5% (12; 13) and at present (2013), the poverty rate is around 26% (BBS-projection). Nevertheless, food price spikes place balanced diets beyond the reach of many, particularly the urban poor and rural landless.

Since its inception, FSNP has tracked the average market price of several food commodities in local markets nationwide. In contrast to recent years, the price of rice was stable in 2012 but increased over 2013. While the average local price of rice was 29 BDT in January-April 2010, it rose 25% to 35 BDT by February-April 2011, before falling again to between 28 and 29 BDT for the entirety of 2012, than rose again to 33 BDT by October-November 2013.

<sup>1</sup> This graph was constructed from Table 8 and Table 15 of the *National Food Policy: Plan of Action and Country Investment Plan: Monitoring Report 2013* and Table 10 and Table 19 of the *National Food Policy: Plan of Action and Country Investment Plan: Monitoring Report 2014* (7; 6).

<sup>2</sup> Items included in this assessment are rice, wheat flour, potatoes, eggs, onion, two varieties of lentils, two varieties of cooking oil, fresh milk, beef, fish, chicken, green chili, leafy vegetables, other vegetables, banana, and sugar.

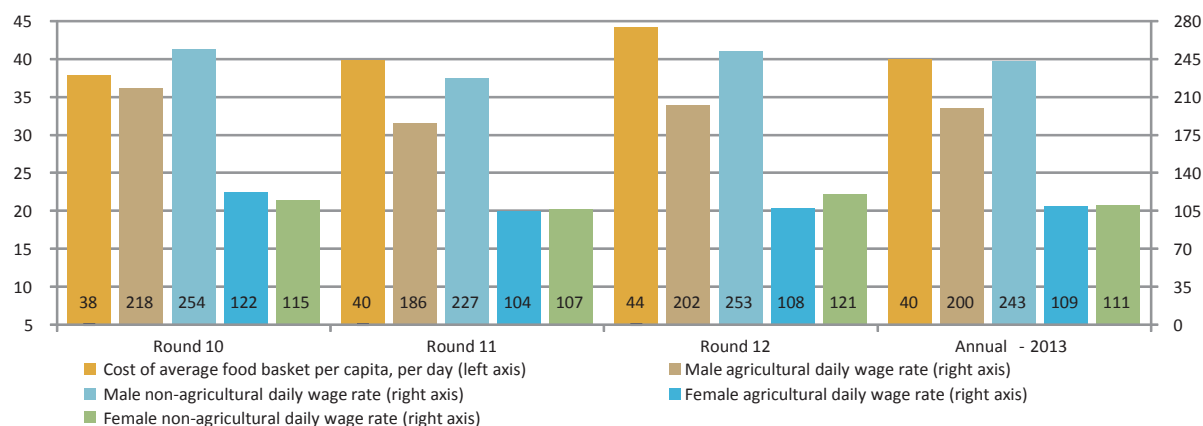
**Figure 4.3: Cost of items in the average basket by season<sup>3</sup>**

The cost of the average, per-capita, daily amount of each food commodity, as reported in the Report of the Household Income and Expenditure Survey (HIES): 2010 (12), is added together to create the price of the average daily, per capita Bangladeshi food basket.<sup>4</sup> The costs of components of the food basket are detailed in Figure 4.3. Clearly, diets in Bangladesh are greatly dependent on commodities (rice, wheat, lentils, and oil), which is the only portion of the food basket which was measured in 2010 (Round 1). The commodity portion of the food basket contained around half of the total cost of food, though this proportion shrank over 2011 and early 2012 as the price of rice fell and has increased since that time. The cost of onions and green chillies has increased significantly, and fish slightly since early 2011. Comparing the costs of this basket to the one used in the 2010 report, which was based on the 2005 HIES, indicates that households in Bangladesh are increasingly demanding more expensive food baskets. The mean cost of the average 2005 HIES food basket was 33.8 BDT in comparison to a mean of 40.0 BDT for the average 2010 HIES basket.

<sup>3</sup> This graph excludes the cost of miscellaneous items, and therefore the overall cost is lower than that given in Figure 4.4.

<sup>4</sup> See page 48 of HIES report: 2010; methods used in the construction of this indicator are the same as was used in 2012 (26).



**Figure 4.4: Seasonal variation in mean food price and daily labour wages by gender and category of work**

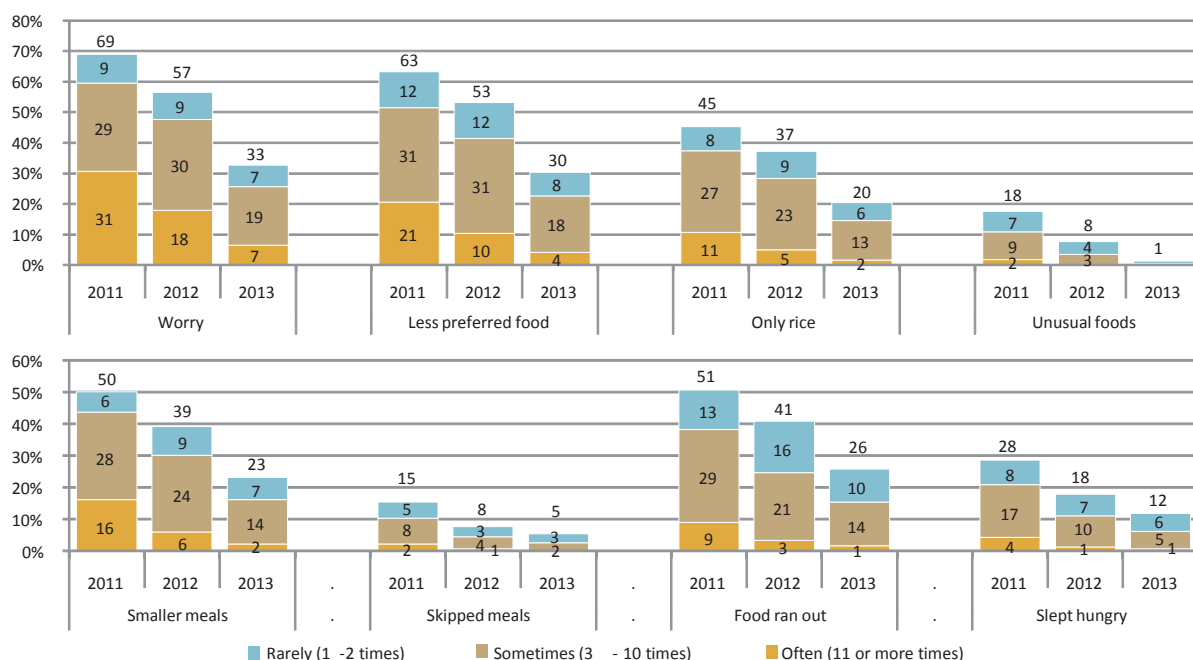
FSNSP also tracks the average wage rates earned by one of the most vulnerable populations in the country - day labourers. Labour wage rates were calculated by asking all households that reported one or more member working for a daily wage in the month prior to the interview to disclose what cash wage male and female household members received on the last day worked for both agriculture and non-agricultural occupations. Figure 4.4 displays seasonal variations in the average cost of the food basket and the wage rates for men and women, by category of labour. In line with past results, women's daily wage rates are half that of men's,<sup>5</sup> and there is less difference in the daily wage rates paid to women between agricultural and non-agricultural occupations.

### Perceptions of household access

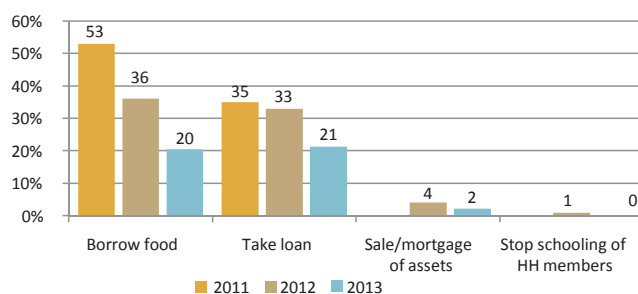
FSNSP also asks households about their food security situation and, in particular, their ability to access sufficient food to meet the perceived needs of household members in the month prior to interview. Food insecurity results in a typical range of responses independent of whether the episode of food insecurity is chronic or acute, or its cause. When individuals face constraints, or predict that they will face constraints in their ability to procure sufficient food for their households, they may experience uncertainty or worry. As the gap widens between a household's food needs and its ability to procure sufficient food, various strategies are employed such as purchasing foods of lower quality, consuming smaller amounts of preferred items, or resorting to socially unacceptable or unsustainable behaviours such as begging and borrowing (14). An acute episode of food insecurity may result in households reducing their food intake. The consequences of food shortages are observable, and range from feeling hunger to short-term weight loss to impaired growth attainment among children. In FSNSP, these indicators are elicited by asking the household food manager about whether specific behaviours occurred during the month prior to interview.

Figure 4.5 displays the national prevalence of selected behaviours in the month prior to interview averaged annually over all surveillance rounds from 2011 to 2013. The prevalence of all indicators fell between 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 estimate the proportion of households who practiced the behaviour with the given frequency.

<sup>5</sup> For information on why this difference is slightly greater than has been reported elsewhere (5; 24; 7), please see the 2012 report (26).

**Figure 4.5: Households reporting behaviours linked to food insecurity (2011-2013)**

Levels of worry fell dramatically from 2011 to 2013, with the largest reduction among those who reported frequent episodes of worry. Similarly, 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 prior to the interview declined from over half of households in 2011 to only a little over a quarter of households in 2013. In 2013, nearly one-third of households reported eating less preferred foods, a decline by more than 50% since 2011. The proportion of households that contained a member or several members who were reduced to eating a meal of only rice, also declined from nearly half in 2011 to only one fifth in 2013. The consumption of unusual foods was quite rare in all years, but the overall prevalence fell from nearly one-fifth in 2011 to only 1% in 2013. Similarly, in 2013, less than one-quarter of households had members who had eaten insufficient meals in the month prior to interview, in contrast to half of households in 2011. Moreover, the proportion of households with members who had skipped meals declined from 15 to 5%. In 2013, only a little over one-tenth of households reported that one or more members had slept hungry in the month prior to interview, a decline from over one-fourth in 2011. Less than 1% of households in all three years contained members who had ever had to go the entire day and night without eating, so that question is not included in the graph above.

**Figure 4.6: Households resorting to unsustainable means to obtain food**

The occurrence of households using socially unacceptable or unsustainable means to obtain food has declined dramatically since 2011. The proportion of households that directly borrowed food or rice in the month prior to interview fell from over half in 2011 to only one-fifth in 2013. Similarly, the

proportion of households that took a loan to purchase food reduced from around one-third in 2011 and 2012 to only one-fifth in 2013. Indicators for selling or mortgaging assets in order to purchase food and stopping the schooling of household members were not recorded in 2011. Only a few households reported these behaviours in 2012 and 2013, with a slight decline between the two years.

### Composite indexes

The indicators of food insecurity presented in the previous section are combined to create two internationally standardised indexes, both developed by the Food and Nutrition Technical Assistance project (FANTA). The first index, the Household Food Insecurity Access Scale (HFIAS), measures food insecurity, while the second index, the Food Deficit Scale (FDS), measures serious shortcomings in households' ability to maintain adequate levels of food.<sup>6</sup> HFIAS includes all eight indicators in Figure 4.5 in addition to the frequency of going day and night without eating. The results of this scale are not comparable across cultures but can measure changes in the level of food insecurity within a culture over time (15; 16). In contrast, the second index, FDS, is created from the most severe subset of questions in HFIAS (food running out, sleeping hungry, and day and night without food). FDS has been validated for comparing food access across cultures (15).

**Figure 4.7: Seasonal variation in food insecurity and food deficits**

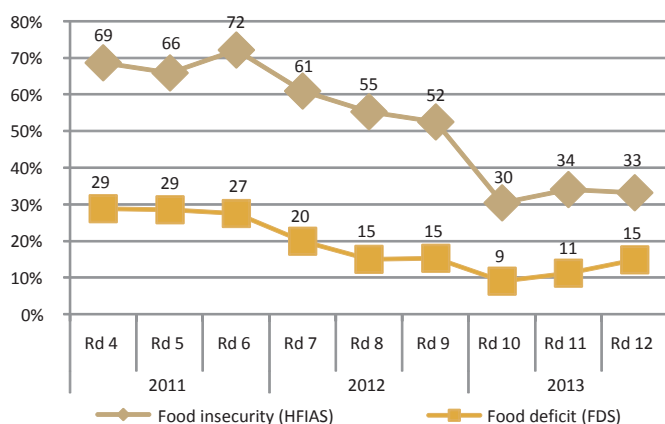


Figure 4.7 displays the seasonal prevalence of food insecurity and gaps in food provisioning among households, from the fourth to the twelfth round of FSNP. The proportion of households who were food insecure or had a deficit in food provisioning was greatest during 2011, before trending downward through 2012 and into early 2013. The level of food deficit as well as food insecurity increased slightly during 2013.

There were substantial regional variations in levels of food insecurity and food deficits. Food insecurity was significantly lower in the divisions of Rajshahi and Dhaka than in the other five divisions. On average insecurity and households with food deficits in rural areas were one and a half times larger than the rates in urban areas. Among surveillance zones, rates of food insecurity and the proportion of households with food deficits was much greater in the Eastern hills. The remainder of this section will focus on the prevalence rates for food insecurity (HFIAS) across household characteristics, as the patterns seen are very similar between food insecurity and food deficit scales.

<sup>6</sup> This measure is identical to the Household Hunger Score. For more information on these indicators, please refer to past reports (25; 26).

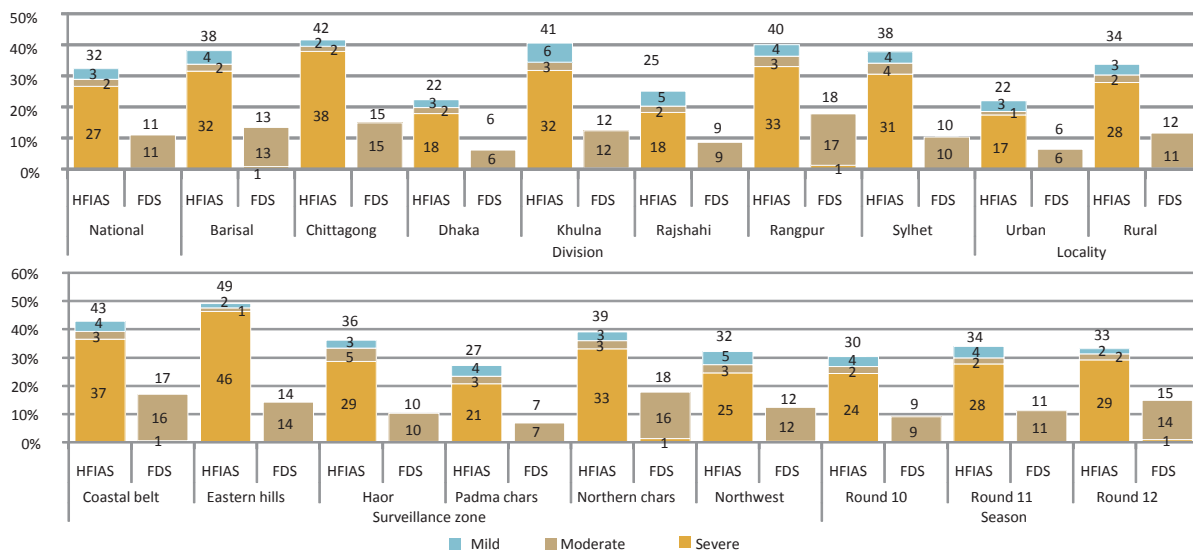
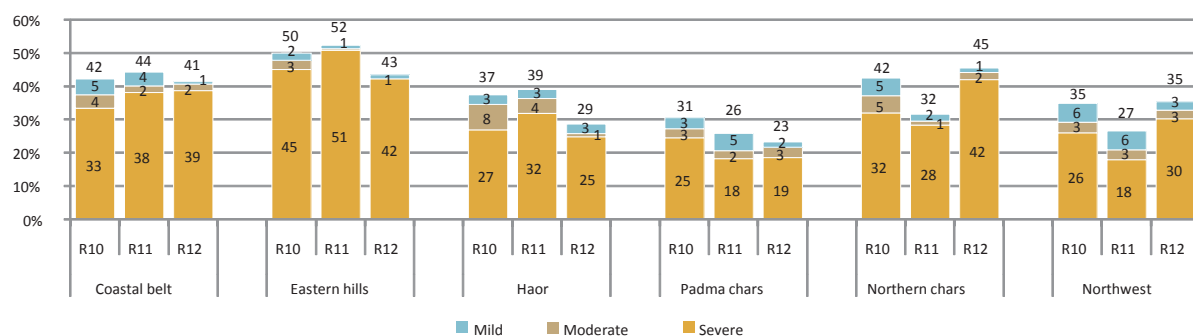
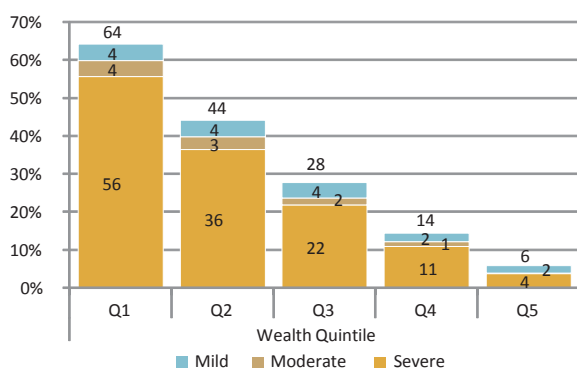
**Figure 4.8: Proportion of households food insecure or with deficits by area of residence and season****Figure 4.9: Regional variation in household food insecurity by season (HFIAS)**

Figure 4.9 displays seasonal variation in food insecurity by surveillance zone. In the Coastal belt, Eastern hills, and Haor, households were more food insecure in monsoon season, while the households in the Northern chars and in the Northwest were less food insecure in this season. These differences underline the diverse seasonal and harvest patterns across the country, which are important in predicting when lean periods are experienced.

**Figure 4.10: Household food insecurity by household wealth**

Similar to past results, the proportion of food insecure households was much lower in wealthier quintiles in 2013; the pattern being almost a step-wise linear decline. Between 2012 and 2013, declines in the proportion of households that were food insecure were apparent in all quintiles; however, the decline was much larger among the wealthiest quintiles. At 6%, the 2013 level of food insecurity among the richest was only one-third of its 2012 level. The 2013 level of food insecurity among the poorest quintile was 64% over three quarters of the 2012 level.

## Household utilisation

A household's food utilisation is a function of the qualities and quantities of food a household is able to, and chooses, to access. Since 2011, FSNSP has included the food consumption score (FCS), an indicator developed by the World Food Programme (WFP), to capture the diversity of food available in the household, thereby measuring households' access to, and demand for, diverse foods. For this indicator, respondents were asked 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 (17). To create the FCS, responses are weighted by a rough approximation of their nutritional content - standardised across countries by WFP - then summed (18; 19). The resulting index is a continuous score ranging from 0 to 112. Standardised cut-offs are then applied to categorise households into groups according to their ability to adequately access food.<sup>7</sup>

**Figure 4.11: Households with poor or borderline food consumption (2011-2013)**

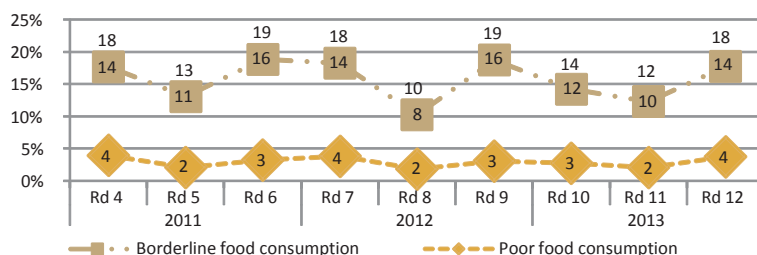


Figure 4.11 compares 2011, 2012, and 2013 seasonal FSNSP estimates of the proportion of households consuming poor and borderline diets. Between 2011 and 2013, in spite of the greatly reduced report of food insecurity, there has been little reduction in the proportion of

households consuming poor or borderline diets. The proportion of households with borderline diets was slightly lower in the monsoon season compared to the other two seasons in all years.

**Figure 4.12: Regional variation in proportion of households with sub-optimal food consumption**

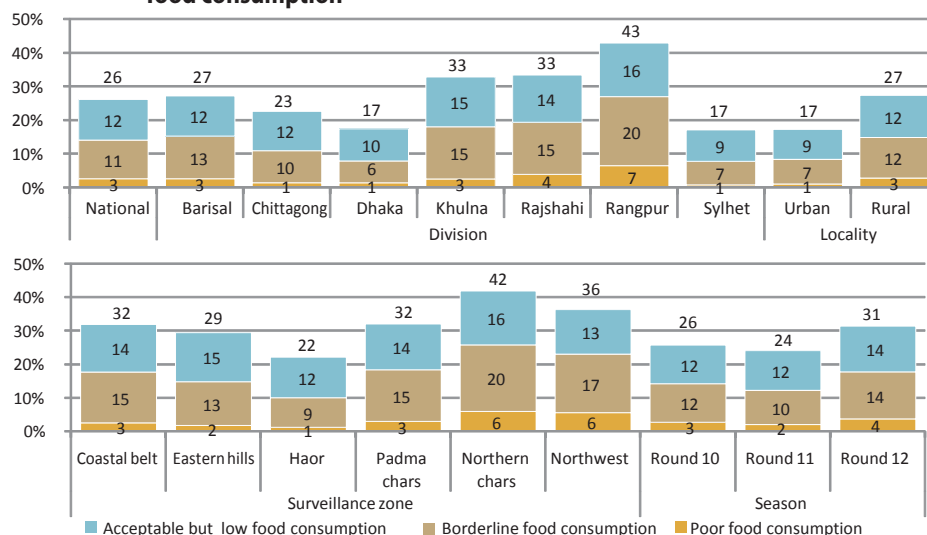


Figure 4.12 depicts regional variation in the proportion of households with sub-optimal diets - defined here as a diet categorised as poor, borderline, and acceptable low. Nationally, around one-quarter of households consumed sub-optimal diets in 2013, slightly lower than the proportion in 2012.

<sup>7</sup> For FSNSP, cut-offs are drawn from the HFSNA survey(18).

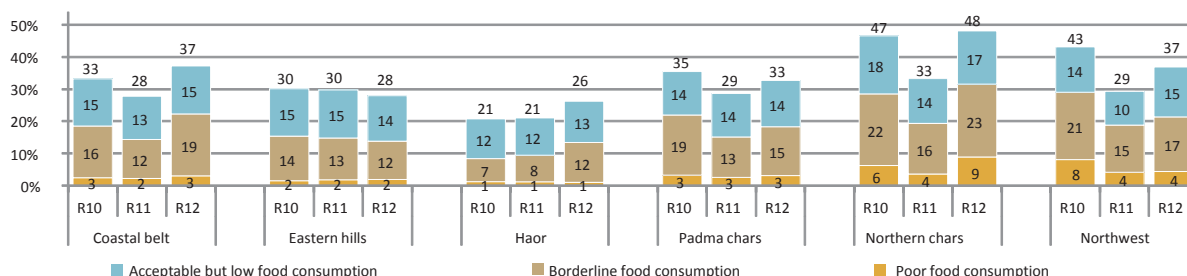


Among Divisions, Rajshahi, Khulna and Rangpur reported the greatest proportion of households with limited food consumption.

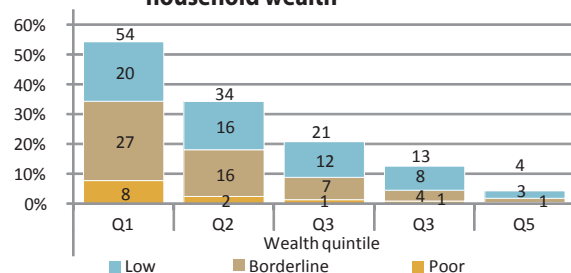
These estimates are nearly identical to those reported in 2012 across divisions, except in Barisal and Sylhet where the proportion of households with limited food consumption declined by over 10% in each area. Across the surveillance zones the Coastal belt, Eastern hills and Haor areas experienced a reduction in the proportion of the households with poor or borderline diets, while the level in the remaining zones held constant between 2012 and 2013.

Interestingly, the proportion of households with inadequate diets varies more over the year than food insecurity or household hunger. Additionally, the pattern of change seems to be countercyclical to the general perceptions of the cycle of food insecurity in Bangladesh. While it is more common for households to be food insecure between rice harvests during the monsoon months, a lower proportion of households recorded eating a sub-optimal diet during this season nationally. This pattern held in all zones except for the Eastern hills. This difference may be a consequence of households having to diversify diets into other food groups because rice was less available between the boro and aus harvests. This pattern also indicates a limitation of this indicator, as food habits may vary over seasons, but for reasons that are not related to food insecurity. For example, households which are low on staple foods are likely to eat more varied diets during a time of constrained food access (20; 21).

**Figure 4.13: Seasonal and regional variation in proportion of households with sub-optimal food consumption**



**Figure 4.14: Suboptimal food consumption by household wealth**



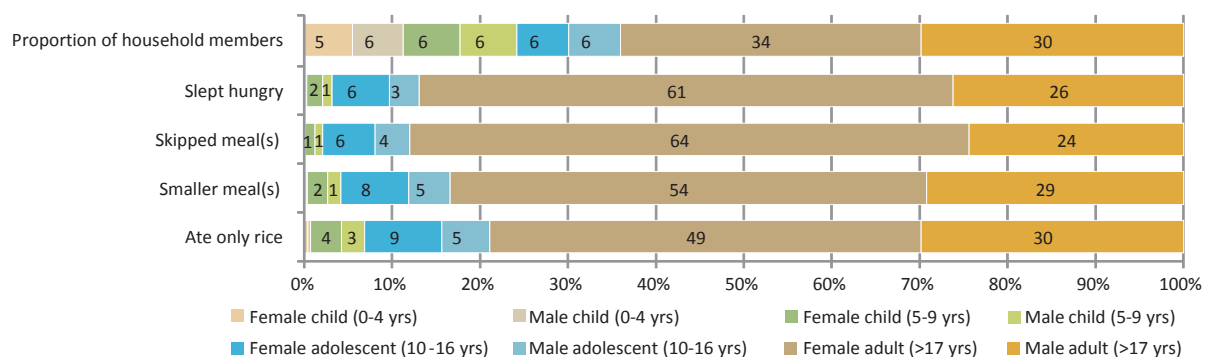
There was a stepwise decrease in levels of sub-optimal food consumption with increasing household wealth. However, the proportion of households eating sub-optimal diets reduced slightly among all quintiles except the most wealthy. In line with the previous year's results, households with children under the age of five consumed sub-optimal diets in a lower proportion than households without young children (73% compared to 76%).

## Intra-household utilisation of food

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

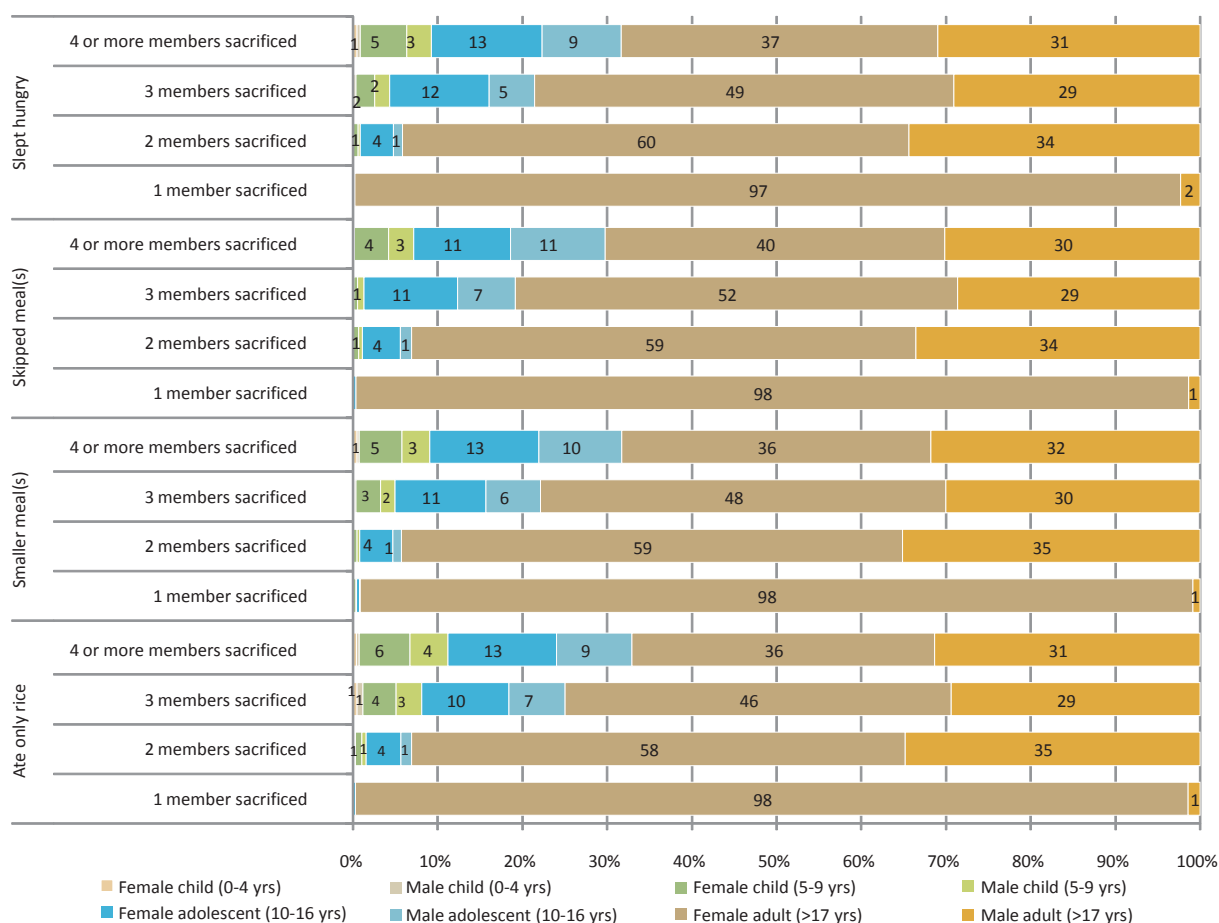
Figure 4.15 displays the proportion of household members by age and sex categories who undertook coping behaviours when the whole household did not reduce consumption. Notably, adults sacrificed their consumption in a much higher proportion than their underlying population proportion, implying that they protected younger individuals in the household. More troublingly, across all age groups except the youngest, a greater proportion of females sacrificed consumption compared to males.

**Figure 4.15: Households' members by age and sex who practice coping strategies in food insecure households**



This pattern is even more apparent in households where only a few members had to reduce or change their consumption practices.

**Figure 4.16: Households' members by age and sex who practice coping strategies by number who sacrificed**



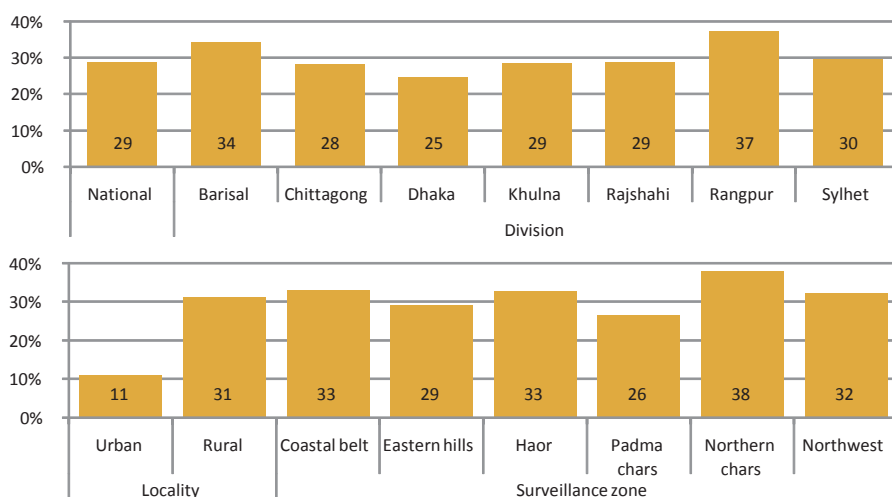
If only one member of a household reduced consumption, it was virtually always an adult woman. When two members sacrificed, adults of both sexes were involved along with some adolescent girls. Children younger than ten years of age only reduced or changed consumption when three or more members were affected. Even among children younger than 10 years of age, a greater proportion of girls than boys changed their eating habits due to food insecurity. Notably, however, nearly no households reported cutting consumption of children less than five years of age.

### Vulnerability

As noted in the introduction to this section, the final elements of food and nutrition security are safeguards to ensure that a currently food secure household will continue to be food secure even in the face of shocks or disasters, be these predictable seasonal shocks, or unexpected events. The methods used for estimating food insecurity in FSNP have a short recall period in order to minimise recall bias, however, this short period enables the system to classify households based on their situation at the time of the interview and not their "regular" food security situation. As such, FSNP cannot separate the population of the country into those who are food secure at the time of interview but are food insecure seasonally or vulnerable to food insecurity when shocks occur.

However, FSNSP is able to separate out groups that are more vulnerable to food insecurity based on occupational, educational, and wealth characteristics. In addition, starting in Round 5, FSNSP recorded if households had received a cash benefit from any governmental 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 recession. These transfers can be without conditions, such as the Freedom Fighters allowance, or conditional, such as cash for work or cash for education programmes. Social protection and social safety net programmes are an important component of Bangladesh's antipoverty strategy (22; 23).

**Figure 4.17: Households who received cash from a social safety net programme by area of residence**



Over one-quarter of households in Bangladesh reported receiving a cash benefit from a social safety net programme; the vast majority from the cash for education programme (22%) followed by the old age allowance programme (4%). Overall, a greater proportion of households in rural areas (31%) reported

receiving benefits than in urban areas (11%). This is expected, as the Cash for Education programme targets poor, rural households in less wealthy areas of the country. These estimates remained similar between 2012 and 2013.



# Water, sanitation and hygiene

Improved toilet facilities have increased from only a little over half of households in 2011 to almost two-thirds in 2013.

Households with children less than five years of age had sanitary latrines in a greater proportion than households without children.

While soap was present in 98% of households and used the day before the interview in 96% of households, only 4% of those managing the kitchen reported washing hands before preparing food and only 6% before eating.

Two-thirds of caregivers reported washing their hands with soap after using the toilet, but less than one-tenth of caregivers reported washing their hands before preparing food and feeding their child.

Nationally, half of households disposed of children's solid waste in the appropriate manner, but only a little over one-third of households have access to a toilet facility that will contain waste to prevent contamination.

Almost double the proportion of households disposed of child waste appropriately in urban areas compared to rural areas, and once sanitary toilet facilities were taken into account, this difference increased.



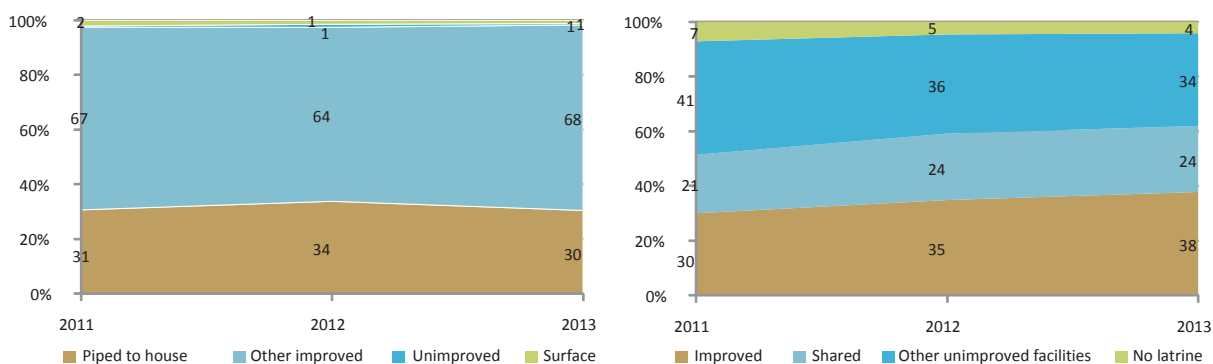


Diseases resulting from inadequate water facilities, sanitation, and hygiene account for 4% of all deaths and approximately 6% of the total disease burden worldwide (1). The majority of these cases are in developing countries where an estimated two million child deaths from diarrhoea occur annually. 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 (2). 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 indicators of hygiene.

### Drinking water and sanitation facilities

Bangladesh has made tremendous progress in providing safer drinking water and improved toilet facilities to citizens. Access to safe drinking water and sanitation is one of the basic determinants of good health. Unsafe water and inadequate sanitation are linked to diarrhoeal diseases, acute respiratory infections (ARIs), and skin diseases (3). FSNSP uses the two indicators to assess basic water and sanitation which are included in MDG Target 7c: "Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation"(4). For both measures, two broad indicators of improved and unimproved facilities have been further categorised in four sub-groups, following the WHO/UNICEF Joint Monitoring Programme for water supply and sanitation (JMP) guidelines (5). For drinking water, the categories are: piped water to dwelling (as improved source), other improved sources (protected dug well, tube well etc.), unimproved sources (unprotected dug well, cart with small tank, etc.), and surface water. In recent years there has been little change in the proportion of households relying on unimproved sources of drinking water, with less than 2% of households using an unimproved source.

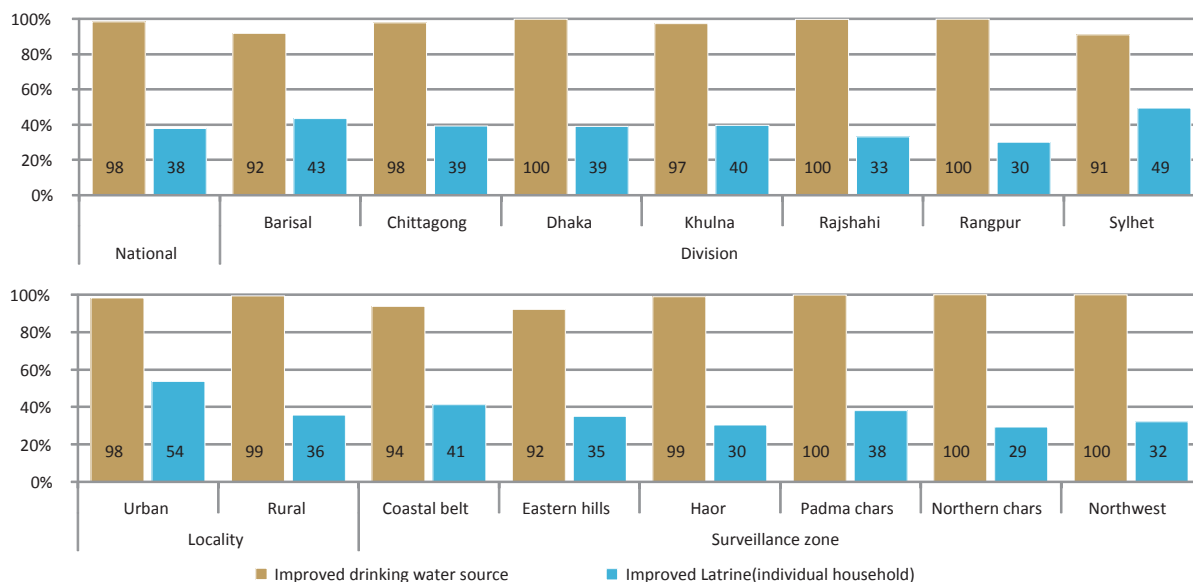
**Figure 5.1: Source of drinking water and type of latrine, 2011-2013**



For sanitation facilities, four categories are also used: proportion of people with no toilet facility at all (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. The percentage of households without access to any toilet facilities has declined incrementally from 7% in 2011 to 4% in 2013. This has been largely due to reductions in open defecation in rural areas.

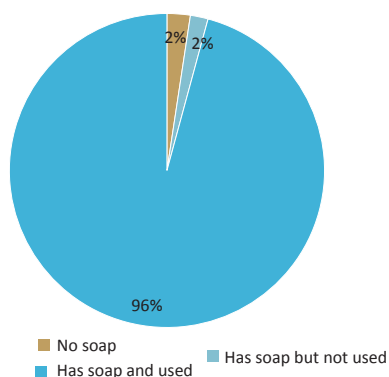
Additionally, the proportion of households with an improved single family toilet facility has increased from 30% in 2011 to 38% in 2013. All together, improved sources have increased from only a little over half of households in 2011 (51%) to almost two-thirds in 2013 (62%). Households with children less than five years of age had sanitary latrines in a greater proportion than households without children (graph not shown).

**Figure 5.2: Source of drinking water and type of latrine by area of residence**



Over 90% of households in all divisions had access to an improved water source. Sylhet division, the Coastal belt, and the Eastern hills have a slightly lower proportion of households with access to an improved drinking water source. There is also only a limited amount of variation in the proportion of households with sanitary latrines (single household improved sanitation facilities) by area of residence. While all divisions have shown an increase in the proportion of households with sanitary latrines, Sylhet's increase has been the largest by far: from one-third to nearly one-half. The Northwest divisions of Rajshahi and Rangpur have the lowest proportion of households with unimproved facilities. Sanitary latrines are more common in urban than rural areas, and least common in the Northern chars.

**Figure 5.3: Soap among households**



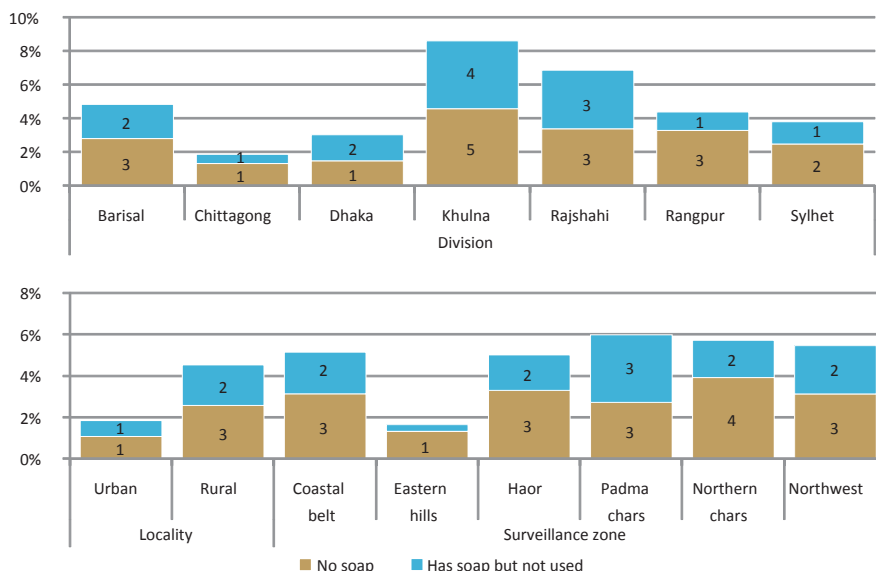
## Hygiene and hand washing

Hygiene refers to conditions and a specific set of practices associated with the preservation of health, for example, safe waste disposal, hand hygiene, and water and sanitation facilities (6). Though Bangladesh has made tremendous progress in providing safer drinking water and improved toilet facilities to citizens, other components of a healthy environment are still lagging behind. In the past, FSNSP has measured a few key indicators of hand washing, but these have not been widely reported on due to the lack of comparative data. Beginning in 2012 and continuing in 2013, FSNSP has expanded these indicators using sections from



modules contained in the Maternal Child Integrated Programme project (MCHIP) (7), supplemented by indicators shown to be effective at predicting diarrhoea episodes in Bangladesh (8). In addition to this, since 2013 FSNSP is examining households hand washing behavior for all members of the household.

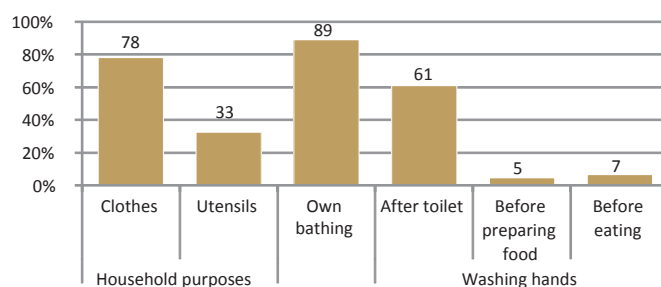
**Figure 5.4: Proportion of households with soap by area of residence**



Basic ability to wash hands was measured by asking households about the presence or absence of soap in the household. As seen in Figure 5.3, soap was present in around 98% of households and it was used the day before the interview in almost all of these households (96%). This pattern was the same in households regardless of the presence or absence of children less than five years of age. By division, soap use was

less prevalent in Khulna and Rajshahi than other areas. Rural households used soap in a lower proportion than urban households. Among the surveillance zones, only the Eastern hills stood out for having higher rates of soap use.

**Figure 5.5: Times when soap was used**



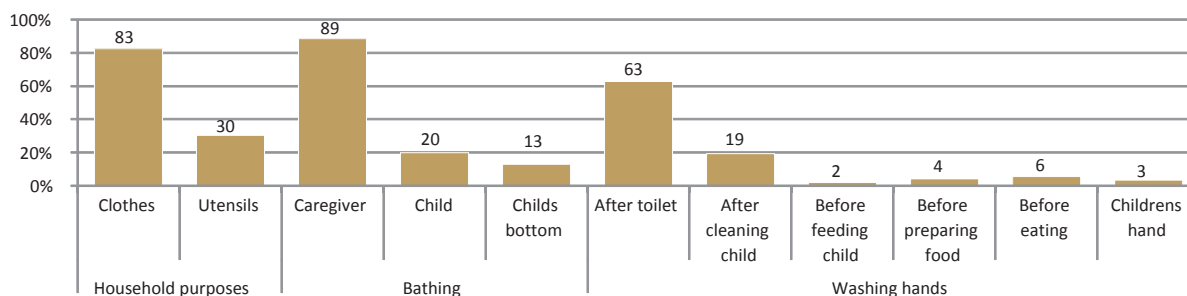
FSNSP also asks the manager of the kitchen in each household about when he or she used soap the day before the interview. Troublingly, only 5% of these individuals reported washing hands before preparing food and only 7% before eating. Soap was most often used for washing clothes, bathing and after using the toilet. Clearly, a lack of soap is not the cause of inadequate hand washing.

### Sanitation and hygiene in households with children

Proper hand washing before child feeding is a life-saving and cost-effective intervention for families in Bangladesh, as absence of this practice may lead to infections and poor appetite; and eventually malnutrition and death (9). Interventions that promote hand washing through education and/or through provision of hand washing supplies, such as soap, have been shown to be effective in

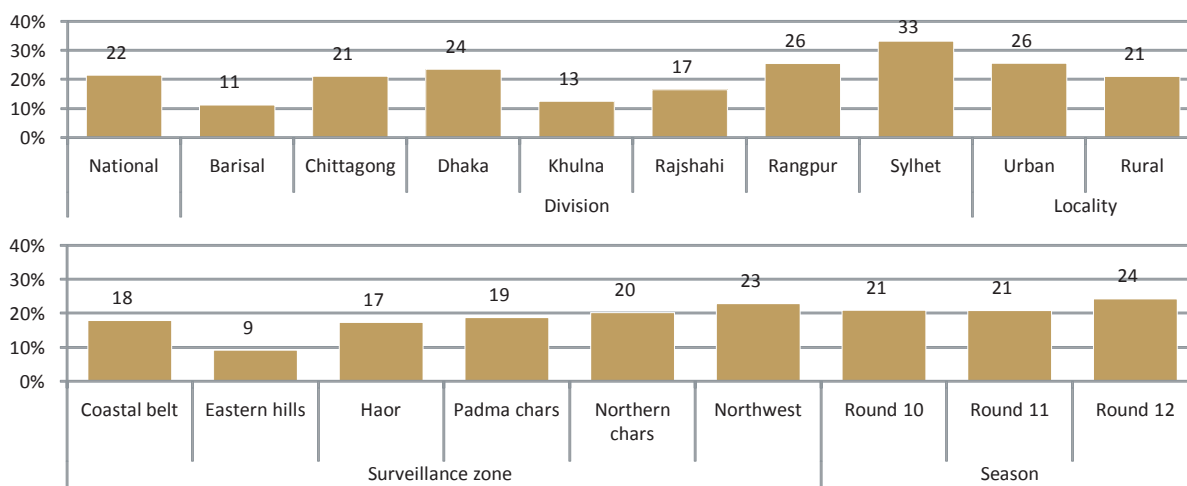
reducing episodes of diarrhoeal disease by one-third. However, the amount of behaviour change communication required to motivate individuals to wash their hands at key moments should not be underestimated (10). Hand washing is a vital intervention for children under five who are both more likely to put their fingers in their mouth and become seriously ill or die from diarrhoeal dehydration (11).

**Figure 5.6: Times when soap was used by caregivers**



However, the key times in which soap was used is limited. While most caregivers reported using soap to wash clothes and bathe, the proportion of caregivers who reported using soap at key hand washing moments was extremely low. While two-thirds of caregivers reported washing their hands with soap after using the toilet, less than one-tenth of caregivers reported washing their hands before preparing food and feeding their child.

**Figure 5.7: Proportion of caregivers with appropriate hand washing behavior by area of residence**

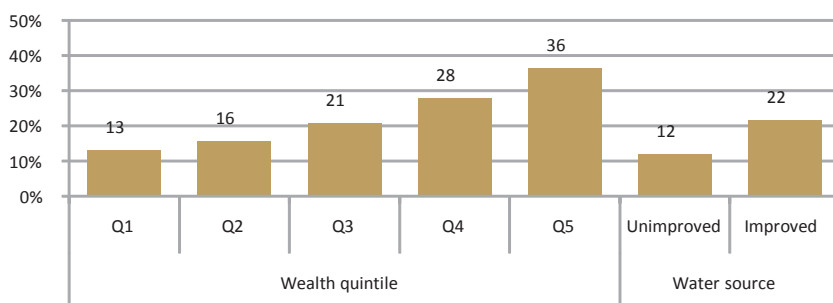


FSNSP further classifies hand washing practice through the use of a KPC indicator that measures the proportion of caregivers in households which used soap for hand washing at least two critical times in the past 24 hours (7). These two times include after own defecation and at least one for the following: after cleaning a young child, before preparing food, before eating, and/or before feeding a child. Based on this measure, one-fifth of households with infants and young children were practicing appropriate hand washing behaviors. These practices vary somewhat over the country, with lower levels of hand washing apparent in Barisal and Khulna. A slightly greater proportion of



households in urban areas washed hands at key moments than households in rural areas. Across surveillance zones, households washed hands much less frequently in the Eastern hills.

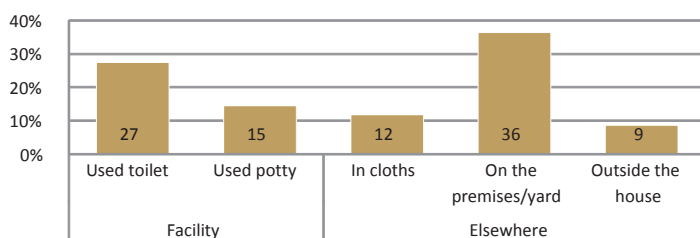
**Figure 5.8: Caregivers with appropriate hand washing by household characteristics**



Appropriate hand washing requires timely access to water; as such, the provision of a convenient water source is a necessary precondition to this behavioural pattern. Not surprisingly, caregivers

from less wealthy households or households with poorer facilities, practice appropriate hand washing much less frequently than households with better facilities. Caregivers who use unimproved water sources practice appropriate hand washing only half as often as caregivers with improved water sources. Furthermore, caregivers from food insecure households also practice appropriate hand washing less often (graph not shown). Similarly, less educated mothers report appropriate hand washing behavior much less frequently than mothers with greater educational attainment (graph not shown).

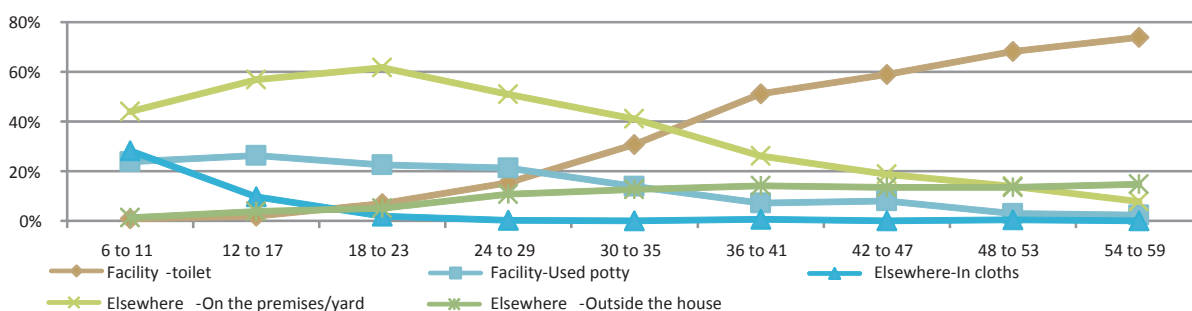
**Figure 5.9: Location of child defecation<sup>1</sup>**



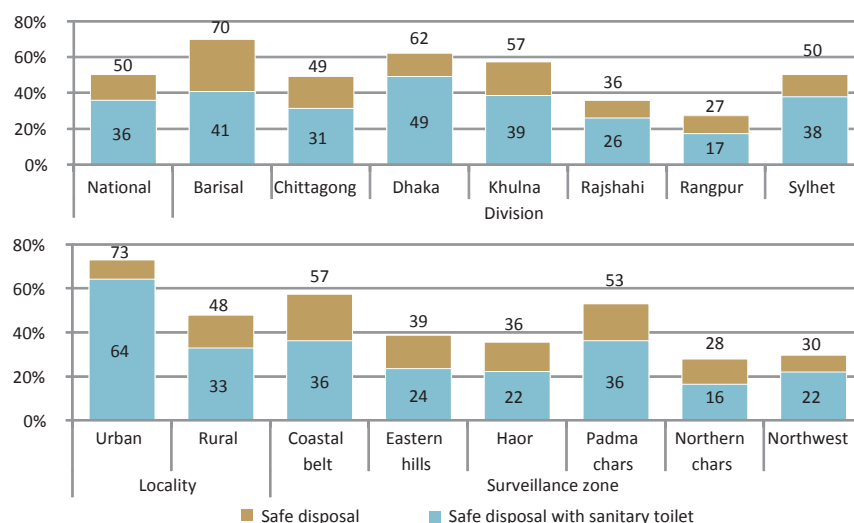
Young children do not tend to use sanitation facilities on their own, but they are equally or more likely to be disease vectors than adults. The plurality of children defecate outside the home while around a quarter of children use the household toilet facility. Location of defecation varies greatly by child age (Figure 5.10).

While infants and young children most commonly use their clothes and outdoors in Bangladesh, after around one and a half years of age, children begin to use the outdoors and potties. At five years of age, around 74% of children are using a toilet facility.

**Figure 5.10: Location of child defecation other than a toilet facility by child age (in months) group**



<sup>1</sup> Not included in this graph are diapers, other areas, and don't know, as very few caregivers reported that their child used these locations for defecation.

**Figure 5.11: Households safely disposing of child's solid waste by area of residence**

Complementary to having a sanitary toilet facility is proper disposal of children's solid waste. FSNP defines safe disposal of a child's faeces using the KPC/DHS criteria in which the only safe option is disposal into a toilet facility (7; 12). Additionally, FSNP examines the proportion of these households with access to an improved toilet facility, whether shared or individual, as only through a combination

of these indicators can contamination be controlled. Nationally, half of households disposed of children's solid waste in the appropriate manner, but only a little over one-third of households have access to a toilet facility that will contain waste to prevent contamination. The proportion of households appropriately disposing of waste was greatest in Barisal, over two-thirds of households, and lowest in Rangpur, where only a quarter of households disposed of waste in this manner. Almost double the proportion of households disposed of child waste appropriately in urban areas compared to rural areas, and once sanitary toilet facilities were taken into account, this difference increased. Across surveillance zones, the Coastal belt and the Padma chars had a much greater proportion of households that disposed of child solid waste safely than in the other zones.

Similar to patterns in appropriate hand washing, wealthier and more food secure households appropriately dispose of child waste in greater proportions (graph not shown). This implies that children who are already receiving more limited diets due to food insecurity are also at increased risk of infection. This relationship strengthens once improved toilet facilities are taken into account. Similarly, children of less educated mothers are more at risk of oral-faecal contamination, though maternal income earning does not have an effect.



# Nutrition in women and adolescent girls

59% of women nationally consumed an inadequately diverse diet. This rate is much higher for rural women and these scores are worst in Khulna, Rajshahi and Rangpur Divisions.

Adolescent (under age 18) mothers with children under five years of age are shorter (43%) than women in that age group without children (28%). This underlines the interrelationship between early marriage, poverty and the effect of early pregnancy on linear growth.

Income earning women were shorter on average than women who didn't earn an income – this is true for both adult women and adolescent girls, and particularly pronounced for the latter group.

The nutritional status of adult women is highly correlated 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.





As mentioned in the previous chapter, a household is defined as food insecure when one or more members face limited or uncertain access to food. In contrast, nutritional security can only be measured on an individual basis - taking into account an individual's nutrient intake, stores, and requirements. FSNSP quantifies the nutrition security of adults through the inclusion of one woman from each selected household. 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 generally receive lower levels of care and resources compared to male household members (1). Moreover, adolescents and women of reproductive age are a well-studied population, for whom many standardised indicators have been developed, allowing cross-country comparisons. Women's nutrition is also important because it is closely linked to child nutrition and health.

A woman's nutritional status is a complex function of her current food consumption habits and level of health, the care and diet she has had since childhood, as well as previous illness and past demands on her body, such as pregnancies. To capture some of this complexity, FSNSP collects data on women's dietary habits and measures their height, weight, and MUAC. In 2013, FSNSP interviewed and measured over 23,000 women and girls aged 10 to 49 years throughout Bangladesh.

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

Age group in years	Interviewed		Measured (BMI)	
	Number	Weighted proportion	Number	Weighted proportion
10 to 14	1701	10%	1693	11%
15 to 19	3316	17%	2893	16%
20 to 24	4711	17%	4129	16%
25 to 29	4630	17%	4245	16%
30 to 34	3488	15%	3279	15%
35 to 39	2449	11%	2399	11%
40 to 44	1869	8%	1867	8%
45 to 49	1112	5%	1112	5%

This report provides nationwide estimates of the nutritional status and dietary patterns for two categories of women: adolescent girls, aged 10 to 18, and adult women, aged 19 to 49. This information supplements the maternal indicators covered in Chapter 7 of this report. As shown in Table 6.1, the sample distribution is uneven across age groups, with fewer women identified at both the upper and lower end of the age range. To enable comparisons between FSNSP and past survey results on slightly different populations of women, results for corresponding sub-groups of women are presented.

## Dietary assessment

In each household, one woman between the ages of 10 and 49 years and all pregnant women were asked to recall what they had eaten during the day before the interview. Data collectors categorised their item-by-item responses into 18 pre-coded food groups (2; 3).<sup>1</sup> These 18 food groups include those with high micronutrient content, such as dark green leafy vegetables, and those that are nutrient poor but representative of increased household purchasing power, such as soft drinks (4). This enables FSNSP to observe dietary patterns and estimate the quality and adequacy of women's diets in Bangladesh.

### *Dietary patterns and diversity*

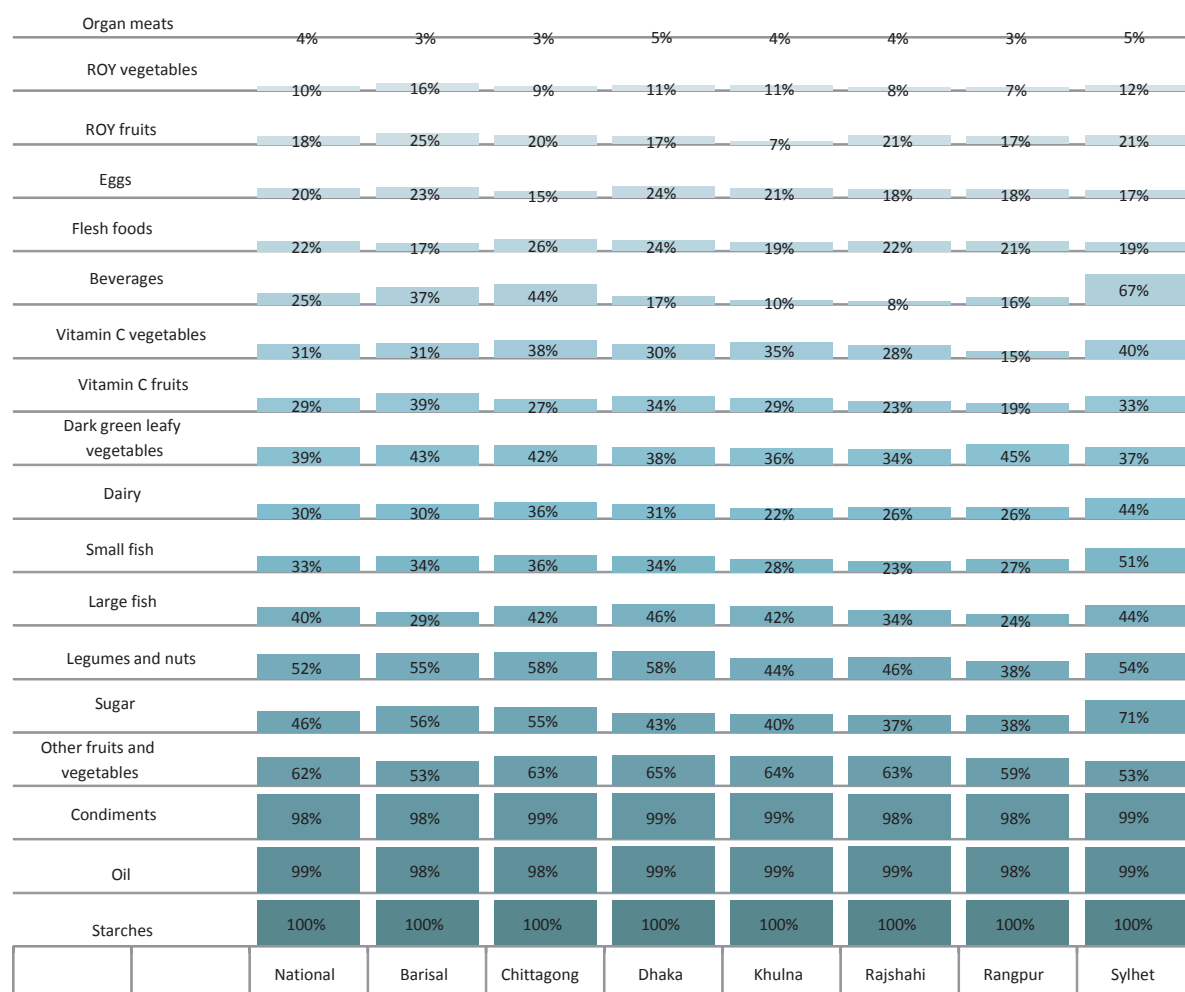
Figure 6.1 presents the proportion of all women 10 to 49 years of age who ate any items from the 18 food types by division. Nationally, there were no major changes in dietary pattern between 2012 and 2013, except for a large reduction in the proportion of women eating small fish with bones (42

<sup>1</sup> This is an increase in the number of food groups from 2012. In 2013, the category of large fish (those not eaten with bones) and shellfish was split from the other flesh foods such as meat and poultry.



to 33%). In line with past results, sizable differences in consumption patterns were seen across divisions. The tea-producing areas of Chittagong and Sylhet had the highest levels of beverage consumption and items from the dairy and sugar food groups, similar to 2012 and 2011. Small fish consumption was highest in Sylhet, while consumption of large fish was comparatively higher in Dhaka, Chittagong, Khulna, and Sylhet. Notably, the proportion of women consuming fish was greater than the proportion consuming other flesh foods. In line with 2011 and 2012 results, diets were most monotonous in Rangpur.

**Figure 6.1: Divisional variation in dietary patterns**



Individual dietary diversity, or the number of food groups eaten by a person in a set period of time, is a proxy measure for both quantity and quality of food consumed, thereby providing an indication of the overall nutrient adequacy of routine dietary intake on a population level (2; 3; 5; 4). The measure of dietary diversity is derived by clustering the 18 food types listed in the questionnaire into a nine-item scale that was developed to ascertain the quality of a woman's diet in light of her nutritional needs and validated for women in Bangladesh (2). The nine items are: starches, dairy products, legumes, dark green leafy vegetables, vitamin A rich fruits and vegetables, other fruits and vegetables, flesh foods (fish, chicken, beef, etc.), eggs, and organ meats.<sup>2</sup>

<sup>2</sup> In mid 2014 it was recommended that programmes switch to a 10 item scale in the near future. Once guidance for data collection has been developed, FSNP will transition to using this scale (17).

Trends in the dietary diversity score for women between 2011 and 2013 are provided in Figure 6.2. In all years, the greatest number of respondents (29%) report having consumed four food groups in the previous 24 hours, with a greater number of women consuming more than four food groups than those consuming fewer than four food groups. However, between these three years there has been an incremental trend towards greater dietary diversity. Seasonal variation was very similar in all years and in line with the household food consumption score; more diverse diets were consumed during the monsoon period. Overall this pattern was most pronounced in 2012.

**Figure 6.2: Trends in dietary diversity score seasonally and annually (2011 to 2013)**

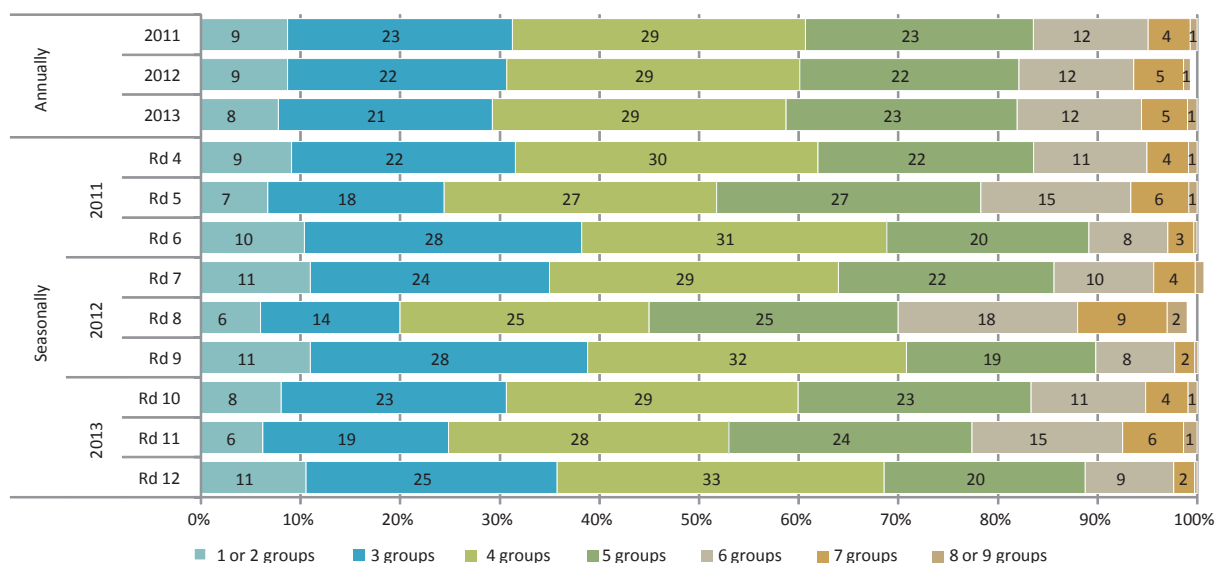
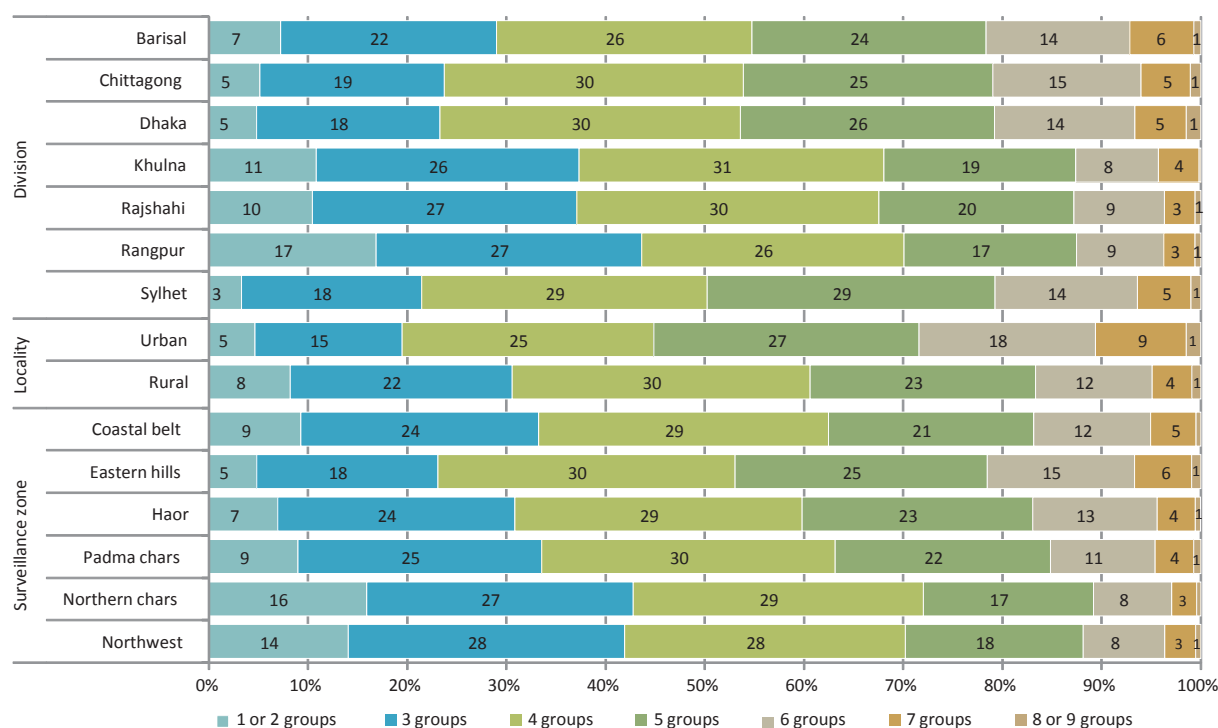
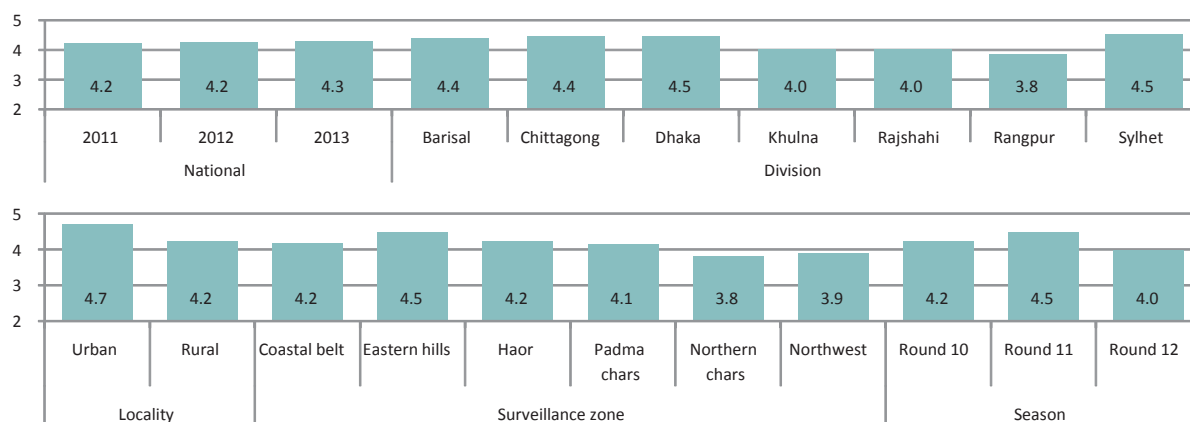


Figure 6.3 displays the distribution of dietary diversity scores among all women and adolescent girls regionally. Divisionally, women in the western divisions of Khulna, Rajshahi, and Rangpur stand out for having less diverse diets. In line with 2011 and 2012, urban women's diets were much more diverse than rural women's. Among the surveillance zones, women consumed less diverse diets in the Northern chars and Northwest, followed by the Coastal belt, Haor, and Padma chars zones. Women in the Eastern hills consumed more diverse diets.

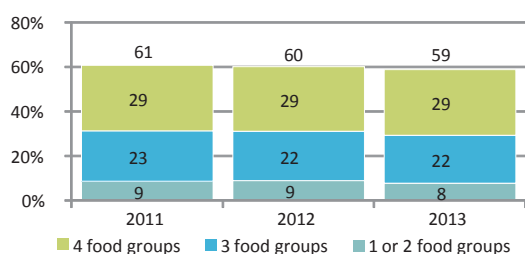
As expected, regional differences in eating patterns remain apparent when dietary diversity is expressed as an average score (Figure 6.4). There has been little change at the national level between 2011 and 2013 with the mean dietary diversity score increasing by a little less than 0.05 points annually. Between 2012 and 2013, there has been an improvement in the mean dietary diversity scores in Barisal and Sylhet of almost half of a food group. The mean dietary diversity score of urban areas is higher than that of rural areas. In line with 2012, the mean dietary score for the monsoon season (Round 11) is still higher than other seasons.

**Figure 6.3: Regional variation in dietary diversity scores****Figure 6.4: Regional variation in mean dietary diversity scores****Dietary inadequacy**

In order to judge if women's diets are adequate in Bangladesh, confining assessment to the comparison of dietary distributions or average dietary diversity score is insufficient. Rather, scores need to be examined in light of their relationship to dietary adequacy, or the likelihood that a diet with a given score has met all or most of the macro- and micronutrient requirements for an average woman. Given the extent of micronutrient inadequacy in women's diets in Bangladesh, the Food and Nutrition Technical Assistance 2 (FANTA-2) Programme has adopted a minimum cut-off approach, below which non-pregnant and non-lactating women are unlikely to have received a diet adequate

in micro- and macronutrients, identifying dietary insufficiency instead of dietary sufficiency (2). FSNSP employs the FANTA-2 cut-off of fewer than five food groups as indicating a diet inadequate in micro- and/or macronutrients.<sup>3</sup> Though these cut-offs have only been evaluated among non-pregnant and non-lactating married women over 15 years of age, FSNSP also applies this methodology to unmarried women, to lactating women, and girls younger than 15 years of age.

**Figure 6.5: Women consuming inadequately diverse diets**



As was the case since 2011, the cut-off value is greater than the average number of food groups women consumed, suggesting that the majority of women in Bangladesh eat inadequate diets. The proportion of women eating inadequate diets appears to have decreased very slightly between 2012 and 2013. Though this change is far from statistically significant, the intra-annual trend since

2011 has been one of slow decline of around one percentage point a year.

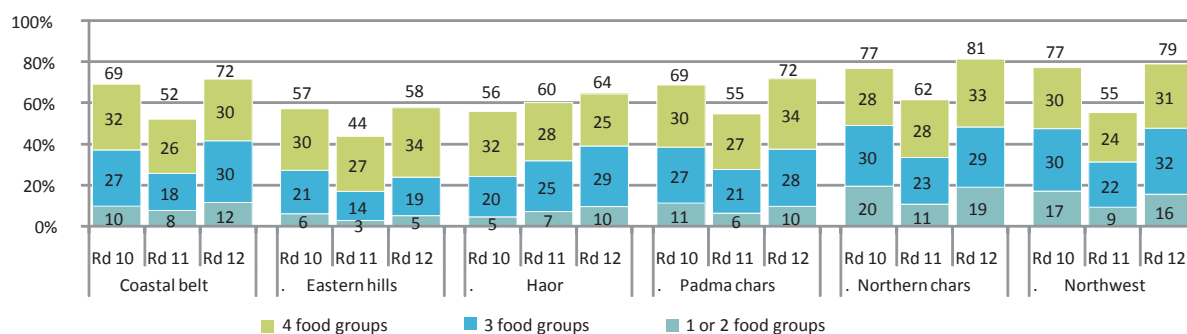
**Figure 6.6: Women consuming inadequately diverse diets by area of residence**



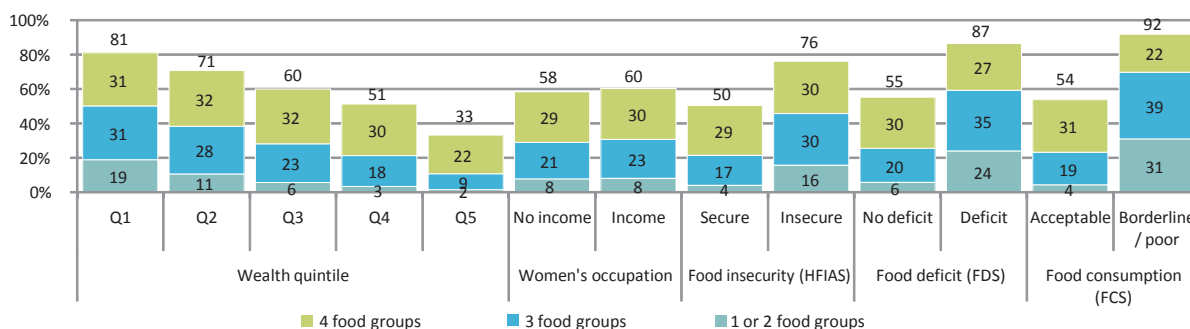
Women's dietary diversity in the western divisions of Khulna, Rajshahi, and Rangpur was worse than other divisions. The only area where less than 50% of women consumed inadequate diets was in urban areas. Across surveillance zones, there were more varied diets in the Eastern hills compared to other areas. In the Coastal belt, Eastern hills, and Haor, there was a decline in the proportion of women eating inadequate diets between 2012 and 2013.

There was much less variation in the proportion of women eating inadequate diets across seasons in 2013 compared to 2012, but 2013 estimates were closely in line with those seen in 2011. Except for the Northwest zone, in the surveillance zones there was much less seasonal variation in 2013 compared to 2012. In fact, the Haor zone deviated completely from the expected seasonal pattern (Figure 6.7).

<sup>3</sup> This cut-off will be revised when the ten group scale (MDD-W) is adopted by FSNSP.

**Figure 6.7: Variation in the proportion of women consuming inadequate diets by season and zone**

As shown in Figure 6.8, consumption of inadequate diets was less common among women from households with greater wealth and better food security. However, even among the wealthiest households, one-third of women consumed inadequate diets, underlining the need for intensified nutrition education activities nationwide. Almost one-third of women in households with poor and borderline food consumption habits consumed only one or two food groups the day before the interview. In line with past results, women earning income ate slightly less diverse diets than women not earning income. This is indicative of the nature of women's income earning in Bangladesh, where women are largely precluded from the workforce unless there is economic need. The relationship between these characteristics and inadequate diets is nearly identical between 2012 and 2013.

**Figure 6.8: Proportion of women consuming inadequate diets by household wealth and food security status**

## Nutritional status

While the nutritional status of women and girls is assessed using the same two measurements of height and body mass index (BMI), the way these measurements are used to define malnutrition differ in rationale and methodology for the two populations. In adolescence, girls are still growing, and therefore their nutritional status must be examined in light of the normal growth pattern for their age in a well-nourished population. By contrast, women 19 years of age or older have completed their growth, and thus cut-offs are applied which are associated with different degrees of risk to health and wellbeing. Because of this, comparisons between these two populations cannot be made. Additional details of these differences are described in the following sub-headings.



### Height of women and girls

Nutritional status indicators based on height are 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. For adult women, height also predicts the risk of complications during delivery, because pelvic size is related to height (6). In addition, since small stature can result from inadequate nutrition during childhood, women of short stature also have higher odds of delivering low birth weight babies due to the intergenerational cycle of malnutrition (6; 7).

**Table 6.2: Rationale and definitions for the categories of malnutrition based on height**

Population	Rationale	Category	Definition
Adolescent girls (10 to 18 years of age)	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 145 cm

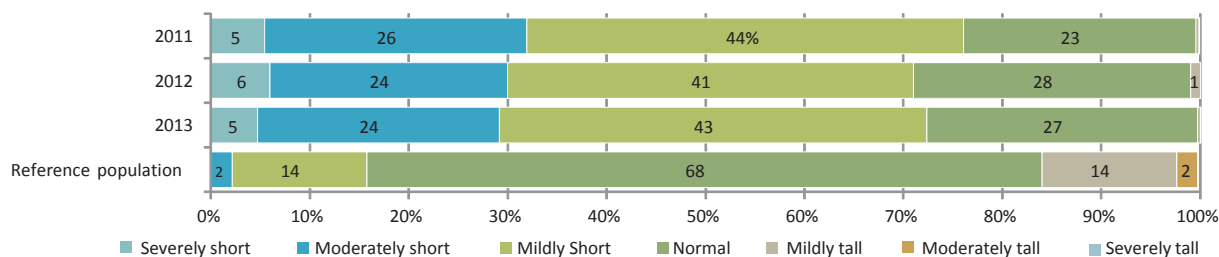
For girls, assessment of height is based on growth curves from the World Health Organization's (WHO) 2007 growth reference for school aged children (8; 9). This reference is used to compare the growth of adolescent girls in Bangladesh to what is expected in an average, well-nourished population through the use of z-scores. In contrast, for adult women, 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 low birth weight babies due to inter-uterine growth restriction. FSNP uses a cut-off of 145 cm since that is the benchmark used by the DHS system<sup>4</sup> (10), resulting in the measure for adult women's malnutrition only having one category, while the adolescent measure has two. The cut-offs used throughout this section are detailed in Table 6.2.

Due to this difference in the rationale behind these measures, rates of malnutrition based on height are much greater in adolescent girls than in adult women. Nationally, a little less than one-third of adolescent girls are short for their age while only a little over one-seventh of adult women are at risk of difficulties during delivery or having low birth weight babies due to small stature. Figure 6.9 compares adolescent height attainment in Bangladesh with that expected in a well-nourished population, indicating that height attainments for adolescent girls were much lower than would be expected in a well-nourished population. For example, 5% of adolescent girls were severely short, while 0% would be expected in a well-nourished population. Almost a quarter of adolescent girls were moderately short, while only 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 16% of this population would be expected to fall into these groups in a well-nourished population. Between 2011 and 2013, there appears to be incremental 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 0%. For adult women

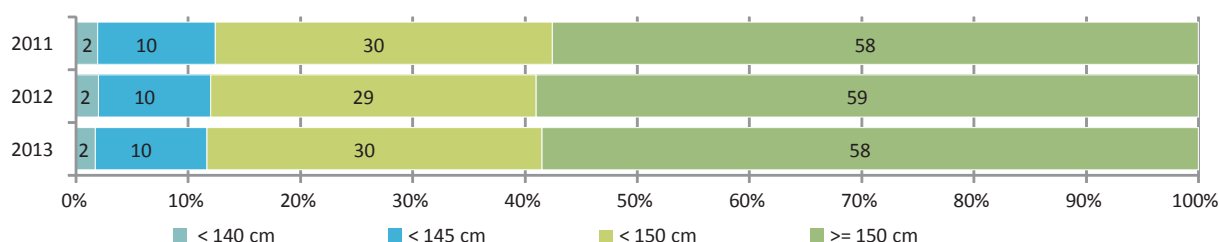
<sup>4</sup> Due to the use of these two internationally standardised methodologies, a disjunction occurs between women aged 18 and women aged 19. Whereas a woman measuring 146 cm in height would be considered short for her age when she is 18 (z-score < -2SD from the mean), among 19 year olds, her height would fall into the normal range (see Figure 6.12).

in Bangladesh, 2% of the population was shorter than 140 cm and one-tenth of adult women were shorter than 145 cm. This indicates that over two in five women in the country are short enough to experience an increased risk at delivery.

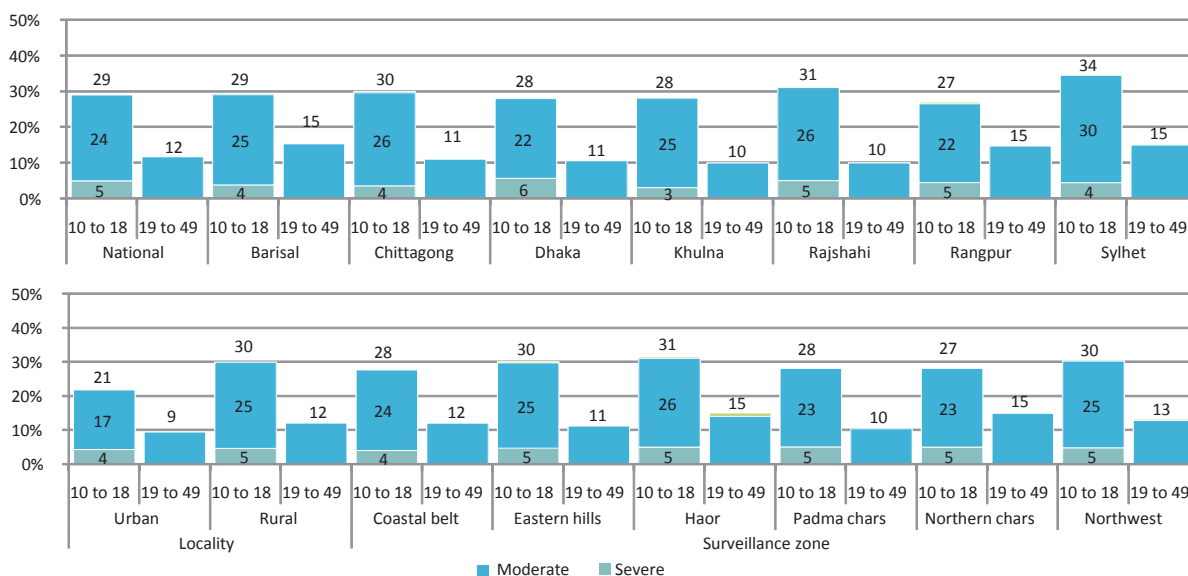
**Figure 6.9: Nutritional status of adolescent girls by height for age measures (2011-2013, 10 to 18 years of age)**



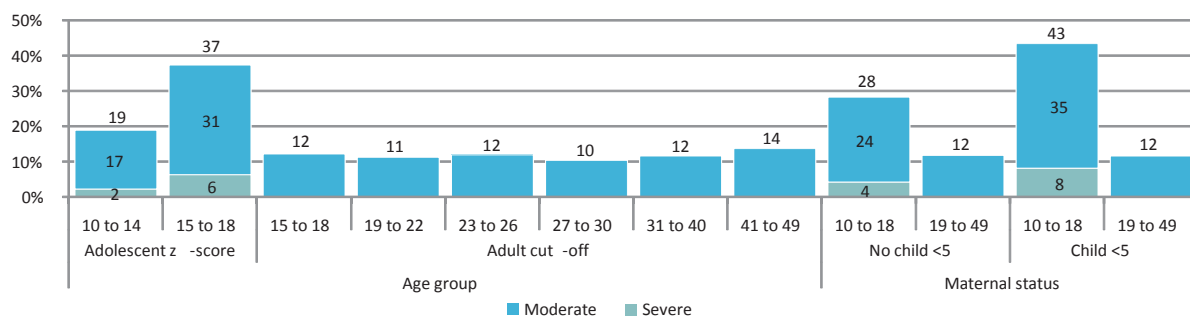
**Figure 6.10: Nutritional status of women by height measures (2011-2013, 19 to 49 years of age)**



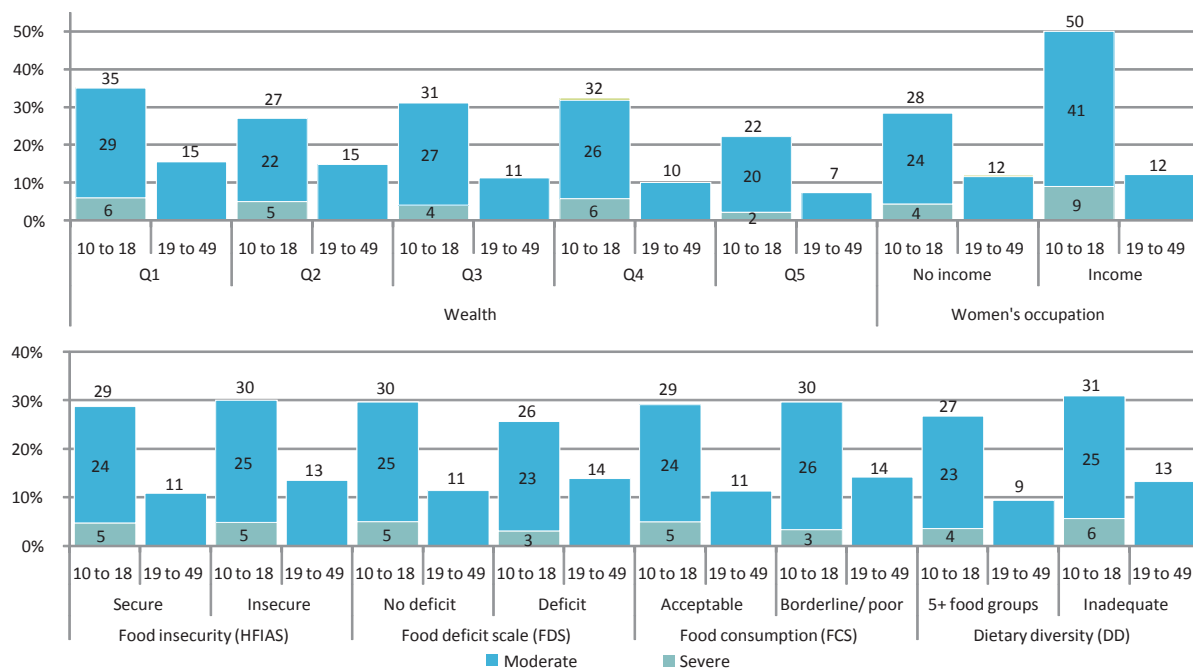
**Figure 6.11: Indicators of inadequate height by area of residence**



In 2013, across divisions and zones there is little variation in both the proportion of women at risk during delivery due to small stature and in the proportion of adolescents who are too short for their ages. As was the case in 2012, Sylhet stands out with higher rates of adolescent stunting, though this proportion has fallen substantially in the past year. In 2013 like 2012, the proportion of girls short for their age is lower in urban areas than rural parts of the country.

**Figure 6.12: Inadequate height by age and maternal status**

The proportion of women with short stature did not increase over the age range from 15 to 49 years, while adolescent girls over 15 are short for their age in much greater proportion (almost double) than girls 10 to 14 (Figure 6.12). This could be due to an early cessation of growth associated with poor nutrition and early childbearing (11). Adolescent mothers with children under five years of age are shorter (43%) than those without children (28%), reflecting the effects of early marriage, poverty and the effect of early pregnancy on linear growth.

**Figure 6.13: Indicators of inadequate height by household wealth, women's occupation, and food insecurity**

There was significant variation in the proportion of adolescents and adults with low height across wealth quintiles. In 2012 and 2013, a greater proportion of adolescents and adults belonging to the poorest quintile of the population were short compared to adolescents and adults in wealthier quintiles. This difference was significant 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. The association between short-term food security measures and height, a long-term measure of malnutrition, was small for adult women and non-existent for adolescent girls. In contrast, dietary diversity was related to the height of both adolescent girls and adult women.

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

The nutritional status of non-pregnant women and adolescent girls is calculated using body mass index (BMI,  $\text{weight}_{\text{kg}}/\text{height}_{\text{m}^2}$ ) (10). By normalising the weights of individuals over their heights, BMI gives an indication of the thinness or obesity of an individual, and thereby information about the energy and nutrient composition of the diet consumed in relation to the requirements of the individual. Nutritional status indicators based on BMI are useful in determining if the individual is suffering from acute malnutrition, but cannot be applied to pregnant women or those who have recently given birth (10).<sup>5</sup>

In FSNP, two distinct approaches are used to classify the nutritional status of women and girls using BMI, as was done with height indicators (Table 6.3). For adult women, 19 to 49 years of age, nutritional status is calculated through the use of BMI cut-offs, while for adolescents and young women, 10 to 18 years of age, BMI-for-age z-scores are employed (9; 10; 12). As with height classification, adolescents are categorised based on what would be normal in a well-nourished population, while adults are categorised based on the observed relationship between illness, activity levels, and BMI scores (13). For girls, growth curves provided by the World Health Organization for school-aged children are employed as a reference population (9; 8). This reference categorises the BMI of the adolescents according to what is expected in a well-nourished population through the use of z-scores. In contrast, for adult women, a cut-off approach is employed based on the point at which women have a greater propensity for illness and reduced work capacity (13). 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>6</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 population who are overweight or obese, and thereby at greater risk for non-communicable disease (12; 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 the BMI score at which an increased risk of non-communicable diseases has been observed (12). As was the case with the 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 or at risk values.<sup>7</sup> Because of these differences, and similar to the estimates of undernutrition, the adult measure of overweight and obesity contains a greater share of the population (See Figure 6.19 ).

<sup>5</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 (10). FSNP uses the presence of no child less than two months of age for a woman as a proxy for no delivery in the last two months.

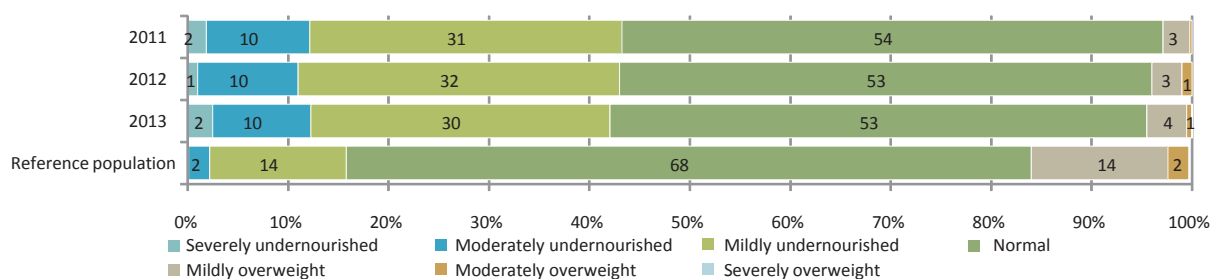
<sup>6</sup> For example, a girl with a BMI of 18.4 at 18.9 years of age would be considered mildly malnourished (z-score < -1 SD but > -2SD), but this level of malnutrition is of less concern and generally not reported when z-scores are used, as approximately 14% of the population are expected to fall into this category in a well-nourished population. However, when this girl turns 19, she will be included in the estimate for CED.

<sup>7</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.

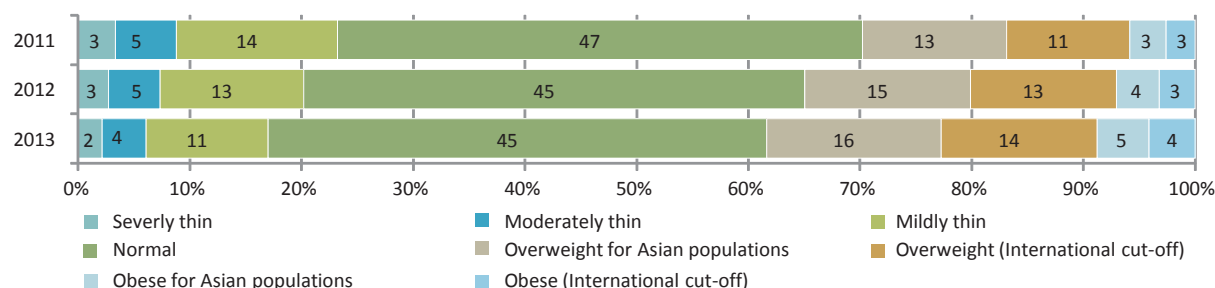
**Table 6.3: Rationale and definitions for the categories of malnutrition based on BMI**

Population	Rationale	Category	Definition
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	BMI 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	Overweight for Asian populations	BMI greater than 23 but less than or equal to 25
		Overweight (International cut-off)	BMI greater than 25 but less than or equal to 28
		Obese for Asian populations	BMI greater than 28 but less than or equal to 30
		Obese (International cut-off)	BMI greater than 30
		Overweight	BMI greater than 23

Illustrating these two systems of classification, Figure 6.14 presents national level data for adolescent girls' nutritional status. Using z-scores, figures for Bangladeshi girls aged 10 to 18 years of age (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 2013, only 53% of girls in Bangladesh fall in the normal range and 42% of girls are undernourished below -1SD from the mean, with only a small percentage overweight (mild - 4%, moderate - 1%, severe - <0.1%). This distribution has changed little since 2011.

**Figure 6.14: Nutritional status of adolescent girls by BMI measures (2011-2013, 10 to 18 years of age)**



**Figure 6.15: Nutritional status of women by BMI measures (2011-2013, 19 to 49 years of age)**

For adult women, aged 19-49, international standards provide eight categories of nutritional status but no guidance on what an "ideal" distribution should be (12; 13). While 17% of the population are undernourished, an even larger proportion are overweight based on Asian cut-offs (38%). The proportion of women overweight increased by around four percentage points each year between 2011 and 2013. The level of under nutrition among adult women identifies Bangladesh as having a medium severity public health problem, but no international classification system exists to assess the public health risk for increasing levels of overweight (14). As rates of child under nutrition have remained high, this worrisome trend towards a double burden of malnutrition requires urgent attention (15; 16).

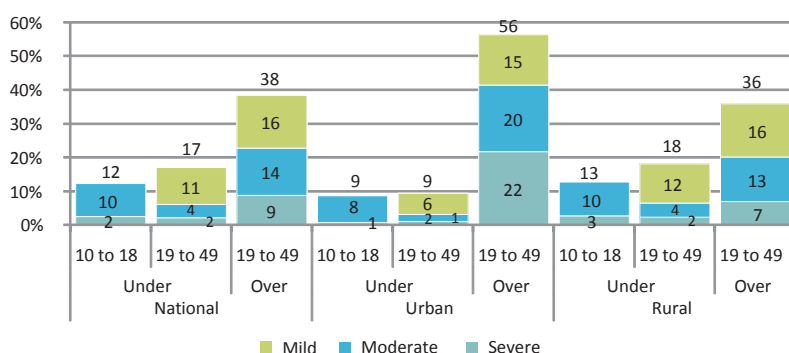
**Figure 6.16: Nutritional status of women and girls by locality<sup>8</sup>**

Figure 6.16 presents national, urban and rural rates of underweight for women and adolescent girls, coupled with the rates of overweight among adult women.<sup>9</sup> As might be expected, overweight among adult women is much more prevalent in urban areas than rural areas. Over half of adult women in urban areas were classified as overweight; the

same proportion as was identified in 2012. However the proportion of the population in the most severe category, women obese using the Asian cut-off, has increased four percentage points. As was the case in years past, in rural areas, considerably more adult women were overweight than underweight. Rates of underweight among girls were somewhat higher in rural areas compared to urban areas, and have not changed since 2012. In contrast, the rate of under nutrition among adult women declined (not shown).

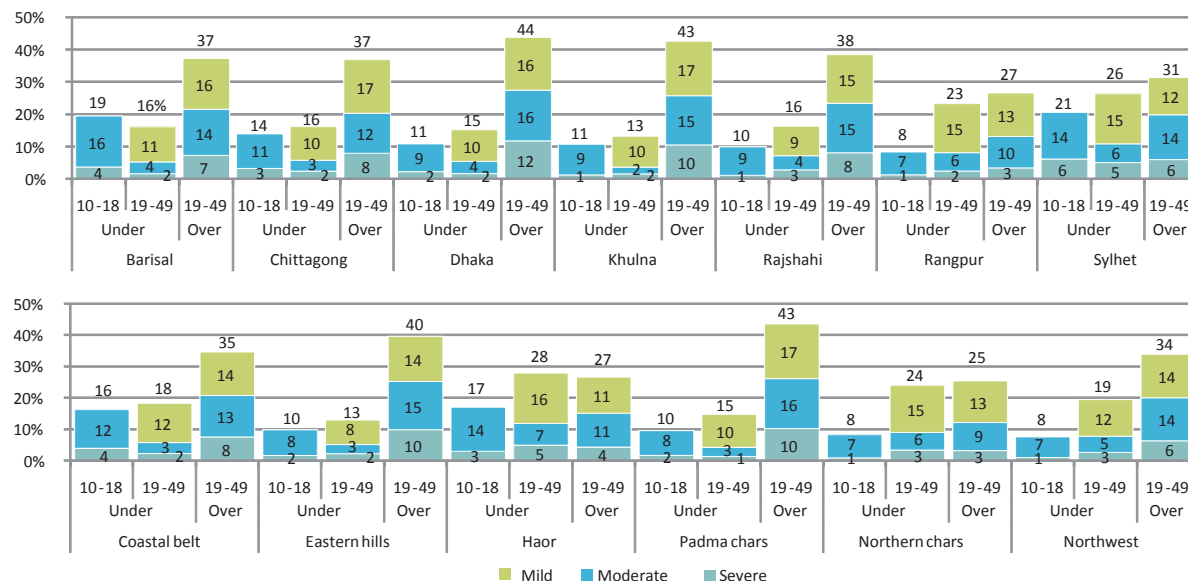
<sup>8</sup> For the remainder of the graphs in this chapter the following cut-offs will be used:

**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

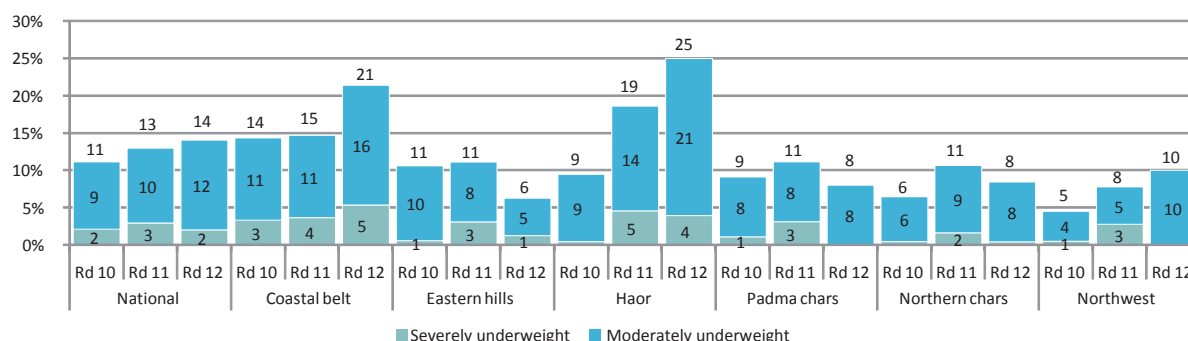
**19 to 49 years overweight:** Mild - BMI greater than 23 but less than or equal to 25; Moderate - BMI greater than 25 but less than or equal to 28; Severe - BMI greater than 28

<sup>9</sup> The proportion of 10 to 18 year old girls who are overweight is not shown because prevalence is less than 1% for all categories (Figure 6.14).

**Figure 6.17: Nutritional status of adolescent girls and women by division and surveillance zone<sup>8</sup>**

As shown in Figure 6.17, there is substantial variation in rates of women's underweight and overweight by division of residence and surveillance zone. While roughly an equal proportion of underweight and overweight women were found in Rangpur, all other areas of the country- excepting Sylhet, the Northern chars, and the Haor - have a greater proportion of women overweight compared to underweight. Sylhet and Barisal stand out as having a much greater proportion of adolescent girls underweight. Between 2012 and 2013, rates of adolescent underweight have increased in Barisal and Sylhet while the proportion of women underweight has not increased in any area. The proportion of adult women overweight has increased most in Barisal and Khulna.

Among the surveillance zones and nationally, there is little seasonal variation in levels of under nutrition among adolescent girls and adult women. Nationally and in the Haor, Coastal belt, and Northwest zones, the level of malnutrition among adolescent girls increased as the year progressed, while in the Eastern hills, the Padma chars, and the Northern chars, the rate of malnutrition peaked in the monsoon months. In contrast, under nutrition among adult women peaked in the monsoon months nationally and in the Eastern hills and Northern chars. These trends were mirrored in the proportion of women overweight.<sup>10</sup>

**Figure 6.18: Seasonal variation in malnutrition among adolescent girls by surveillance zone<sup>8</sup>**

<sup>10</sup> Adolescent overweight and obesity is not shown because levels were too low to disaggregate by season.

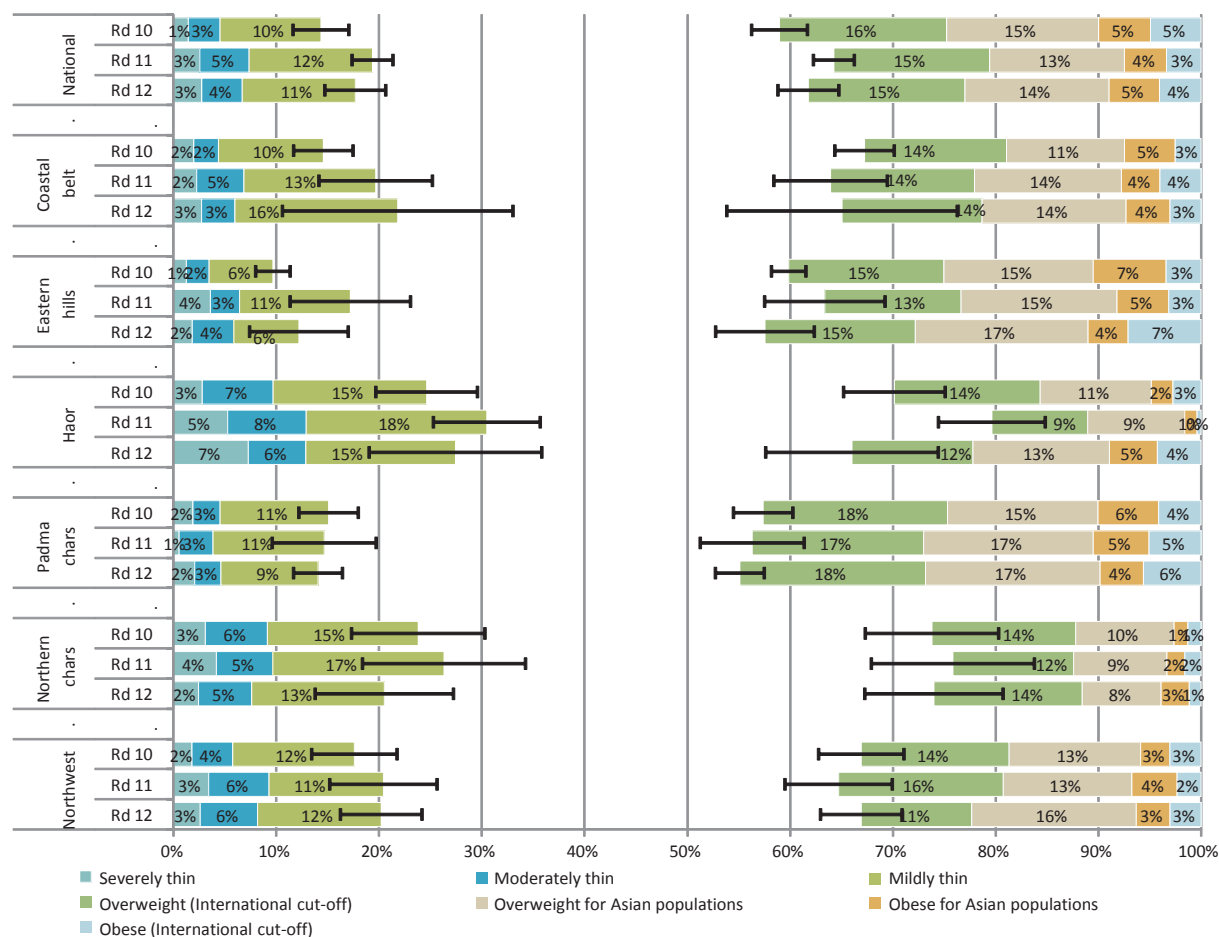
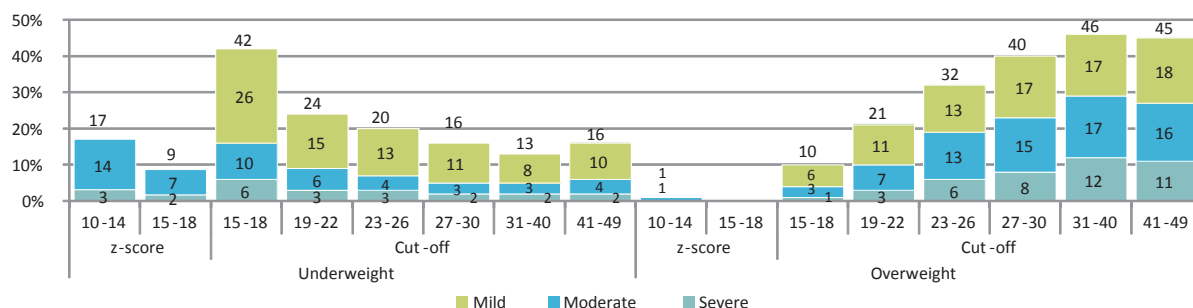
**Figure 6.19: Seasonal variation in nutritional status among women by surveillance zone<sup>8</sup>**

Figure 6.20 illustrates the discontinuity between z-score and cut-off methodologies using the 15-18 year old age group. A much larger proportion of young women are classified as both underweight and overweight using the cut-off methodology compared to the z-score approach. It indicates an almost stepwise increase in the proportion of women overweight as women age from 15 to 40 years of age. There is a less steep decrease in the proportion of women underweight across age cohorts except between the two youngest groups.

**Figure 6.20: Nutritional status of women and adolescent girls by age<sup>8</sup>**

**Figure 6.21: Nutritional status of women and adolescent girls by wealth, food security, and dietary diversity<sup>8</sup>**

Figure 6.21 shows the association of malnutrition of adult women with household wealth quintile, food security status, and individual dietary inadequacy. Rates of malnutrition among adolescent girls vary little by wealth quintile, food security, and dietary adequacy. In contrast, women's nutritional status is highly correlated with wealth and food security status. As wealth increases, there is a decrease in the proportion of underweight women and an increase in the proportion of overweight women. In 2013, like 2012, underweight is strongly associated with food insecurity, hunger, poor food access and lack of dietary diversity.







# Maternal care and nutrition

In 2013, too many girls had children too early. Over half of first pregnancies occurred among adolescent girls (18 years and younger), despite Bangladesh's low fertility rate.

Only two-fifths of pregnant women obtained at least four ANC visits in 2013. This was, however, a large improvement on previous years; this indicator jumped 11% between 2012 and 2013.

In 2013, two-fifths of pregnant women reported never taking iron folic acid (IFA) during their pregnancy. IFA supplementation was extremely low during the first trimester (13% daily and 16% in the last week), although this is the period during which folic acid helps to prevent neural tube defects.

Diets remained extremely poor even during pregnancy, and dietary diversity during pregnancy did not appear to improve between 2012 and 2013. One in four pregnant women were so thin that their foetuses faced a moderate risk of growth retardation.

Women receiving vitamin A after delivery remained constant between 2012 and 2013, while the proportion obtaining PNC check-up from any medically trained provider increased from 35% in 2012 to 42% in 2013.





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 wellbeing 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 antenatal care (ANC) have significantly greater odds of miscarriage compared to those who attended a clinic for a check-up during their first trimester (4). In addition to this, low nutritional status of women results in low birth weight (LBW) babies. According to the national low birth weight survey (2003-2004), low birth weight (<2,500 g) affected 36% of infants in Bangladesh, more than 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 preterm, over one-half born at a low birth weight, and over one-third of children stunted from birth (6).

Care during pregnancy has multiple components, some requiring health professionals and some dependent on family. FSNSP measures aspects of both. In 2013, FSNSP interviewed and measured 1,430 pregnant women and interviewed 845 women with a child less than six months of age about the care they received during and immediately after their pregnancy.

**Table 7.1: Number of mothers interviewed**

Age group in years	Pregnant at interview		With a child less than six months old	
	Number	Weighted proportion	Number	Weighted proportion
10 to 14	7	0%	0	0%
15 to 19	388	29%	155	18%
20 to 24	492	34%	341	41%
25 to 29	315	21%	232	26%
30 to 34	184	13%	88	11%
35 to 39	42	2%	27	5%
40 to 44	2	0%	2	1%
45 to 49	0	0%	0	0%

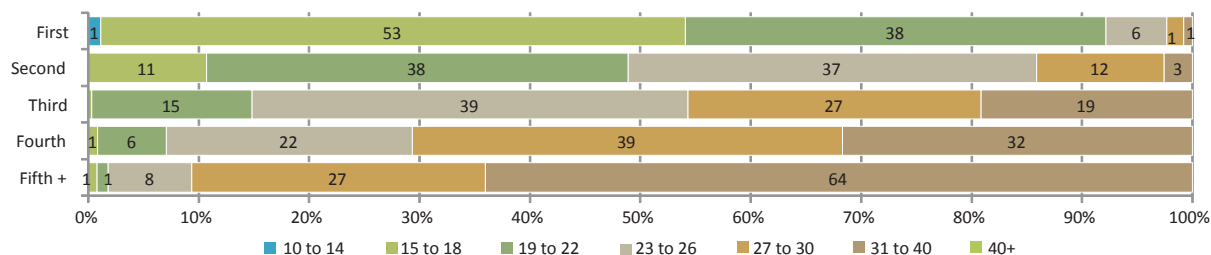
### Fertility patterns

Ideally, pregnancy-related care should start before conception, ensuring women are healthy enough to conceive and carry a child to full term (7; 8). Pregnancy should be delayed until a woman's body has matured and pregnancies should not be timed too close together (9; 10; 8). Since independence, Bangladesh has made great strides in reducing the frequency of birth and increasing birth spacing. Bangladesh has been much less successful in raising the age of first pregnancy, though there has been improvement in reducing the number of births among the very young (those less than 15 years old). The median age of first birth of women 20-24 years of age increased by only one year, from 18 years in 1992/1993 to 19 years in 2011 (11; 12; 13). As the first birth typically takes place one or two years after marriage, this implies that most marriages still occur before Bangladesh's legal age of marriage (18 years for women).

For all pregnant women interviewed, FSNSP recorded the number of previous pregnancies that each woman had, regardless of whether that pregnancy resulted in a live birth or not. As would be expected in a country where the average fertility rate is 2.3 (12), the plurality of pregnant women—about 35%—were in their first pregnancy and a little less than one-third were in their second pregnancy. Similar to past results, in 2013 about 19% of women were in their third pregnancy; only 14% of women were in their fourth and higher pregnancy. Due to the early age of marriage, a little over half of women pregnant for the first time were 18 years of age or younger. Even more alarming, over one-tenth of women in their second pregnancy were 18 or younger. While it is likely

that the girls, 15 to 18 years of age, who reported being on their third or fourth pregnancy did not complete all previous pregnancies, frequent pregnancies and/or complications can compromise the nutritional status and health of the mother and infant (9).

**Figure 7.1: Age group of pregnant women by number of previous pregnancies**



**Figure 7.2: Distribution of number of previous pregnancies by age<sup>1</sup>**

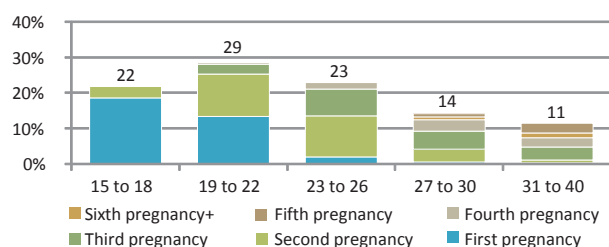


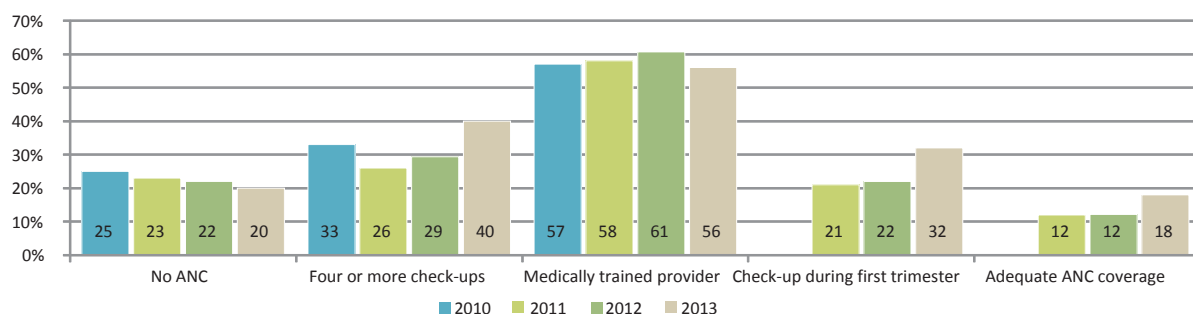
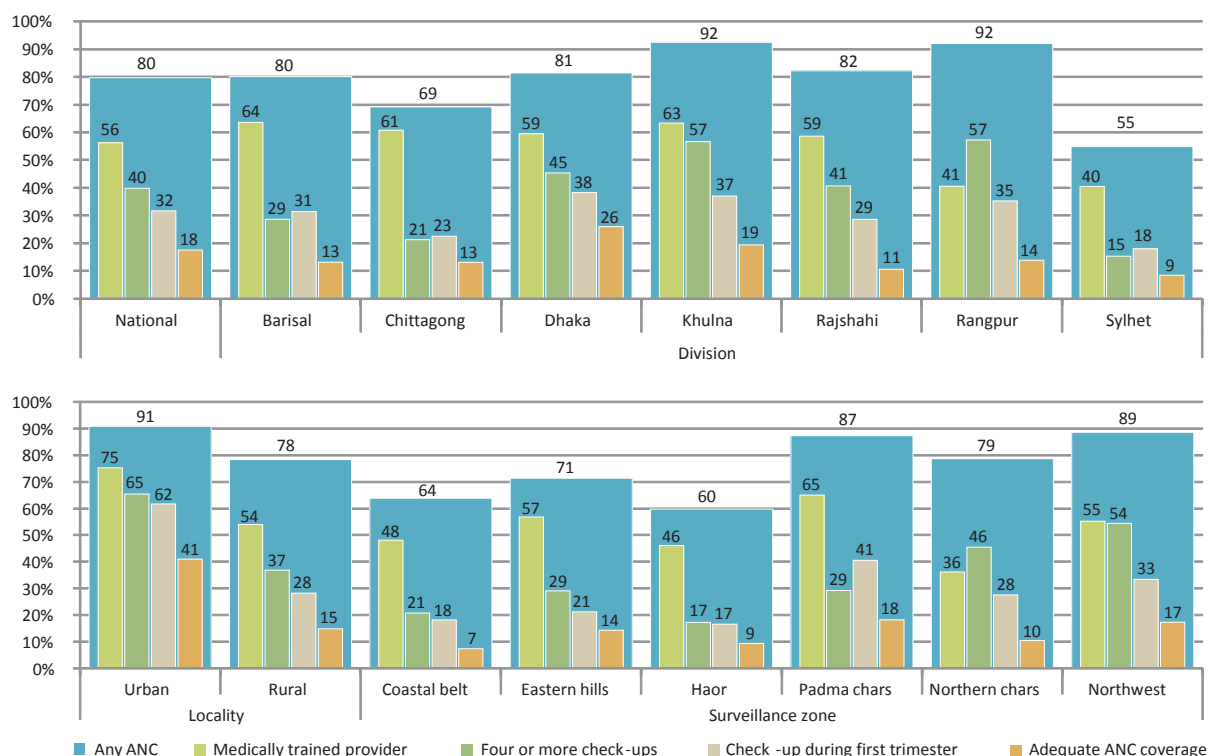
Figure 7.2 displays the age distribution of pregnant women. Almost half of pregnant women were 22 years of age or younger and the largest proportion of pregnant women were 19 to 22 years of age. Over one-fifth of pregnant women were 18 years or younger while only one-tenth of pregnancies occurred among women over the age of thirty.

### Clinical antenatal care

Clinical antenatal care encompasses many different components, which together help ensure the health and safety of mother and baby during pregnancy and delivery. FSNSP collects information on the coverage of care received by women during pregnancy. The focus of FSNSP's indicators is to estimate the proportion of women who are meeting demand-level recommendations of the World Health Organization's (WHO) Technical Working Group on Antenatal Care. 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 (14). The FSNSP system ascertains this information by interviewing mothers of children less than six months of age about care they received during their pregnancy.

Figure 7.3 tracks changes in ANC coverage over time. The proportion of women receiving no ANC has decreased from 25% in 2010 to 20% in 2013, but the proportion of women visiting a medically trained ANC service provider has changed only a little. Two indicators have increased notably between 2012 and 2013: the proportion of women completing four or more ANC visits, and the proportion of women who had an ANC check-up in their first trimester. Ultimately, a little less than one-fifth of pregnant women had adequate ANC coverage, indicating that they had received at least four ANC visits, at least one of which was during the first trimester and from a medically trained provider, thereby receiving care in line with the coverage guidelines set out by the Technical Working Group (14).

<sup>1</sup> This graph excludes seven fourteen-year-old pregnant girls due to the small number of pregnancies at these ages.

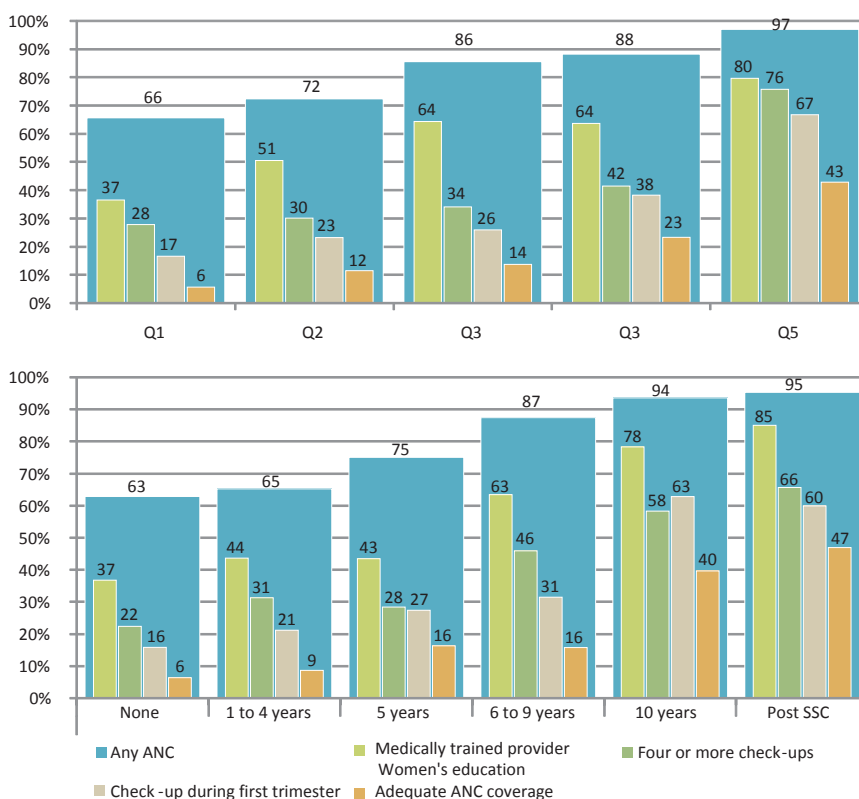
**Figure 7.3: Trends in ANC care for women who delivered in the six months before the interview (2010-2013)****Figure 7.4: Proportion of mothers who received ANC by division and locality**

At the national level, about 80% of women completed at least one ANC check-up during their pregnancy and well over half of these women received care from a medically trained provider. However, only around one-third of pregnant women had their first ANC visit in the first trimester, and about two-fifths received at least four check-ups. Furthermore, less than one-fourth of women who had gone for any ANC, received minimum adequate care. This pattern varies dramatically by division, locality, and surveillance zone. Differences in the indicators of ANC may indicate substantial variation in the knowledge level of mothers and their ability to access care. Figure 7.4 shows these patterns by area of residence. The thick bar indicates the proportion of mothers who received any ANC, while the four thinner bars show the proportion of mothers who received each component of care.



In Sylhet, pregnant women received ANC care in a much lower proportion than those in other divisions, and the proportion receiving at least one ANC check-up is significantly lower than the national level. However, in Sylhet division, the majority of women who received ANC did so from a medically trained provider, possibly indicating a greater use of the formal health system. In Rangpur division, less than half of women receiving ANC did so from a medically trained provider, suggesting substantial barriers to formal health services. Dhaka had the highest proportion (26%) of women who obtained adequate ANC care.

**Figure 7.5: ANC indicators by household wealth and women's own education**



Elements of care increased in an almost step-wise fashion by mother's education level and wealth quintile (Figure 7.5). Overall, ANC coverage was the highest among the most educated women and those in the wealthiest quintile. However, overall rates of adequate ANC coverage (all conditions fulfilled) are alarmingly low regardless of wealth. In the poorest quintile, only 6% of pregnant women received adequate care, while even in the richest wealth quintile, less than one-half received adequate care.

### **Iron and folic acid (IFA) supplementation**

Iron and folic acid tablets are an essential component of adequate ANC. Iron assists in the prevention of anaemia and associated complications during pregnancy and delivery - such as pre-term and low birth weight births as well as increased risk of haemorrhage during delivery - and folic acid reduces the risk of serious neural tube defects in the infant while helping the body fight anaemia (38;39). In Bangladesh, this supplement is provided to pregnant women by the Directorate General of Family Planning as part of regular ANC services; however, coverage of and compliance with the IFA supplementation intervention is low due to lack of awareness and inadequate delivery mechanisms (15). Compliance with an IFA regimen requires two elements: timely receipt of or access to IFA tablets and regular consumption of the tablets provided. FSNP does not regularly record if and when IFA tablets are received by pregnant women, but it records two measures of women's consumption of IFA tablets: the reported frequency of consumption during past

pregnancy for women with a child less than six months of age, and the number of tablets taken in the last week for currently pregnant women.

**Figure 7.6: Mothers not taking IFA during last pregnancy (2010-2013)**

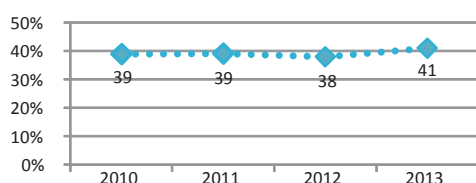
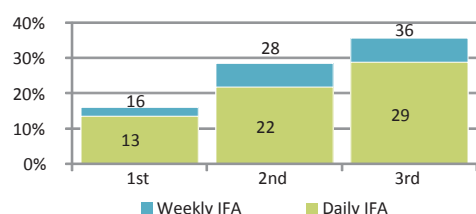


Figure 7.6 displays the proportion of women who have given birth to a child in the six months before they were interviewed who did not take IFA tablets during their last pregnancy. There has been no change in the proportion of women who do not take IFA since 2010. In all years, two fifths of mothers did not take IFA despite the fact that nearly half of pregnant women are anaemic in Bangladesh (16).

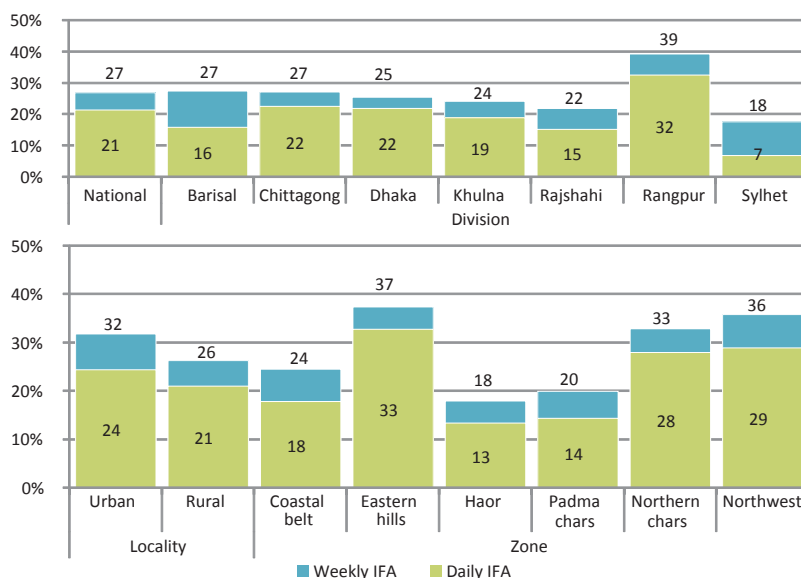
**Figure 7.7: Pregnant women taking IFA by trimester<sup>2</sup>**



However, these figures understate the level of IFA consumption, as women with completed pregnancies tend to report their practices during the last trimester, but few women took IFA consistently throughout pregnancy. When currently pregnant women reported on their consumption of IFA tablets in the past week, the proportion of women taking IFA varied greatly between

trimesters of pregnancy. In 2013, less than one-fifth of women reported they had taken IFA tablets weekly in the first trimester, this rose to nearly two-fifths of women in their final trimester. In 2013, the majority of women who took IFA weekly took it seven or more times in the past week.

**Figure 7.8: Proportion of pregnant women who took IFA by area of residence**



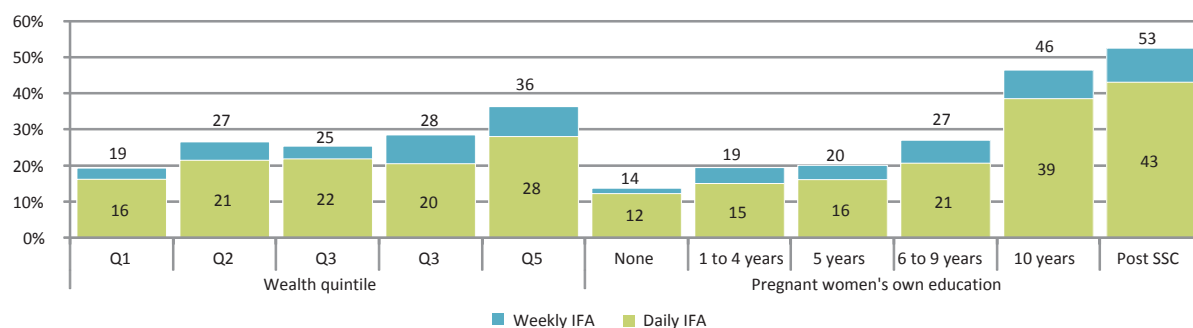
When examining these figures, it is important to keep in mind the specific nutrient needs associated with different stages of pregnancy. Although anaemia is a concern throughout pregnancy and especially at the time of delivery, folic acid is essential during the first trimester when the developing foetus is at risk of developing neural tube defects (17; 18; 8). The proportion of women taking IFA during their first trimester is very low,

putting unborn children at risk of birth defects. The increased use of IFA throughout the pregnancy is positive in terms of preventing anaemia, especially around the time of birth, however more needs to be done to encourage women to take folic acid earlier in their pregnancy.

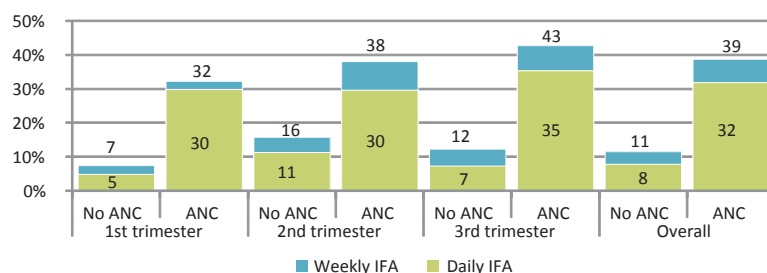
<sup>2</sup> In 2013, FSNP began asking pregnant women the exact number of times they had taken IFA in the week before the interview instead of general practice. Due to this change, the results above cannot be compared to 2012 and 2011 estimates.

Across the divisions, Sylhet had the lowest and Rangpur had the highest proportion of women taking IFA during pregnancy. Iron supplementation is higher among women from urban areas compared to those from rural areas, and the level of difference remains the same over time. Among the different zones, the Haor had the lowest proportion of women taking IFA while the Eastern hills had the highest.

**Figure 7.9: Proportion of pregnant women who took IFA by household wealth and own education**



**Figure 7.10: Pregnant women who took IFA by ANC care and trimester**



While there was limited association between women's age and adherence to an IFA regimen (not shown), expected patterns related to wealth and education were observed. As education increased, so did the proportion of women who reported taking IFA regularly. Moreover, a significantly higher

proportion of educated women took IFA weekly during pregnancy than their less educated peers. The same step-wise fashion in IFA intake was found for wealth quintile as was found for women's education in 2013. Overall, four times more women who had completed at least one ANC visit took IFA weekly compared to those who had had no ANC visits (Figure 7.10).

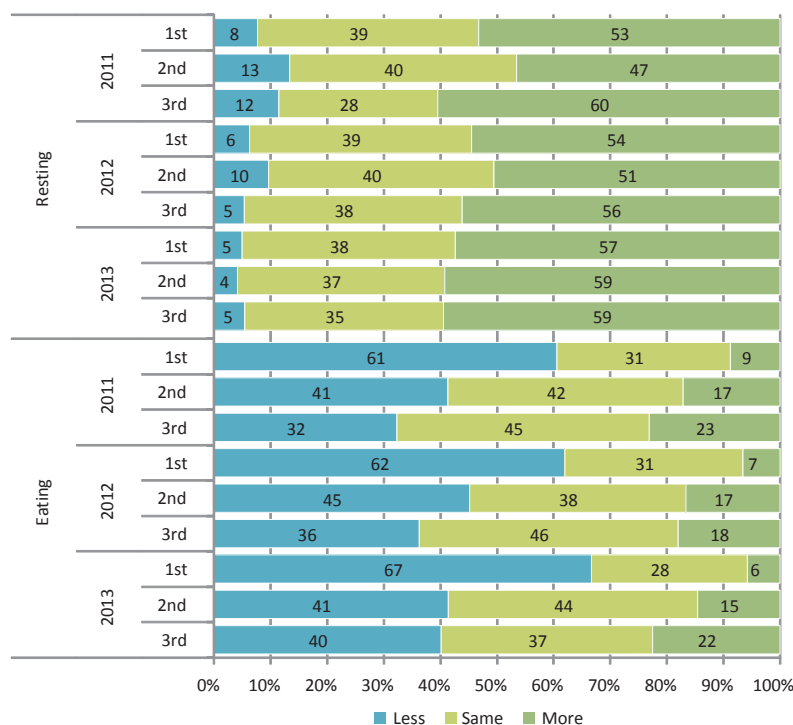
### Family and self-care

Along with clinical ANC, women must receive special consideration in the 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. Household and self-care for pregnant women are captured by a number of FSNP measurements including diet composition, amount of rest taken, and amount of food consumed.

As shown in Figure 7.11, most women report being able to rest more during pregnancy, but only a minority report consuming a greater amount of food. Strikingly, the majority of women actually report eating less during the first trimester of their pregnancy in comparison to before, perhaps due to morning sickness. As the pregnancy proceeds, a higher proportion of individuals report eating more; however, there is still an alarmingly high number of individuals who claim to be eating less than pre-pregnancy levels. Though the proportion of women who rested less than usual decreased between 2012 and 2013, the proportion that ate less food than usual increased by five

percentage points during the first trimester. In the final trimester, the amount of food consumed increased incrementally between 2010 and 2013.

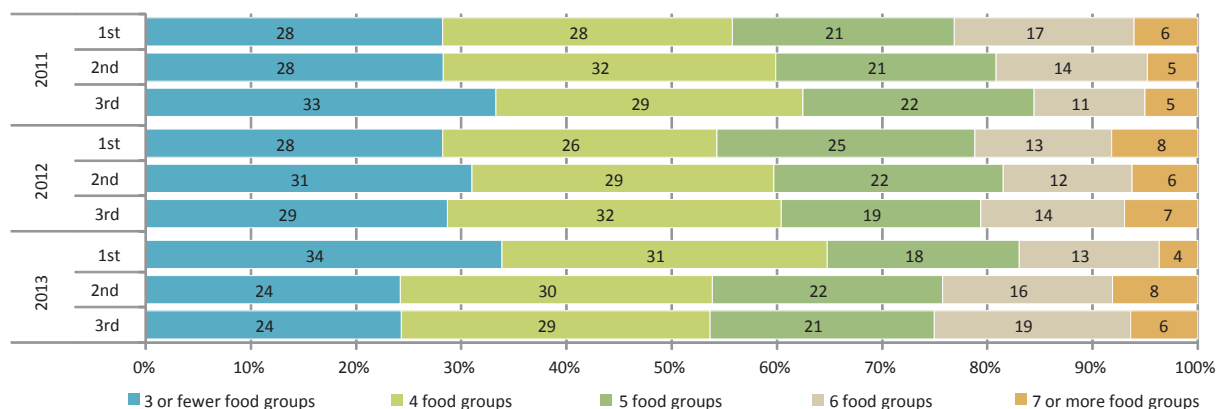
**Figure 7.11: Rest and food during pregnancy compared to before by trimester and year**

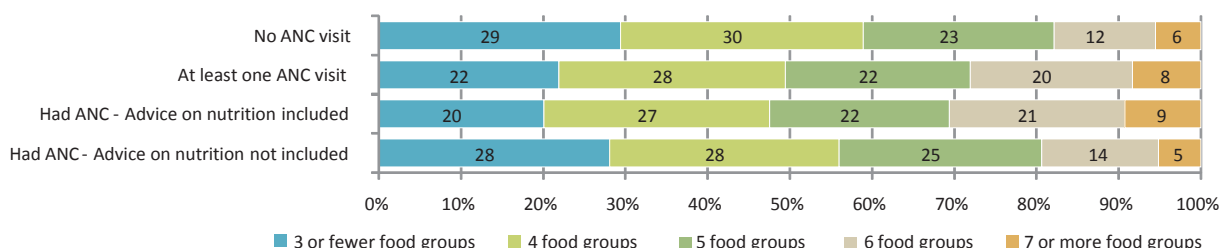


This pattern of food consumption is consistent with information obtained on women's dietary diversity. In 2013, the diets of pregnant women were slightly less diverse during their first trimester compared to other trimesters. Overall, dietary diversity during pregnancy did appear to improve slightly during the second two trimesters between 2012 and 2013. The self-reported women's food consumption is consistent with information obtained on women's dietary diversity. Women's self-reported food consumption before and after pregnancy correspond with differences in dietary diversity scores (not shown). In light of the

increased nutritional needs of pregnant women, these findings raise serious concerns regarding the proper nutrition of women and unborn children.

**Figure 7.12: Dietary diversity scores by trimester**



**Figure 7.13: Dietary diversity scores by ANC visit**

Around 55% of the pregnant women interviewed had received at least one ANC visit before the interview, and these women reported eating more diverse diets than women who had not yet attended an ANC visit. Moreover, 77% of women who had an ANC visit reported that some advice on diet was included in the visit. Among women who had an ANC visit, those who also received advice on their diet at the time of the ANC visit had significantly more diverse diets than those who had not received such advice. If women had not received advice on ANC during their ANC check-up, these women's dietary diversity was similar to those who had not yet received any ANC care at all. This relationship highlights the importance of including nutrition messages at key contact points throughout the life cycle.

### Nutritional status

Because women should gain around twelve kilograms during pregnancy, BMI is not a useful indicator to assess the nutritional status of pregnant women unless data is available on the pre-pregnancy weight of the mother or the pattern of weight gain since pregnancy. Given that FSNP is a cross sectional surveillance system, FSNP does not have access to these pre-pregnancy weights. Instead, current nutritional status is assessed among pregnant women using MUAC while delivery risk among pregnant women is assessed using height. For pregnant mothers, Sphere standards recommend that women whose MUAC measurements fall under 230 mm be included in emergency feeding programmes, as the foetus is at an increased risk of intrauterine growth restriction at this point (19; 20). In addition, FSNP Sphere classifies pregnant women with a MUAC less than 207 mm as severely undernourished (20). Although obesity is also associated with negative pregnancy outcomes (21; 22), there is no standard to classify women's overweight or obesity based on MUAC.

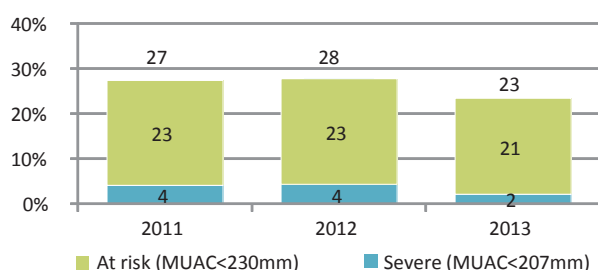
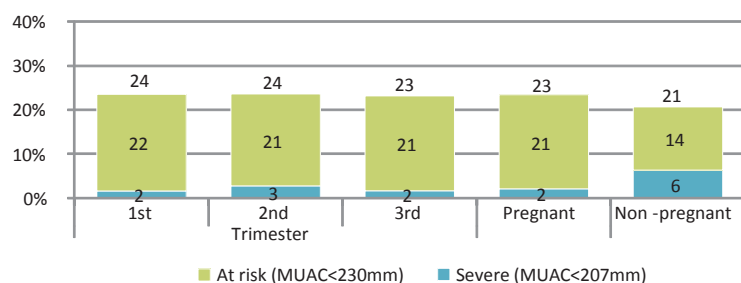
**Figure 7.14: Trends in under nutrition in pregnant women**

Figure 7.14 reveals that the proportion of pregnant women who are severely malnourished decreased from 4% to 2% and those who are at risk decreased from 23% to 21% between 2012 and 2013. Similar to non-pregnant women, as discussed in the last chapter, an estimated 61% of pregnant women were above 150 cm tall; only 13% were of short stature (height less than 145 cm) and 2% were shorter than 140 cm.

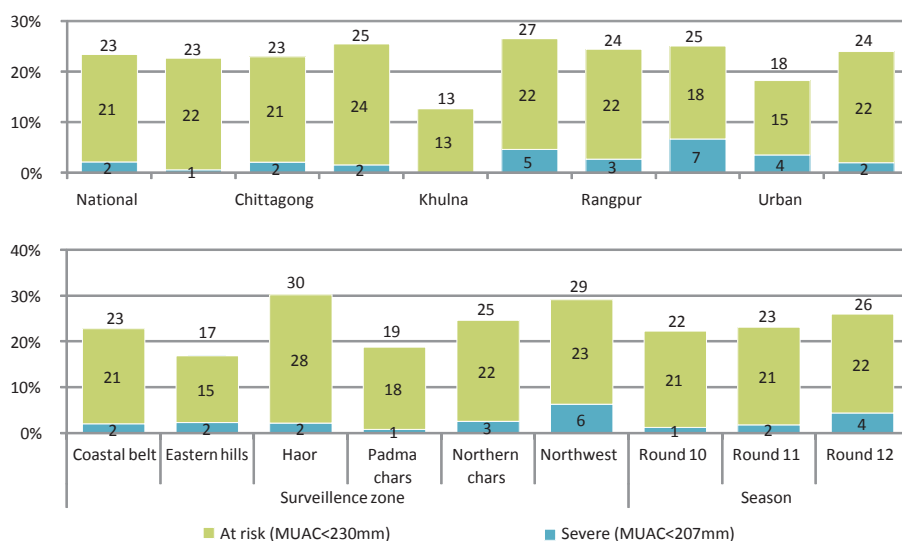
Around 1.5% of recently pregnant women reported to have experienced night blindness at some point in their last pregnancy. These estimates are well below the 5% prevalence cut-off for a public health problem (23; 24; 25).



**Figure 7.15: Women undernourished by trimester and pregnancy status**

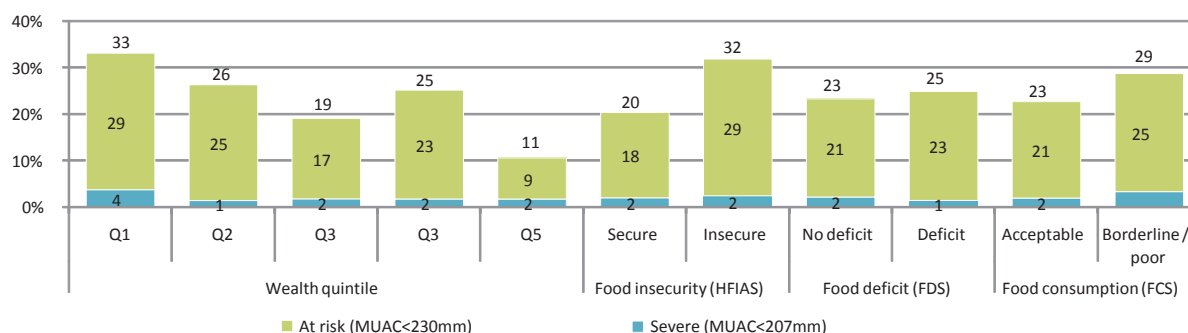
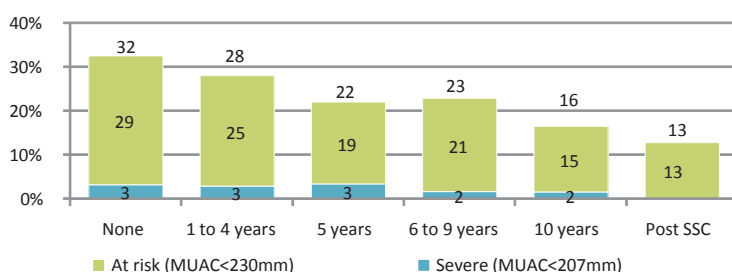
There is not much variation in the proportion of women undernourished by trimester (Figure 7.15). For the sake of comparison, non-pregnant women have also been included on this graph though the at-risk cut-off of 23.0 cm does not apply to this group. Contrary to what might be expected, there is not a great difference in the proportion of

women with MUAC measurements of less than 23.0cm comparing pregnant and non-pregnant populations despite the weight gain that should accompany pregnancy. This difference is not simply due to the age difference between pregnant women and non-pregnant women; across all ages, the proportion of undernourished pregnant women equals or exceeds that of the non-pregnant women (see Figure 7.19).

**Figure 7.16: Pregnant women's nutritional status by area of residence and season**

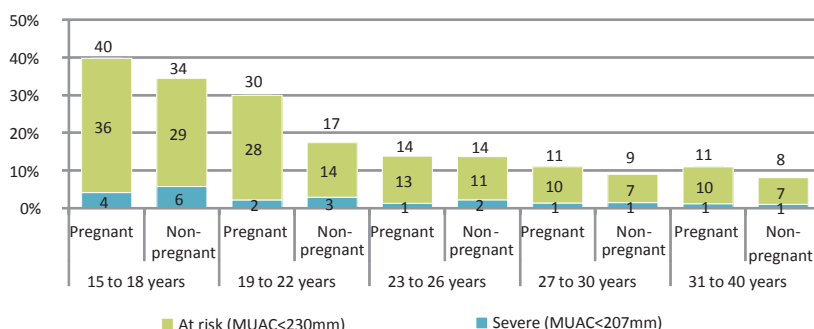
Similar to patterns of under nutrition among non-pregnant women, there were variations in the nutritional status of pregnant women across areas. Khulna stood out for having the lowest rates of malnutrition. As expected, on average, pregnant women in rural areas were at greater nutritional

risk than those in urban areas. The Northwest and Haor had the highest rates of under nutrition during pregnancy. Pregnant women in the Padma chars and the Eastern hills were undernourished at a lower rate than pregnant women in the other surveillance zones. The proportion of pregnant women undernourished varied across seasons, with a smaller proportion of pregnant women at risk due to thinness during Round 10 compared to Rounds 11 and 12.

**Figure 7.17: Pregnant women's nutritional status by household wealth and food security status****Figure 7.18: Pregnant women's nutritional status by women's own education**

As expected, more educated pregnant women and those from wealthier and more food secure households were malnourished in a lower proportion than those less educated or from poorer and more food insecure households. In the wealthiest quintile, a little over one-tenth of pregnant women

were at risk, whereas in the poorest quintile, the rate was nearly one-third. Across women's education levels, over one-tenth of pregnant women with post SSC education were at risk compared to nearly one-third of pregnant women with no education at all. Indicators of care, such as dietary diversity and amount of rest taken, had little association with nutritional status (results not shown).

**Figure 7.19: Proportion of women undernourished by age group and pregnancy status**

As mentioned at the outset, across all ages, the proportion of undernourished pregnant women exceeds that of the non-pregnant women. Not surprisingly, the youngest cohort of women was undernourished in the greatest proportion. For the

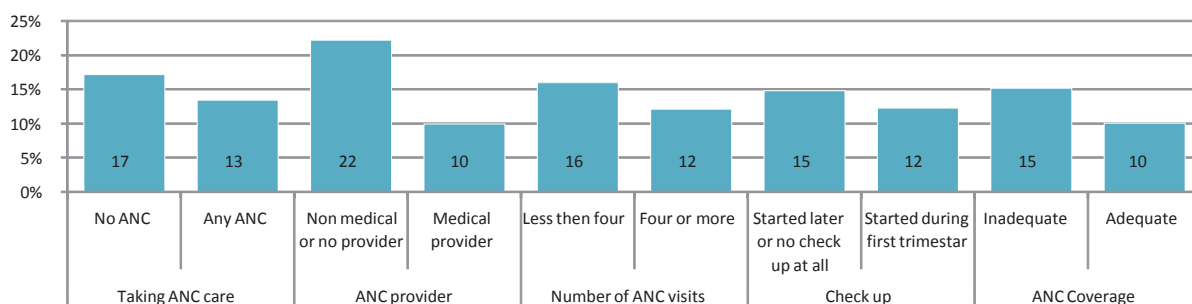
youngest cohort, two-fifths of pregnant women were found to be at risk. These pregnant girls and women were also much thinner than their non-pregnant counterparts at all ages. Clearly more focus is needed on the nutritional status of all, but particularly young, pregnant women. This attention must be given before these girls even become pregnant to ensure that their bodies are

## Low birth weight

As discussed earlier in the chapter, maternal nutrition is an important step forward for reducing low birth weight and its consequences. Though FSNSP cannot directly estimate the prevalence of low birth weight, as children's weight at birth does not measure a random subset of all children in the country, and the precision with which these children were weighed is unknown (26). Of the children weighed at birth in the two years before the interview whose weight could be recalled, 14% were found to be low birth weight infants, or children with a weight at birth of less than 2.5 kg. Through these records, FSNSP can outline some possible risk factors and examine the impact of these factors on the birth weight of children for whom we have information.

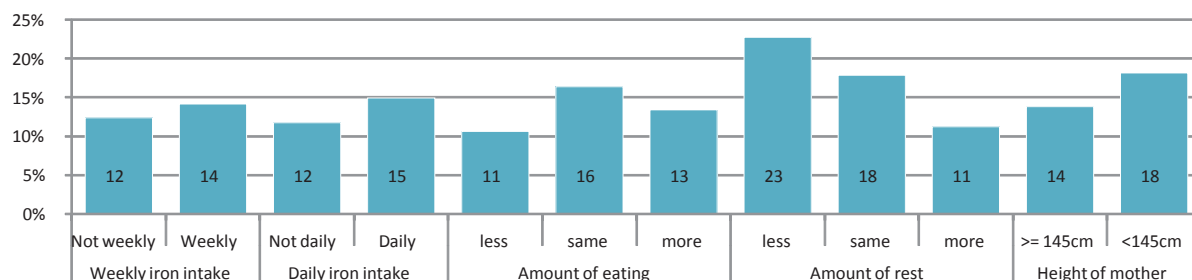
Figure 7.20 shows the prevalence rate of children born with low birth weight by the indicators included in this and the previous chapter. Studies have shown that the birth weight of babies increased with improved clinical ANC visits of mothers (27), and FSNSP data are in line with this. In 2013, of the children whose mothers reported not receiving any ANC, 17% were reported to have been born at low birth weight, whereas only 13% of children were reported with LBW if mothers had taken at least one ANC visit. Timely ANC, four or more visits, and the composite measure of ANC care were also significantly associated with a reduction in low birth weight prevalence.

**Figure 7.20: Relationship between ANC care and low birth weight in children**



However, 2013 results indicated no association between IFA consumption of mothers and low birth weight of babies. Mothers who reported eating more during their pregnancy, and taller mothers also had lower proportions of low birth weight babies than mothers who ate the same during their pregnancy than before and shorter mothers. Also the mothers who reported resting more during their pregnancy had a lower proportion of low birth weight babies than the mothers who reported resting the same or less during their pregnancy than before.

**Figure 7.21: Relationship between maternal care and low birth weight in children**

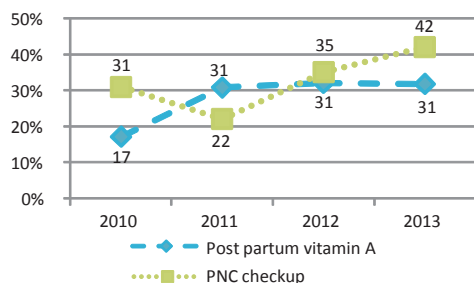


## Care after delivery

In addition to ANC, it is essential that both mothers and babies receive care soon after birth. This facet of care is especially vital in Bangladesh where few deliveries occur within a hospital or with a medically trained provider. Post-natal care (PNC) visits provide an opportunity to screen for and treat complications experienced during and after delivery. These visits also allow health workers to guide new mothers in proper care of infants and to provide support on vital aspects of nutrition, including breastfeeding and nutritional supplementation for mothers.

In spite of the importance of this care, there is a lack of evidence on the optimal timing of PNC, and therefore limited indicators for assessing adequate coverage of care (28; 29). As such, FSNSP uses only three indicators to evaluate care after delivery: receipt of a vitamin A capsule (VAC) post-delivery, PNC check-up with any medically trained provider, and whether or not the child was weighed within three days of birth. The Government of Bangladesh currently implements a large scale vitamin A supplementation programme (30), which provides women who have recently given birth with high potency vitamin A capsules within six weeks of delivery.<sup>3</sup> Vitamin A given to the mother is passed to the child through breast milk and helps the child's immune system to develop (31).

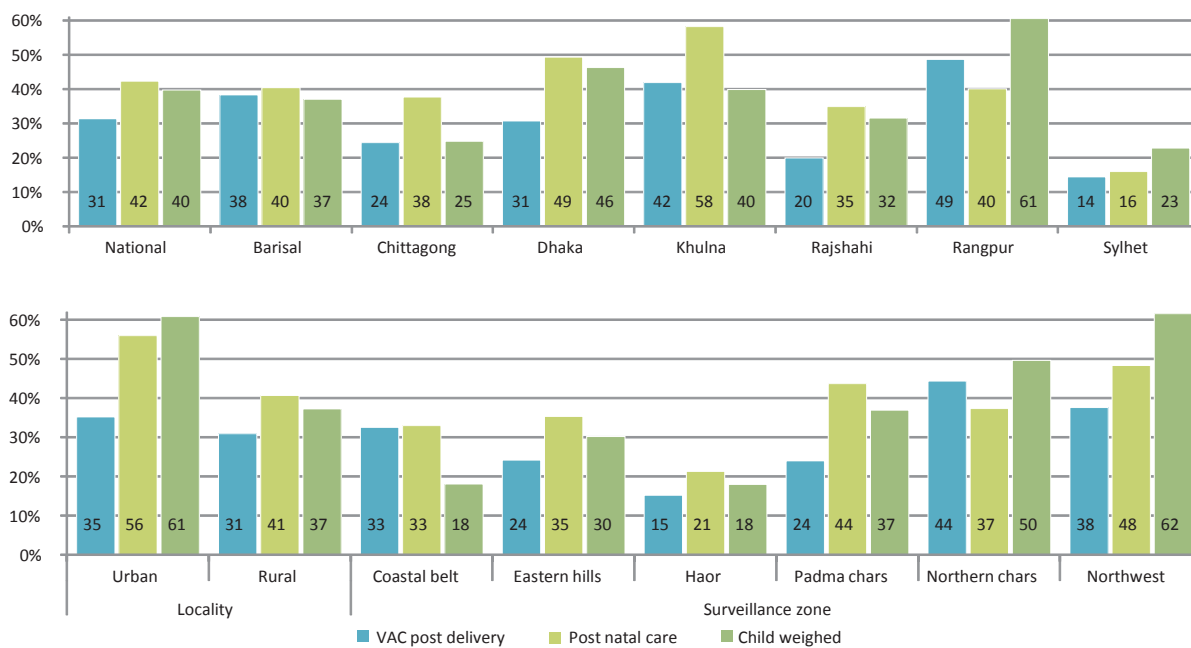
**Figure 7.22: Post-natal care over time (2010 to 2013)**



In 2013, a little less than one-third of women nationally reported receiving a VAC within six weeks of delivery (the level has remained constant at 31% since 2011). Only slightly over two-fifths of women received a post-natal check-up within 30 days after birth, and about two-fifths of children were weighed at birth, which were recorded in discharge certificates, cards or birth certificates preserved in the households. The rates for PNC check up and child weighed have increased around 7% in 2013 compared to 2012. Across divisions,

Rangpur stands out for having the highest rates of all indicators, and Sylhet the lowest (Figure 7.23). There is not a large difference between urban and rural areas for VAC post-delivery, however a greater proportion of urban mothers (more than half) receive post-natal care and have had children weighed at birth. In general, rates of PNC are extremely low, and even when PNC was received, opportunities for relaying nutrition messages and supplementation appear not to have occurred. For example, among women who received PNC check-ups, only nearly half had received VAC, 84% had received nutrition messages and around 74% had received support for breastfeeding (not shown). It is unclear if these gaps were due to supply gaps with VAC, a lack of provider training, or a lack of provider training.

<sup>3</sup> Recently the World Health Organization has provided detailed recommendations for vitamin A supplementation programmes, which do not recommend supplementing women postpartum (31). The Government of Bangladesh has decided to keep this programme component but to shorten the period of postpartum supplementation to two weeks, which was the initial guideline set in 2003 (30).

**Figure 7.23: Post-natal care by area of residence**





# Child care and feeding

The prevalence of exclusive breastfeeding in the first month of life decreased from over four-fifths in 2012 to only three-quarters in 2013 due to an increase in water intake rates for children less than four months of age.

Earning mothers initiated breastfeeding earlier compared to mothers without income, and provided prelacteal feeds to their children in lower proportion than the mothers without income.

In 2013, more than one-third of children were fed minimally adequate diets. This is a considerable increase in children eating minimally acceptable diets since 2011, but the current level is still far short of the target of 52% set in the HPNSDP.

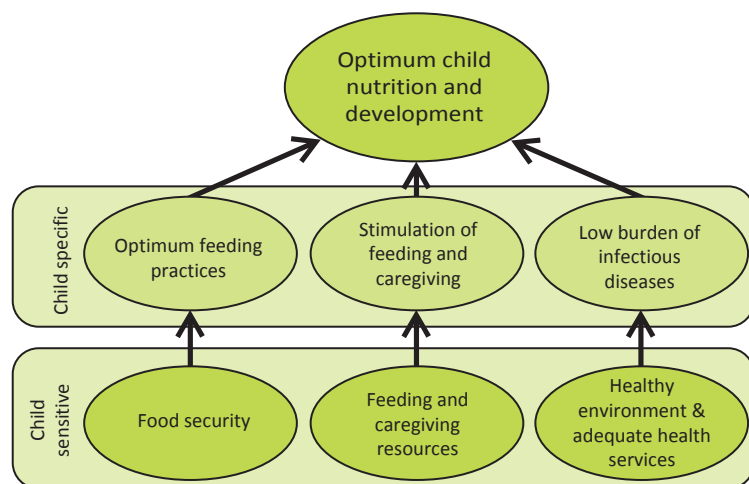
Vitamin A coverage for children under five has decreased greatly from 90% in 2010 to 64% in 2013. The low coverage rate of the VAC campaigns in recent years is due to gaps in the scheduling of these programmes and to drops in programme coverage since 2010.

The proportion of children who received anti-helminthes tablets dropped from nearly four-fifths in 2012 to only two-thirds in 2013. Coverage was higher among those from food secure households and among the children whose caregivers had better educational attainment.



Adequate infant and young child feeding (IYCF) is necessary for the survival, growth, and development of children through to adolescence and adulthood. The Lancet series in 2013 estimated that 12% of all deaths of children under the age of five could be prevented through universal coverage of appropriate breastfeeding (1); a further 6% of deaths could be reduced with appropriate complementary feeding practices (2). Appropriate IYCF practices have long-term cognitive and health benefits, all of which reduce the economic burden of disease and malnutrition (3; 1). Optimal child

**Figure 8.1: Lancet 2013 framework of child development**



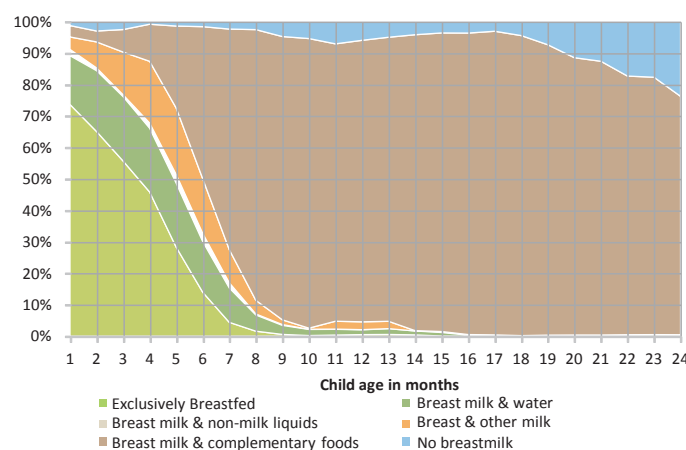
development results from environments where children and their mothers are fed diverse and nutritious diets, where children receive appropriate stimulation and care from the earliest ages, and where children have a low burden of infectious diseases (Figure 8.1). Children can only receive this care and attention in situations where households are food secure, caregivers have adequate support and education, home environments are adequate, and health services are available and accessible.

This chapter explores the child specific causes of child malnutrition. To obtain estimates of care and feeding practices for infants and young children, FSNP interviews the caregiver of the youngest child in each selected household. As such, all estimates in this section should be interpreted as prevalence of the indicators for the youngest born child in the household. This approach to data reduces the number of older children included in the surveillance system (Table 8.1).

**Table 8.1: Children surveyed by age**

Age group in months	Number surveyed	Weighted proportion
0 to 5	949	9%
6 to 11	1146	11%
12 to 17	1150	11%
18 to 23	1190	13%
24 to 35	2129	22%
36 to 47	1834	19%
48 to 59	1586	16%

**Figure 8.2: IYCF practices by month of age<sup>1</sup>**



### Child feeding

Using the WHO suite of indicators, this section will focus on the package of World Health Organization (WHO) recommended and Government of Bangladesh endorsed IYCF practices, which includes: early initiation of breastfeeding; exclusive breastfeeding from birth through six months of age; appropriate introduction of varied and nutritious complementary foods in sufficient amounts from the age of six months; and continued breastfeeding

<sup>1</sup> This figure is constructed using a three month moving average and will differ from point estimates given elsewhere in this report.



for two years (3; 4). In addition to ongoing large-scale activities by civil society in support of improved IYCF practices, nutrition programming - focused largely on maternal and child nutrition - is currently being mainstreamed into the government health services.

Figure 8.2 illustrates IYCF practices by month of age in 2013. Overall, IYCF practices in Bangladesh have remained largely consistent over the past three years. However, the prevalence of exclusive breastfeeding in the first month of life decreased from over four-fifths in 2012 to only three-quarters in 2013 due to an increase in water intake rates for children less than four months of age. As was the case in past years, the majority of children were breastfed throughout their first two years of life, though the proportion of children who continued to receive breast milk at two years of age decreased considerably between 2012 and 2013. In the coming sections, these feeding patterns are further explored using the standardised set of indicators recommended by the WHO as a basis for assessing IYCF practices (5; 6).

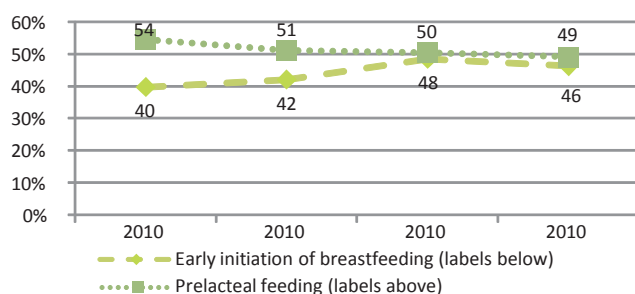
### Breastfeeding

Breast milk is the ideal food for infants and an important part of the diet of young children. Interventions to protect and promote breastfeeding can greatly improve child survival, averting over one-tenth of deaths among children younger than five years of age (7). Additionally, during illness, a child's appetite for foods is often diminished but their demand for breast milk remains unchanged (8; 9), thus breastfeeding helps to prevent dehydration and provides vitamins, minerals, and energy to aid recovery (10). Optimum breastfeeding practices also improve cognitive, motor, and socio-emotional development as well as learning capacity (11; 12; 1).

### Breastfeeding during the first days of life

The Government of Bangladesh, in line with WHO recommendations, promotes the "early initiation of breastfeeding," which is defined as providing breast milk to the infant within one hour of birth. Early initiation helps ensure that infants consume the first milk, colostrum, which is rich in

**Figure 8.3: Child feeding during the first days of life (2010-2013)<sup>2</sup>**



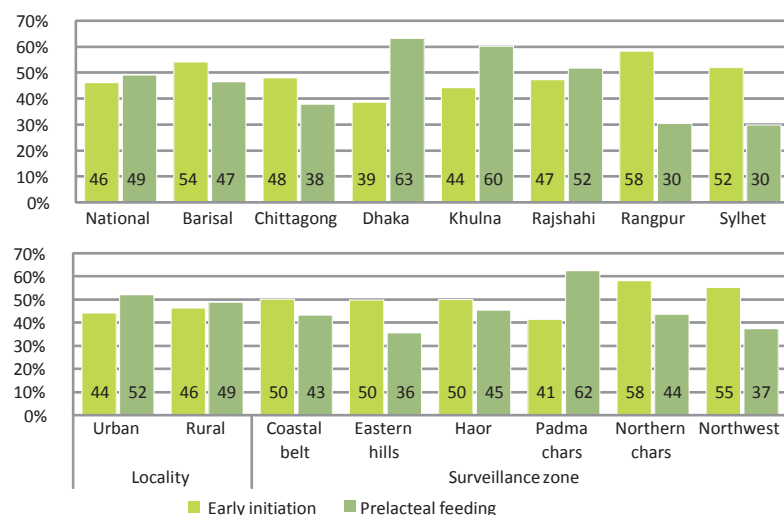
antibodies and contains a larger percentage of protein, minerals and fat soluble vitamins than mature milk. However, traditional beliefs delay breastfeeding. In line with this, FSNP records the proportion of living infants who are fed prelacteal foods in the first three days of life (13). Prelacteal feeding refers to the practice of feeding an infant anything other than breast milk during the first three days after birth. Prelacteal

feeding is discouraged by UNICEF and WHO because it can adversely affect breastfeeding and introduce pathogens into a child's digestive system.

Since 2010, there has been a small increase in the percentage of children breastfed in the first hour of life and a smaller decrease in the proportion of children fed prelacteally (Figure 8.3). Similar to 2012 results, Dhaka division has the lowest rates of early initiation as well as the highest rates of prelacteal feeding (Figure 8.4). In line with past results, rates of early initiation were similar between rural and urban areas though slightly more urban households engaged in prelacteal feeding. Looking across surveillance zones, there were very high rates of prelacteal feeding in Padma char compared to very low rates in the Eastern hills.

<sup>2</sup> FSNP asks these questions only to mothers about their youngest living children who is less than two years of age (41).



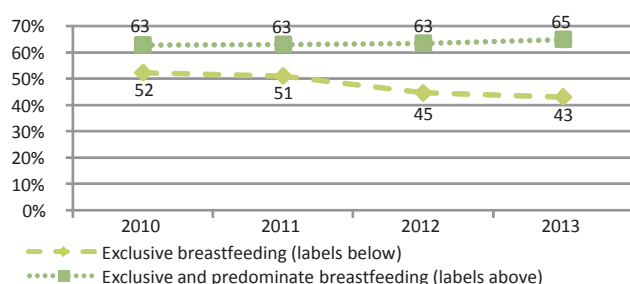
**Figure 8.4: Child feeding practices during the first days of life by area of residence**

There was little variation in the rates of early initiation or prelacteal feeding across wealth quintiles or categories of food security but the rates of early initiation of breast feeding was significantly higher in poor households (figure not shown). Child gender also had no significant effect in rates of early initiation and prelacteal feeding (figure not shown). More educated mothers provided prelacteal feeds to their children in lower proportion than less educated

mothers, yet, at the same time, initiated breastfeeding later than the less educated group (figure not shown). Earning mothers initiated breastfeedings earlier compared to mothers without income, and provided prelacteal feeds to their children in lower proportion than mothers without income.

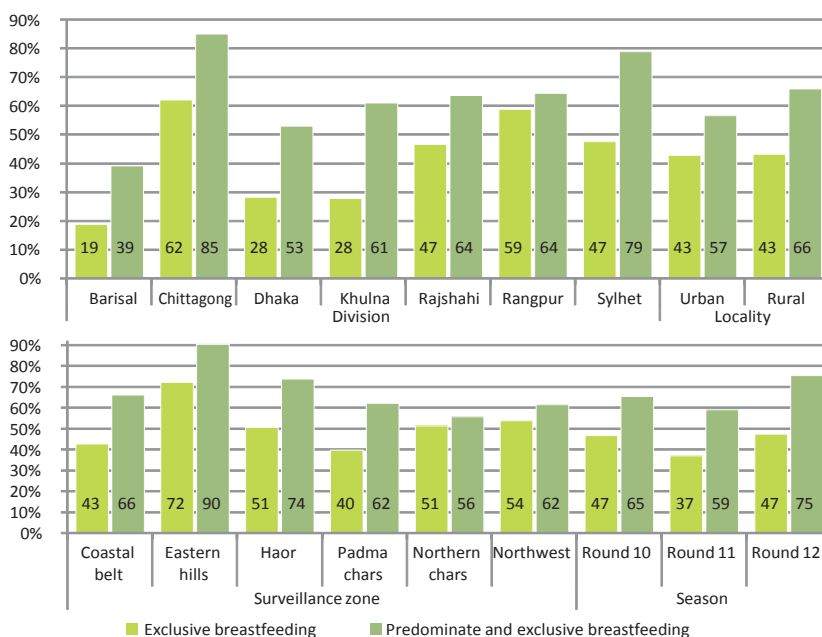
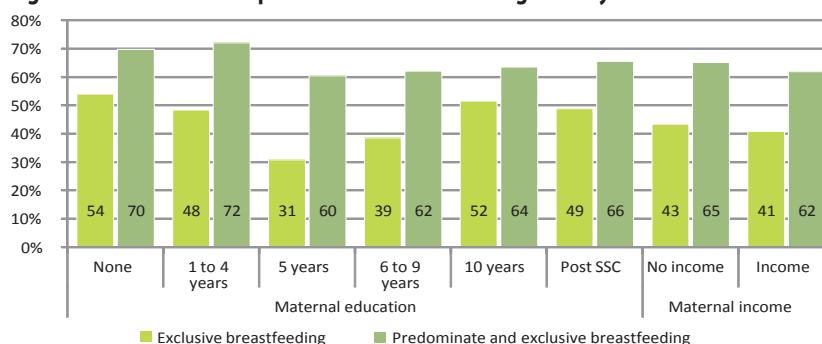
### Exclusive breastfeeding

Exclusive breastfeeding of infants for the first six months provides all the nutrients required for healthy growth and protects them from exposure to food contaminants before their immune system has matured. Because of this, exclusive breastfeeding, feeding nothing but breast milk and required

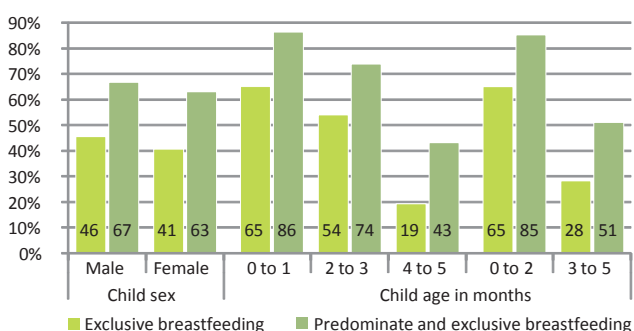
**Figure 8.5: Exclusive and predominant breastfeeding rates (2010 - 2013)**

medicines, is the only recommended feeding practice for infants under six months of age. According to the scientific literature, during the first six months of life, exclusively breastfed infants have one-third lower odds of death than infants who are fed breast milk and non-milk liquids (predominantly breastfed) and two-thirds lower odds than children who are breastfed and receive complementary foods or breast milk substitutes (7). FSNP records the proportion of children who were exclusively and predominantly breastfed, as these combinations indicate that the principal source of nutrients in the child's diet come from breast milk.

The rate of exclusive breastfeeding has fallen between 2010 and 2013, while the rate of predominate breastfeeding remained constant. Bangladesh remains well below the goal set by the 65th World Health Assembly of at least 50% of the babies around the world exclusively breastfed by 2025 (14). Chittagong and Rangpur had the highest rates of exclusive breastfeeding, and Barisal had the lowest - followed by Dhaka and Khulna. The large variation seen between 2012 and 2013 in some divisions is troubling but not statistically significant. The proportion of rural children exclusively breastfed was the same as the proportion of urban children - a sizable but not

**Figure 8.6: Exclusive and predominant breastfeeding rates by area of residence****Figure 8.7: Exclusive and predominant breastfeeding rates by maternal characteristic**

insecure households or by wealth quintile (figures not shown), though a slightly higher proportion of poor or food insecure households practiced exclusive breast feeding.

**Figure 8.8: Exclusive and predominant breastfeeding rates by child characteristics**

statistically significant increase over 2012 rates in urban areas. Rates of exclusive breastfeeding are more consistent in the surveillance zones. Largely due to differences in the age of the children included in the rounds of surveillance, there was a lower proportion of children exclusively and predominantly breastfed during the monsoon season.

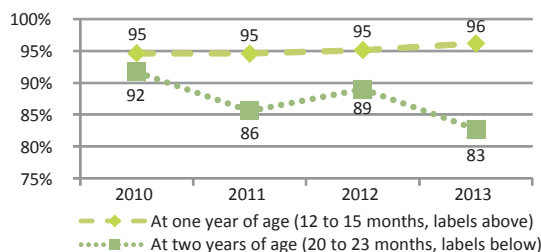
The proportion of exclusive breastfeeding was higher for mothers who had either no or less than primary education as well as for the mothers with secondary education or more. Involvement in income earning did not have a significant association with rates of exclusive breastfeeding. In line with past findings, there is little variation in exclusive breastfeeding rates between food secure and food

The association between child's sex and rates of exclusive breastfeeding was statistically insignificant in 2013, with a slightly higher proportion of male infants exclusively breastfed compared to female infants. As might be expected, rates of exclusive breastfeeding decline steadily with the age of a child. While more than three-fifths of children are exclusively breastfed in the first two months of life, the rate decreases to less than one-fifth of children in the fourth and fifth months of

### Continued breastfeeding

At six months of age, an infant's diet should transition from exclusive breastfeeding to breast milk accompanied by semi-solid and solid foods. During this transition and up to two years of age, breast milk continues to provide an essential nutritional contribution to the child's diet, supplying 35-40% of calories, 70% of vitamin A, 40% of calcium, and 37% of riboflavin required by the child during the

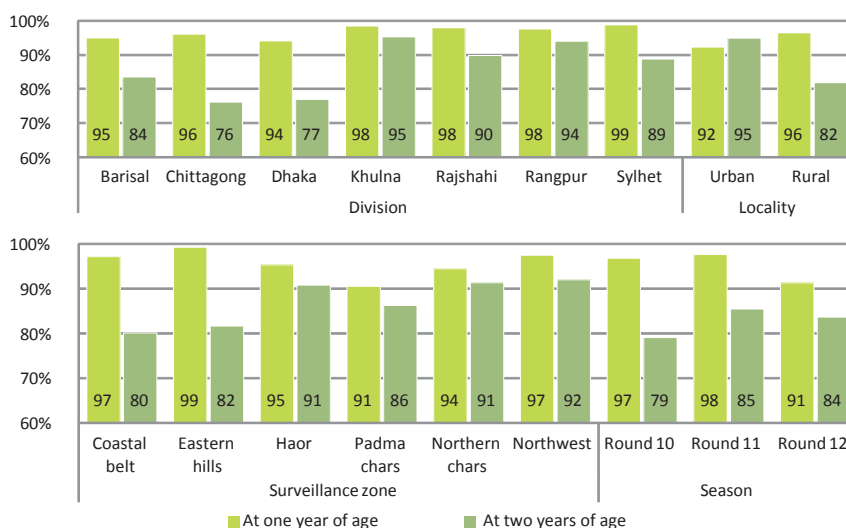
**Figure 8.9: Breastfeeding continuation rates (2010-2013)**



second year of life (15; 16). Bangladesh has consistently had very high rates of continued breastfeeding; the median age of breastfeeding discontinuation (i.e. the point at which 50% of children are no longer breastfed) is 33 months and almost 10% of children in Bangladesh continue to be breastfed until the start of the fifth year of life. FSNP measures these behaviours using two WHO-recommended indicators. The first is continuation of breastfeeding at one year of age, which is

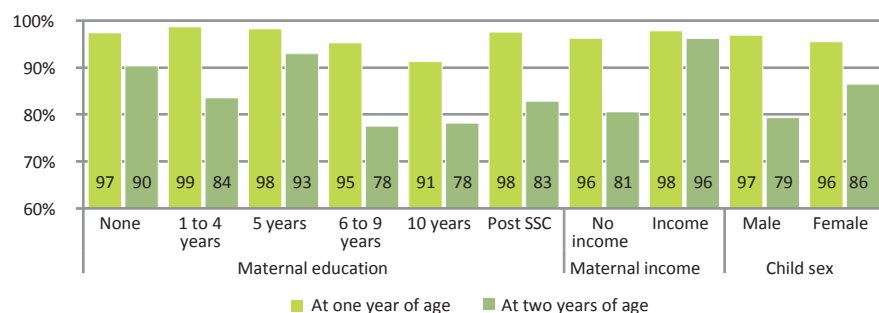
defined as the proportion of children 12 to 15 months of age who were breastfed the day before the interview. The second is continuation of breastfeeding at two years of age, which is defined as the proportion of children 20 to 23 months of age who were breastfed the day before the interview.

**Figure 8.10: Breastfeeding continuation rates by area of residence**



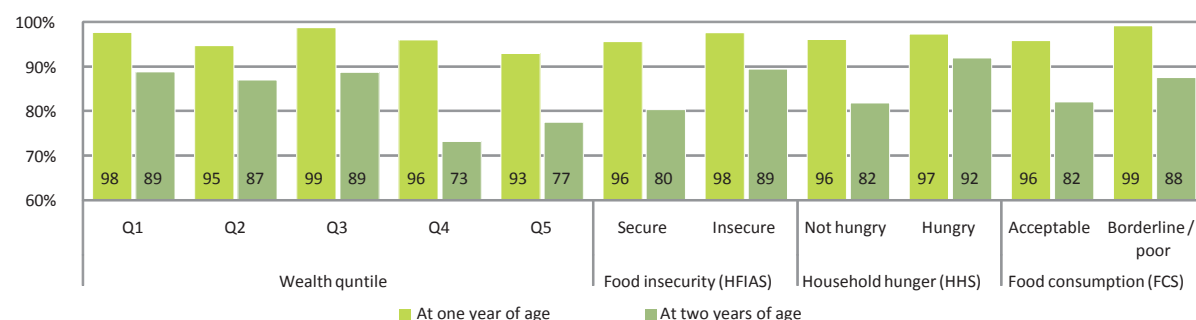
Since 2010, rates of continued breastfeeding for children at one year of age have been consistent at 95%, while rates of continued breastfeeding at two years have been greater than 80%. However, the proportion of children breastfed at two years of age have been declining somewhat since 2010. Across the nation, there was little geographical and seasonal variation in these indicators (Figure 8.10). The proportion of

children who continued to receive breast milk at two years of age was comparatively lower in Chittagong and Dhaka than the other divisions.

**Figure 8.11: Breastfeeding continuation rates by maternal and child characteristics**

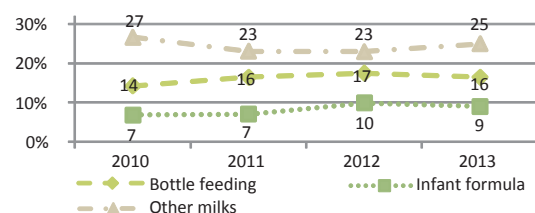
Little variation in rates of discontinuation was apparent comparing mothers with different levels of education. Among women earning income, a startling proportion of children continue to be breastfed at age two. There were no

significant effects of child sex on the proportion of children who were continued breastfeeding at one and two years of age. Continuation rates of breastfeeding were higher in less wealthy and more food insecure households, a finding consistent with the literature and known to confound studies that associate continued breastfeeding with nutritional outcomes (17; 18; 19).

**Figure 8.12: Breastfeeding continuation rates by households' wealth and food security**

### Threats to breastfeeding

In Bangladesh, despite high rates of breastfeeding, there is poor knowledge of the benefits and recommended duration of breastfeeding and widespread misconceptions of mothers being unable to produce milk sufficient to meet their baby's needs (3; 13). There is also limited understanding of

**Figure 8.13: Threats to breastfeeding (2010-2013)**

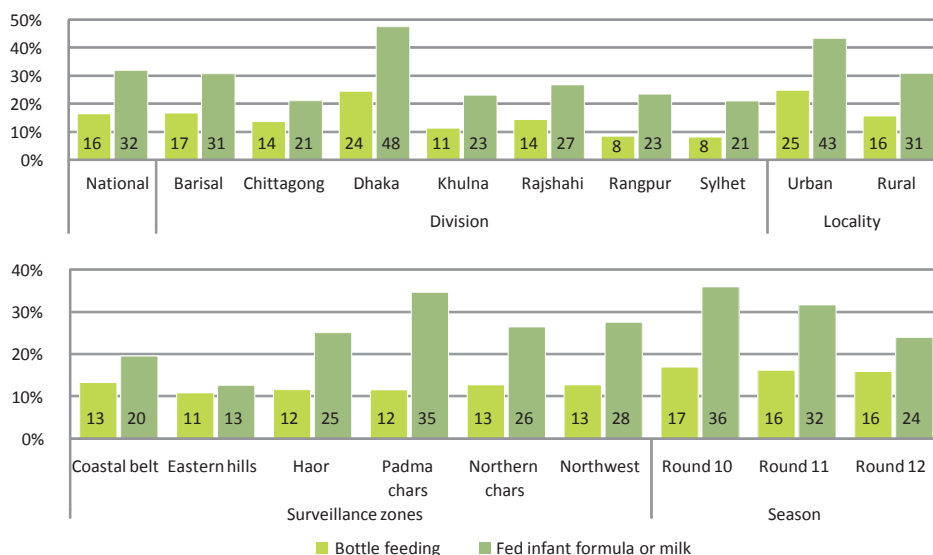
the risks of bottle feeding and breast milk substitutes. Bottles are a frequent source of bacterial or viral contamination and the substitutes themselves do not provide increased immunity for the child (8; 5; 20). While the Government of Bangladesh supports the protection of breastfeeding through various legislation and policy initiatives - such as the International Code for the Marketing of Breast Milk Substitutes, six

months maternity leave, health system support, and community support (3; 21) - the marketing of breast milk substitutes has remained widespread.

To monitor the use of breast milk substitutes, FSNP tracks the proportion of infants and young children zero to twenty-three months of age who were fed animal milk or milk substitutes, such as infant formula, the day before the interview, and/or those who were fed anything from an artificial

nipple, such as a bottle. As noted in Figure 8.13, the proportion of children who were fed with either of the three practices has not changed appreciably over the past four years. Fewer than one in five children less than two years of age were fed with a bottle. Feeding of either category of milk supplement was 32% in 2013, an incremental increase from 28% in 2011 and 31% in 2012.

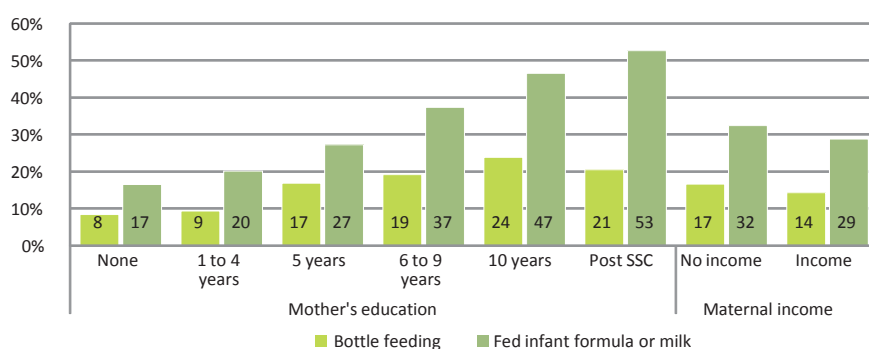
**Figure 8.14: Indicators of threats to breastfeeding by area of residence and season**



The proportion of infants and young children fed breast milk substitutes or with bottles varies greatly across the regions. Dhaka stands out for having the highest rates of both bottle usage and formula/milk feeding. Bottle and milk-supplement feeding are much

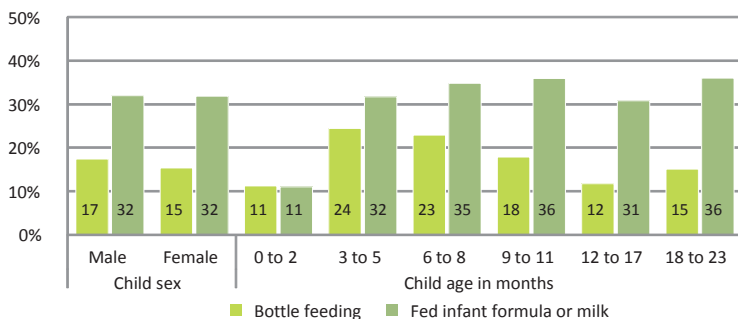
more frequent in urban areas compared to rural areas and have decreased somewhat between 2012 and 2013. The proportion of children fed with a bottle did not vary greatly over seasons, but feeding breast milk substitutes was lowest during Round 12. Most of the seasonal variation was caused by a change in the proportion of children fed animal milk.

**Figure 8.15: Indicators of threats to breastfeeding by maternal characteristics**



More educated mothers fed their children breast milk substitutes in a much greater proportion than less educated mothers (Figure 8.15). A mother's income earning status 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).



**Figure 8.16: Indicators of threats to breastfeeding by child characteristics**

given breast milk substitutes instead of being exclusively breastfed. Approximately one third of children received supplementary milk feedings from six to 23 months of age.

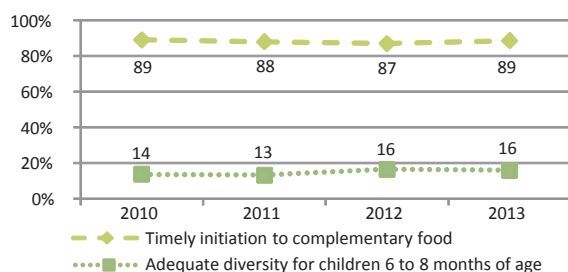
No significant difference was found between the proportions of male and female infants and young children who were fed by bottle or received infant formula or milk. The majority of bottle feeding takes place during the first year of life; almost one quarter of children three to five months of age were fed with a bottle and almost one-third were

### Complementary feeding

Complementary feeding refers to the transition from exclusive breastfeeding to breast milk accompanied with semi-solid and solid foods in the young child's diet. This transition should begin at six months of age after the period of exclusive breastfeeding has ended. The Bangladesh National IYCF Strategy (following WHO guidelines) stipulates that adequate complementary feeding be timely (meaning introduced immediately after the child has reached six months of age); 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 includes proper *recuperative care* when children fall ill (3; 4). This section will use five standardised indicators to examine complementary feeding practices in-depth and over targeted age ranges. The indicators in this section will focus on children six to twenty-three months of age, a critical period when inappropriate diets and nutritional deficiencies can retard growth and development for the remainder of the child's life (22).

### Timely introduction to complementary feeding

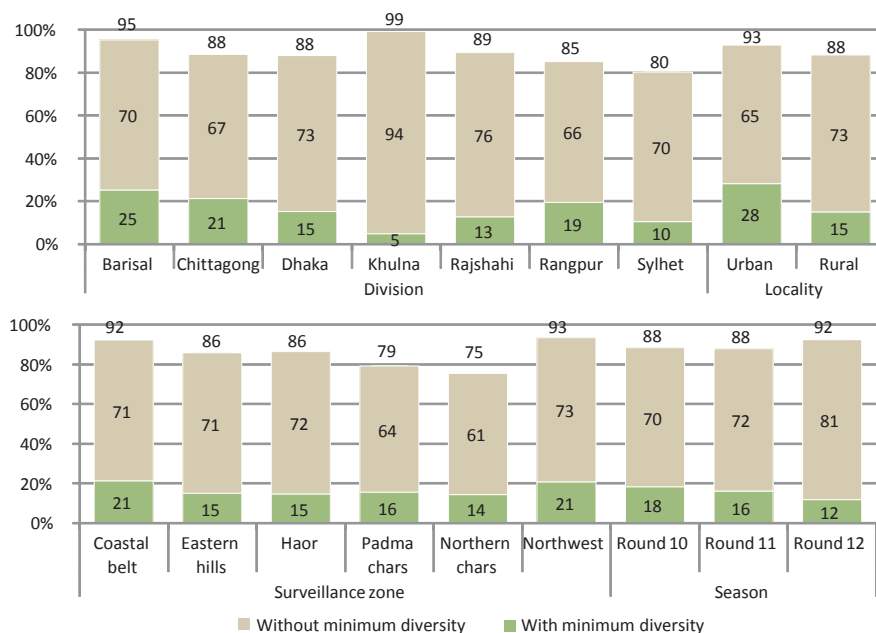
As mentioned above, children should begin receiving complementary foods as soon as they reach six months of age. This transition is required because the concentration of some nutrients, such as zinc and to a lesser extent iron, are relatively low in human breast milk and after six months of age it is difficult for infants to meet their nutrient needs from human breast milk alone (23; 8; 24). To estimate the proportion of infants who begin eating complementary foods at this ideal time, WHO recommends measuring the proportion of infants six to eight months old who ate any solid or semi solid food the day before the interview. As noted in Figure 8.17, the proportion of children who are timely fed complementary foods has not changed from 2010 to 2013; the level remained a little below 90%.

**Figure 8.17: Introduction to complementary foods (2010-2013)**

While this high rate of child feeding at six to eight months of age is heartening, the majority of children's diets are not diverse enough to provide adequate micronutrients. The Government of Bangladesh recommends that children six to twenty-three months of age eat a diverse diet, while WHO has indicated that a diverse diet should consist of at least four out of seven food

groups every day. Nationally, only around 16% of infants six to eight months of age are eating in line with this standard. This figure has held constant between 2012 and 2013, after a slight increase from 2012 (Figure 8.17).

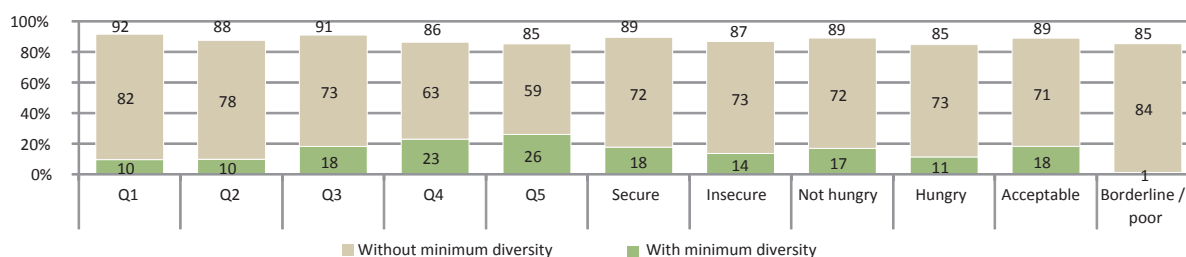
**Figure 8.18: Timely introduction to complementary foods by residence and season**



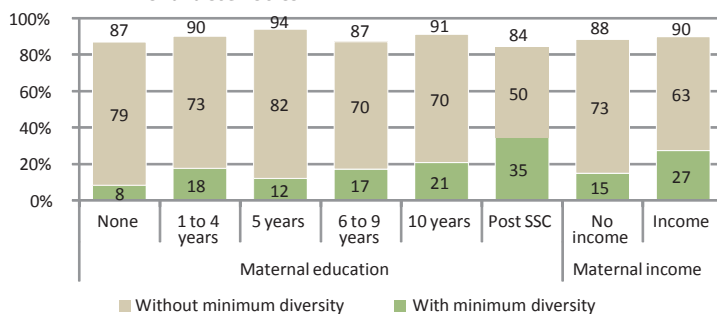
Minimum dietary diversity at these ages ranged from 5% in Khulna to 25% in Barisal, while introduction to any complementary foods ranged from 80% in Sylhet to 99% in Khulna. The rates of timely introduction to complementary foods were similar for both rural and urban areas, but a greater proportion of infants in urban areas were fed with minimum diversity. Overall rates of timely introduction

to complementary foods increased as the year progressed, while rates of adequate diversity fell significantly between Rounds 11 and 12.

**Figure 8.19: Timely introduction to complementary foods by household wealth and food security status**



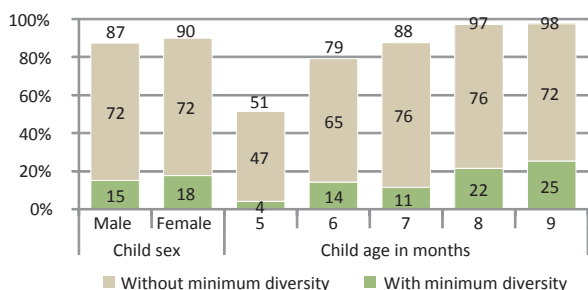
**Figure 8.20: Timely introduction to complementary foods by maternal characteristics**



The wealth and food security status of the household had only a limited association with the proportion of children who were introduced to foods at six to eight months of age, but a stronger association with the proportion of children receiving an adequately diverse diet. While only 10% of infants six to eight months old in the lowest wealth quintile had

an adequately diverse diet, over a quarter of those in the wealthiest quintile did. Not surprisingly, food consumption score, itself a household dietary diversity measure, was highly associated with infants' adequately diversified diets; almost no children from households with poor or borderline food consumption habits had adequate diversity. There was no significant relationship between maternal income and indicators of introduction to complementary foods and only a very limited association with level of mother's education (Figure 8.20).

**Figure 8.21: Timely introduction to complementary foods by child sex and age in months**



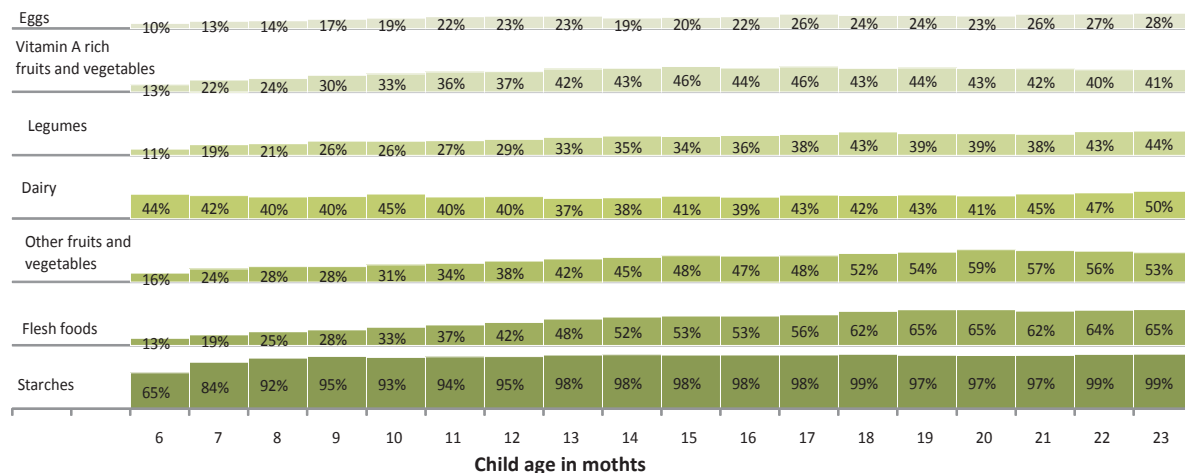
The proportion of male infants introduced to complementary foods on time did not vary significantly compared to that of female infants, likewise, there was no significant difference in the proportion of male versus female children fed foods with adequate diversity. As child age increased, the proportion of children fed complementary foods and the diversity of their diets increases. Results by age in months

indicate one shortfall of the measure: it fails to account for the considerable number of children who are fed before six months of age. In Bangladesh, nearly half of children aged five months were fed complementary foods.

### Dietary quality

As indicated above, children need to eat a variety of foods every day to meet their nutritional needs (3; 8; 25). Because of children's rapid growth and development, during the first two years of life, nutrient needs are very high in comparison to a child's overall size and the amount of food that they are able to eat in one sitting. Caregivers should ensure that meals contain sufficient fats and are nutrient and energy dense (8; 25). In addition, children should consume animal source foods and vitamin rich vegetables and fruits every day (26; 8; 25).

**Figure 8.22: Composition of childhood diets by WHO food group across age in months**

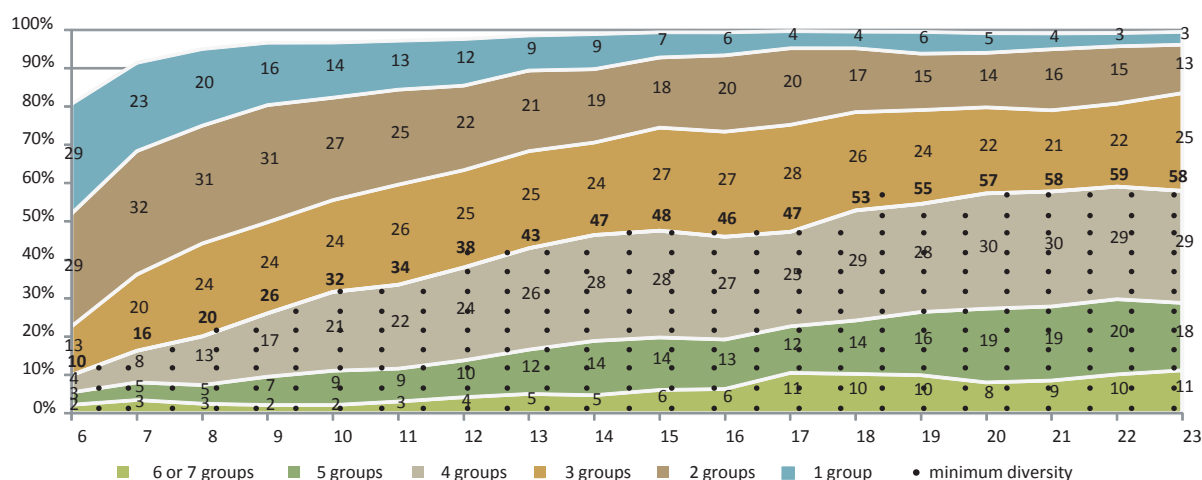


Using the WHO methodology, dietary quality is measured through the use of a seven-item scale - containing starches, legumes and nuts, dairy products, flesh foods, eggs, vitamin-A rich fruits and

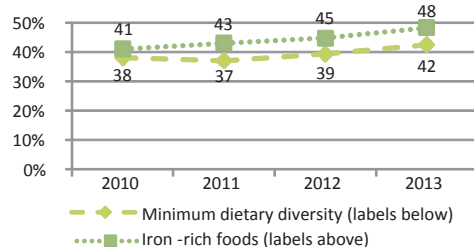
vegetables, and other fruits and vegetables - constructed from the 16 food type categories included in WHO's standardised IYCF questionnaire (5; 6). Figure 8.22 displays the proportion of children who were consuming foods from these groups by child age in months. As was seen in 2012, until ten months of age, the only food groups eaten by more than a third of children were micronutrient poor starches and dairy products that often replace breast milk. Until fifteen months of age, a little over half of the children were consuming micronutrient-rich flesh foods. Overall, diets are lacking in diversity.

Similar to the logic that informed the women's dietary diversity measures, a summary of food groups eaten is not enough to quantify the proportion of children eating a diet with adequate diversity. Accordingly, a cut-off for the minimum number of food groups required for an adequate diet has been constructed for children six months to two years of age: four out of seven food groups are required each day. Unlike the adult indicator, the minimum dietary diversity measure for children identifies probable dietary sufficiency. As can be seen from Figure 8.23, too few children are meeting this requirement in Bangladesh. Though virtually all children are being fed complementary foods by 11 months of age, 13% of these children are only consuming foods from one food group, usually micronutrient poor starches. By two years, slightly over half of children were eating a diet that is minimally diverse.

**Figure 8.23: Number of food groups consumed by children across age in months<sup>3</sup>**



**Figure 8.24: Trends in child dietary quality indicators**



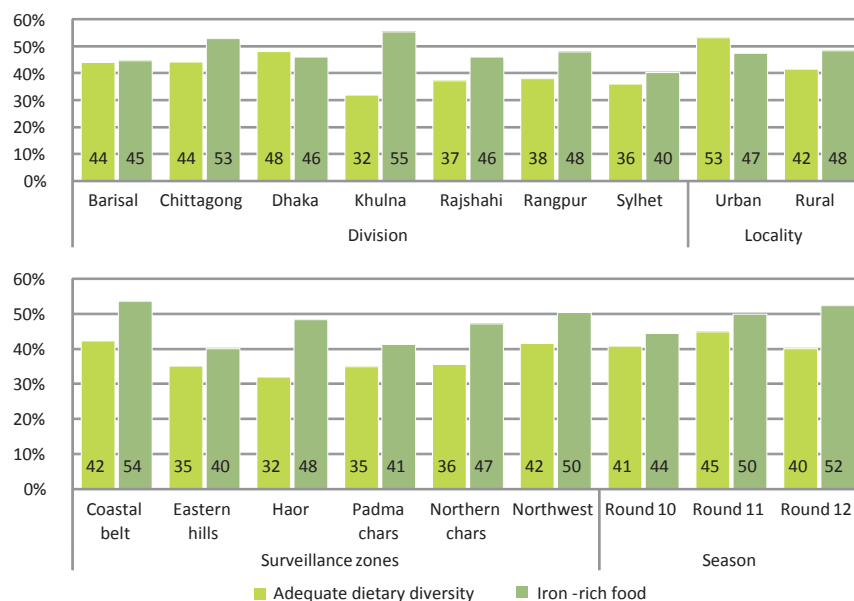
As shown in Figure 8.24, the proportion of children fed a minimally diverse diet has increased incrementally since 2010, with only a little over two-fifths of children eating a minimally diverse diet in 2013 (27; 28). In addition to general dietary diversity, WHO recommends measuring the proportion of children six months to two years of age 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. This

indicator has also increased slightly over the period. The vast majority of these children met this requirement through the consumption of flesh foods, particularly fish, and only around 1% of children had consumed an iron supplement or micro-nutrient powder packet the day before the interview.

<sup>3</sup> This graph is constructed using a three month moving average thus it will differ from point estimates elsewhere in this report.

Similar to past results, Khulna stood out as the division with a very low proportion of children, only a little over one-quarter, meeting the minimum diversity standard, followed by Rajshahi, Rangpur and Sylhet. In contrast, in Khulna and Chittagong slightly over half of the children in these areas ate an iron-rich food the previous day. A greater proportion of children in urban areas meet the minimum

**Figure 8.25: Indicators of dietary quality by area of residence and season**



dietary diversity standards than children in rural areas, but there is no difference in the proportion of children eating an iron-rich food. Across surveillance zones, the Coastal belt stands out as the zone with the highest percentage of children eating iron-rich foods. The proportion of children eating a minimally diverse diet is higher in the monsoon (Round 11) compared to Rounds 10 and 12, which is in line with the pattern observed in women's diets and households'

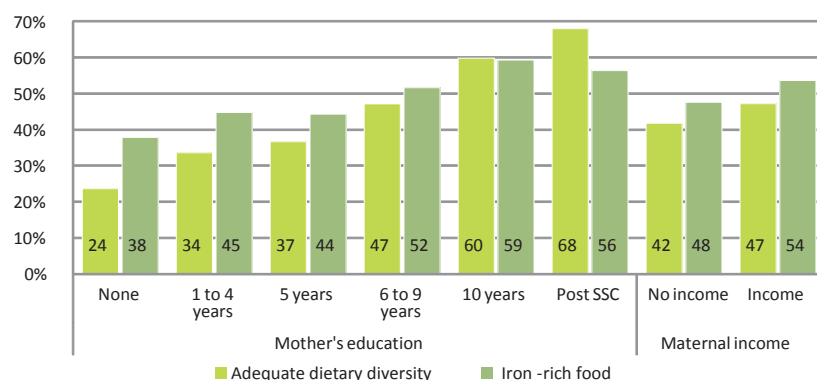
food consumption. As was the case with these other indicators, this pattern of seasonal variation was not found in all surveillance zones (figure not shown).

**Figure 8.26: Indicators of dietary quality by household wealth and food security status**

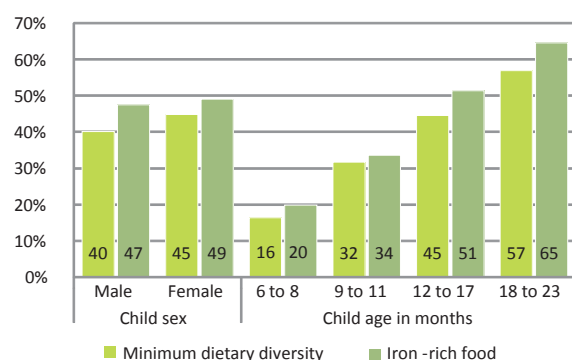


There was a step-wise increase in the proportion of children consuming diverse diets with increasing wealth quintile; however, this relationship was not seen between wealth quintile and the proportion of children consuming an iron-rich food. As shown in Figure 8.26, children from households in the wealthiest quintile ate significantly more diverse diets than children from households in the lowest



**Figure 8.27: Indicators of dietary quality by maternal characteristics**

found between wealth categories. Maternal education was more strongly associated with children's dietary quality than wealth category, while maternal income was insignificant for both indicators (Figure 8.27).

**Figure 8.28: Indicators of dietary quality by child age and sex**

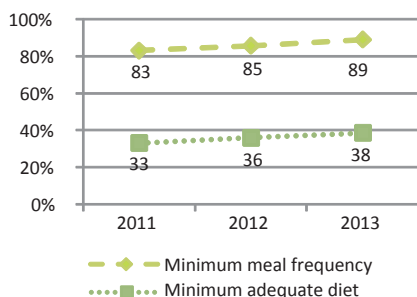
There were small and statistically insignificant differences in the proportions of male versus female children who ate minimally diverse diets and who ate an iron-rich food. However, age was significantly associated with both of these indicators; as age increased, so did the proportion of children that ate in line with these practices. However, even among children 18 to 23 months of age, only a little over half ate minimally diverse diets and around two-thirds consumed an iron-rich food the day before the interview.

### Minimum acceptable diets

In addition to adequate dietary diversity, infants and young children need to be fed a sufficient quantity of complementary foods for their diets to be adequate. The amount of complementary food in children's diets should increase gradually over the period from six months to two years of life and care must be taken so that complementary feeding does not replace breast milk (8). Bangladesh's IYCF guidelines, in line with the WHO complementary feeding guidelines, recommend using frequency of feeding as a proxy for amount of food fed. Guidelines state that children six to eight months of age should be fed two to three meals of soft foods a day in addition to snacks, and children nine months to two years of age should be fed three to four meals a day in addition to snacks (3; 8). To measure the proportion of children consuming a minimum acceptable diet, FSNP uses two indicators recommended by WHO: minimum meal frequency and minimum acceptable diet. Both of these measures require separate tabulation for breastfed and non-breastfed children, the results of which are combined into one indicator. Because the 92% of children six months to two years of age are breastfed, the overall estimates of these indicators closely track those for breastfed children (see Figure 8.30). Given that the definitions of these indicators differ by breastfeeding status, it is important not to directly compare these indicators between breastfed and non-breastfed children (5; 6).

FSNSP directly asks caregivers the number of times they fed their child 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 six months to two years of age ate meals, snacks, and had milk-feeds a total of at least four times. In 2013, nearly 90% of all children were fed with minimum frequency, indicating an incremental increase each year since 2011.

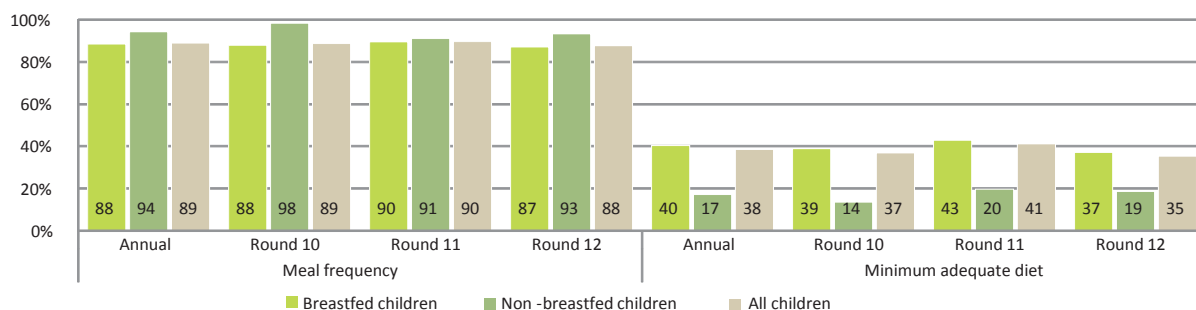
**Figure 8.29: Adequate diets (2011-2013)**



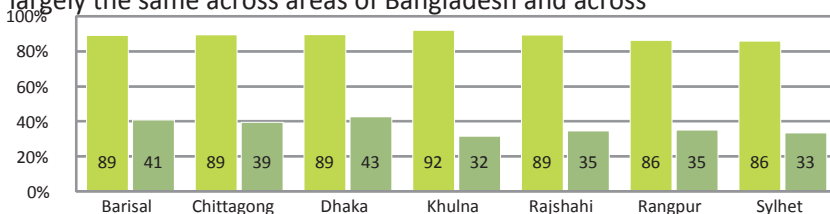
The second indicator, minimum acceptable diets, combines the dietary diversity measure given in the previous section with the feeding frequency indicator just reviewed. Breastfed children aged six months to two years are classified as having had a minimum acceptable diet if they met the criteria for both of these indicators. For non-breastfed children, the tabulation is more difficult. Non-breastfed children aged six months to two years old are classified as having had a minimum acceptable diet if they had been fed milk at least twice, had been fed milk or solid/semi-solid foods at least four times, and if they had eaten at least four food groups

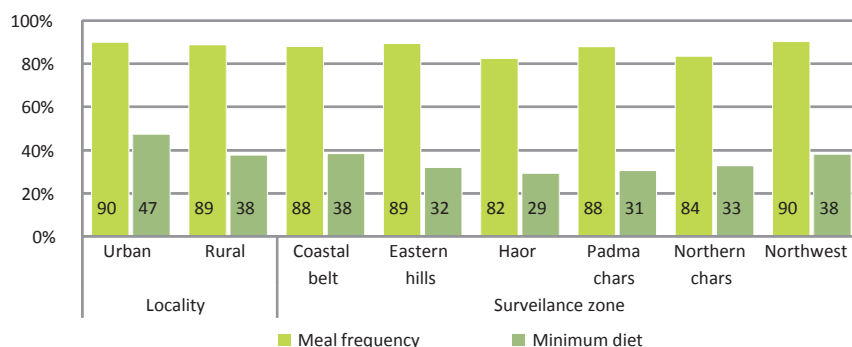
excluding dairy products. In 2013, more than one-third of children were fed minimally adequate diets (Figure 8.29). This indicates a considerable increase in children eating minimally acceptable diets since 2011, but the current level is still far short of the target of 52% set in the HPNSDP.

**Figure 8.30: Minimum meal frequency and adequate diet nationally by breastfeeding status and season**



**Figure 8.31: Minimum meal frequency and adequate diet by area of residence**

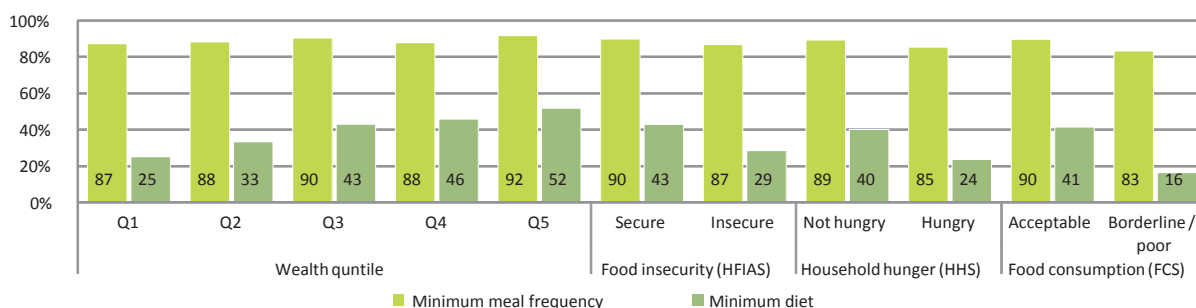




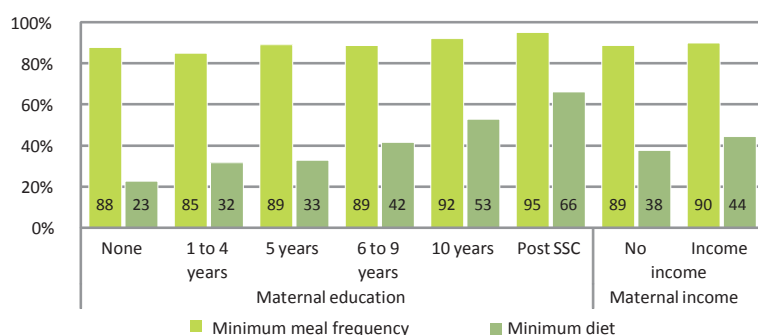
seasons in 2013. A slightly greater proportion of breastfed children compared to non-breastfed children were fed with adequate frequency in all seasons, but this group attained a minimal diet less frequently than the breastfed group across all

seasons. Children in urban areas ate an adequate diet more frequently than children in rural areas. There was much greater variation in the proportion of children fed minimally adequate diets than those fed with minimum frequency. Across the seasons of 2013, there were slightly greater proportions of children eating minimum adequate diets in the monsoon months than at other times of the year. This difference was largely due to changes in the diversity of children's diets during the year.

**Figure 8.32: Minimum meal frequency and adequate diet adequacy by wealth and food security**

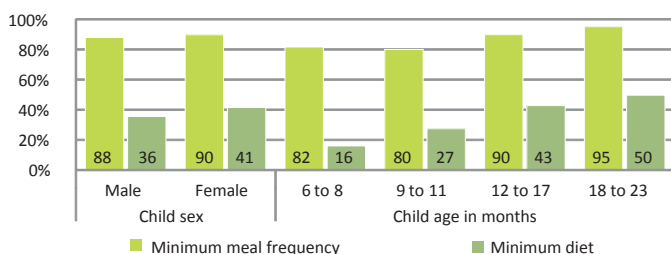


**Figure 8.33: Minimum meal frequency and adequate diet adequacy by maternal characteristics**



The proportion of children fed with the minimum frequency was slightly lower in the lowest quintile compared with that in the highest wealth quintile. In contrast, there was a step-wise increase in the proportion of children fed with minimally adequate diets as wealth quintile increased (Figure 8.32). However, even in the wealthiest quintile

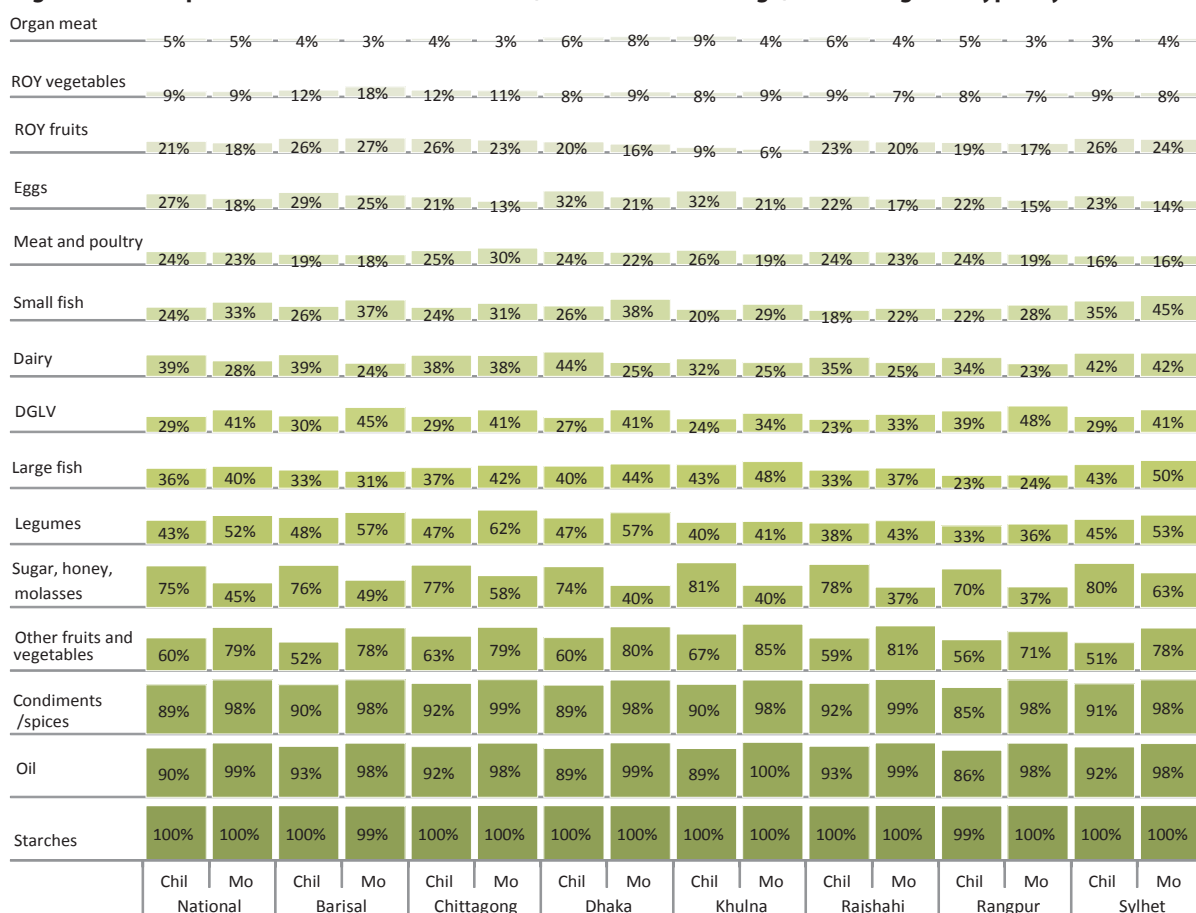
only a little over half of children received the minimum diet. There was little or no difference in the proportion of children fed with minimum frequency in food secure compared to food insecure households, but there were sizable differences in the proportion of children being fed minimum adequate diets. The proportion of children fed with minimum acceptable diets was associated positively with the level of maternal education (Figure 8.33). Over seasons, there were no notable patterns in these indicators by wealth or food security characteristics (graphs not shown).

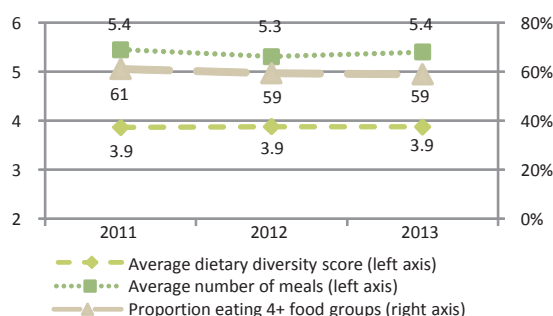
**Figure 8.34: Minimum meal frequency and adequate diet adequacy by child sex and age**

In 2013, a significantly higher proportion of female children were fed minimally acceptable diets than male children. As with many of the complementary feeding variables, the proportion of children fed in line with these guidelines increased with age. While less than one-fifth of children six to eight months of age were fed in line with minimum standards, this increased to half of children in the oldest age group.

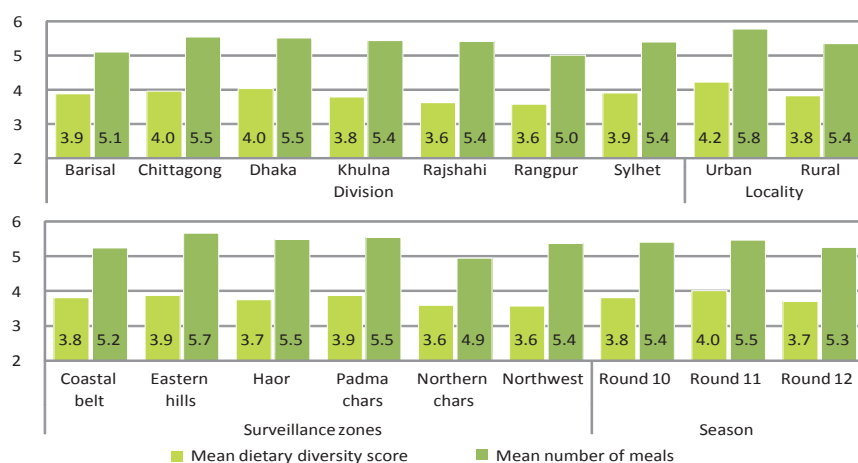
### *Dietary patterns among older children*

FSNSP includes pre-school children older than two years of age in dietary assessment, even though standardised IYCF indicators currently do not include this group (5; 6). The information on older children allows FSNSP to track changes in the dietary diversity and eating habits of this population (5; 6 29). Figure 8.35 compares the dietary patterns of mothers to their children over two years of age. Foods types eaten by mothers and children are largely the same but there are some notable differences. Nationally, the only items consumed by a significantly greater number of children than mothers were sweets, followed by dairy and eggs. A lower proportion of children eat spices, oil, fish, dark green leafy vegetables, and other fruits and vegetables than their mothers.

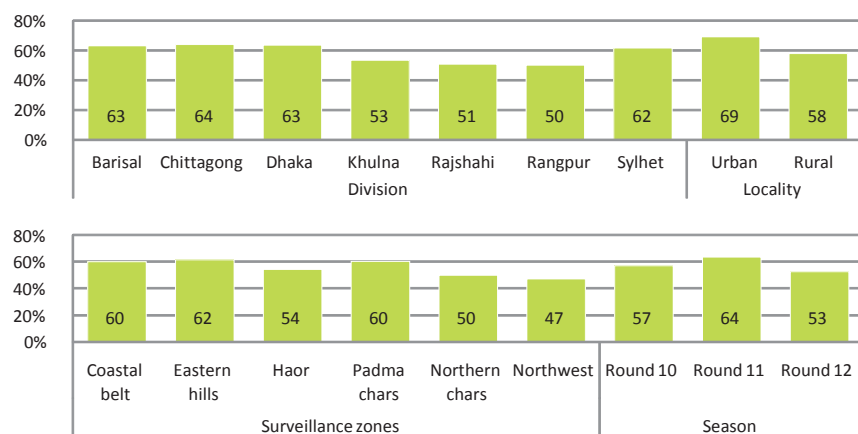
**Figure 8.35: Proportion of mothers and children (24 to 59 months of age) consuming food types by division**

**Figure 8.36: Diets fed to children 24 to 59 months of age**

The mean dietary diversity score and meal frequency for older pre-school children has changed little since 2011 (Figure 8.36). Regionally, children ate less diverse diets in Rajshahi and Rangpur, in line with the pattern seen for younger children (compare Figure 8.25 and Figure 8.37). Children ate more diverse diets and more frequently in urban areas compared to rural areas. The diversity of child diets and frequency of feeding increased slightly during the monsoon (Round 11).

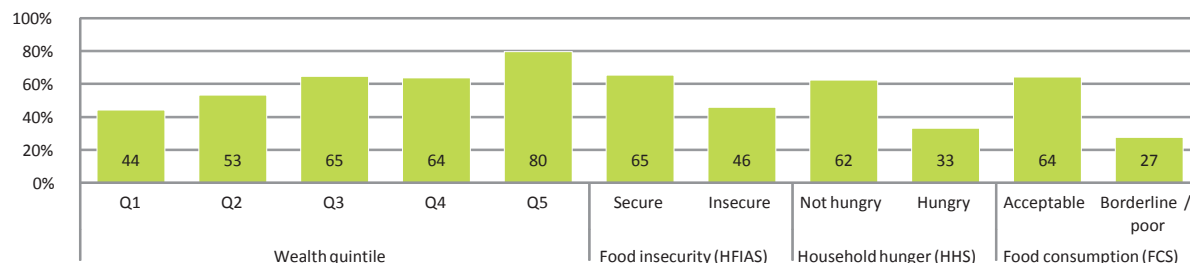
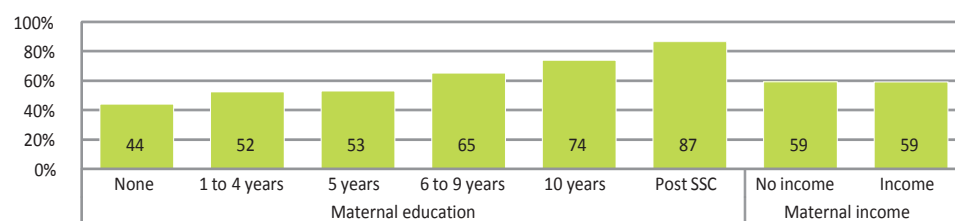
**Figure 8.37: Mean dietary diversity scores and meals by residence (24 to 59 months of age)**

average, children are fed standard meals plus two to three snacks a day. In contrast, many children still did not meet the requirement of eating four out of seven food groups the previous day (Figure 8.38).

**Figure 8.38: Children 24 to 59 months of age eating four or more food groups by residence**

By applying the IYCF indicator principals to older children, excluding the breast milk requirements, FSNP estimates the proportion of older children who are eating an adequate diet. Nearly all children over two years of age are eating at least three meals or snacks a day (99%, figure not shown), and many are eating much more frequently than this. Nationally, on average, children are fed standard meals plus two to three snacks a day. In contrast, many children still did not meet the requirement of eating four out of seven food groups the previous day (Figure 8.38). Only half of children in Rajshahi and Rangpur ate diets which were minimally diverse. A significantly higher proportion of urban children 24 to 59 month of age ate minimally diverse diets than rural children. Significantly, more children ate a diverse diet during the monsoon months (Round 11), which is consistent with the observed dietary diversity patterns of women and households.



**Figure 8.39: Children 24 to 59 months of age eating four or more food groups by wealth and food security****Figure 8.40: Children 24 to 59 months of age eating four or more food groups by maternal characteristics**

Interestingly, in all the wealth quintiles, the proportion of children 24 to 59 month of age fed four or more

food groups is much higher than the proportion of children six months to two years of age eating diverse diets (compare Figure 8.26 with Figure 8.39). This indicates that even less wealthy households were able to manage more diverse diets for older children, but failed to do so for younger children. However, some households, such as the fifth of households with poor or borderline food consumption, were largely unable to meet the diversity requirements for children of this age as well. Maternal education but not maternal income earning status was associated with an increase in the proportion of children fed a diverse diet (Figure 8.40). There was no difference in the proportion of male and female children who ate a minimally diverse diet (graph not shown). There was also no difference over age in the proportion of children eating a diverse diet (graph not shown).

### Preventative health care

Adequate hygiene and appropriate feeding practices are very important for preventing illness in infants and young children. Nutritional supplements and routine medicines also play an important role in building the immune systems of children so that they can fight infections. Children who do not receive adequate micronutrients while young are at a higher risk of suffering from developmental delays and chronic health problems later in life (30). This section will focus on two Government of Bangladesh-led preventative health care campaigns: the national vitamin A supplementation programme and the national deworming programme.

#### National vitamin A campaigns

Required by all body tissues for normal growth and repair, vitamin A is vital for proper immune system functioning, visual perception, and cellular reproduction (31). Vitamin A deficiency, even when mild, has been linked to increased morbidity and mortality and delayed development of infants and young children. Clinical vitamin A deficiency is identified by decreased vision, particularly at night. Though vitamin A deficiency is still the leading cause of preventable blindness in children, the number of children affected has fallen dramatically since the early 1990s. This is no doubt due to large scale interventions that seek to improve breastfeeding and complementary feeding practices and provide vitamin A supplementation to children (32). Vitamin A and nutrient components that can be made into vitamin A in the human body (vitamin A precursors) are naturally occurring in many foods.

The Government of Bangladesh currently implements a large scale vitamin A supplementation programme coordinated out of the Ministry of Health, Directorate of Health Services (32). This programme provides low potency vitamin A supplementation (100,000 i.u.) to children six to 11 months of age and high potency vitamin A capsules (200,000 i.u.) to children from one to five years of age twice a year on national immunisation day (NID) and national vitamin A campaign (NVAC) days. Recent WHO recommendations support this programme (33). In addition, the national vitamin A policy and WHO encourage all to eat more diverse diets, especially those for whom vitamin A supplementation is not recommended (32; 34; 33).

**Figure 8.41: VAC coverage for children 12 to 59 months of age (2010 to 2013)**

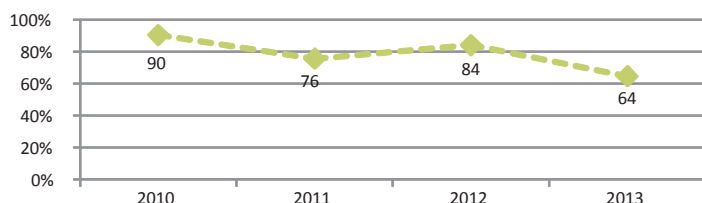
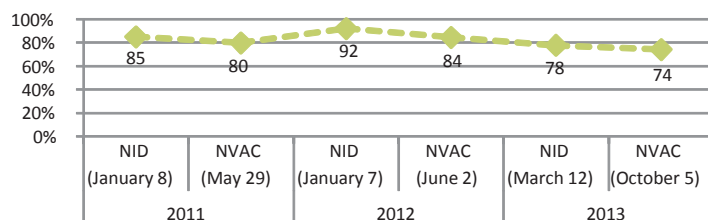


Figure 8.41 displays the proportions of children 12 to 59 months of age who had received vitamin A capsules (VAC) in the six-months prior to interview.<sup>4</sup> Notably, the level of coverage has decreased greatly from 90% in 2010 to 64% in 2013. The low coverage rate of the VAC campaigns in recent years are due to gaps in the scheduling of these programmes and to drops in programme coverage since 2010. In 2013, the NID (March 12th) was held after a sizable delay due to issues around capsule procurement. The NVAC day was held on October 5th. In addition, any measure of programme coverage must take into account the age of the child on the last VAC distribution date and not the child's age at interview. The coverage of both VAC events in 2013 was lower than the events held in 2011 and 2012 and much lower than the HPNSDP target of 90% for 2016. However, the coverage rates varied much less by age than they have in recent years (Figure 8.46).

**Figure 8.42: Coverage of recent VAC campaigns (6 to 59 months)**



**Figure 8.43: Coverage of the NVAC campaigns by area of residence (6 to 59 months)**

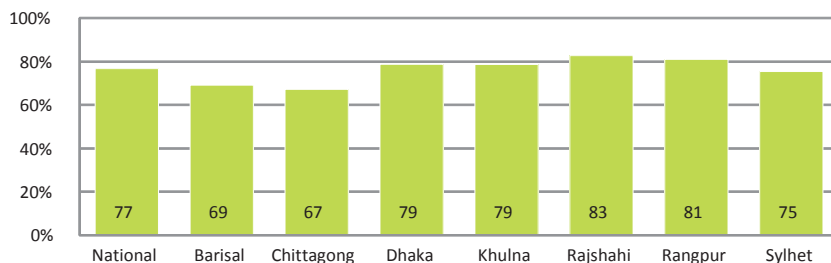
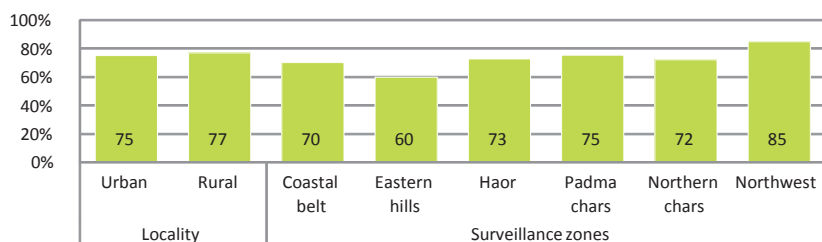
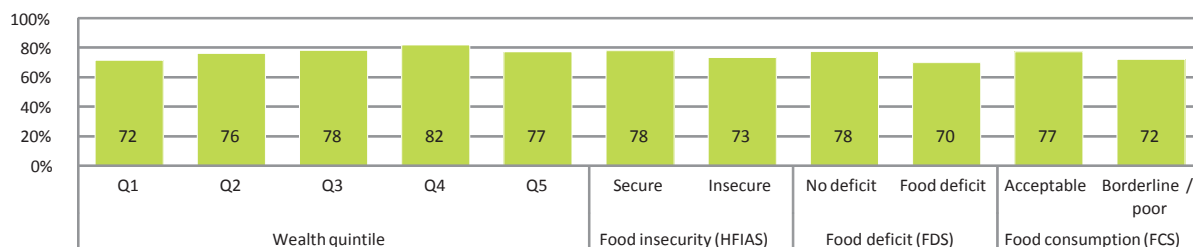


Figure 8.43 pools these two estimates to show overall coverage of the NVAC events among children six to 59 months of age at the time of the event. Coverage rates among these groups declined by ten percentage points nationally between 2012

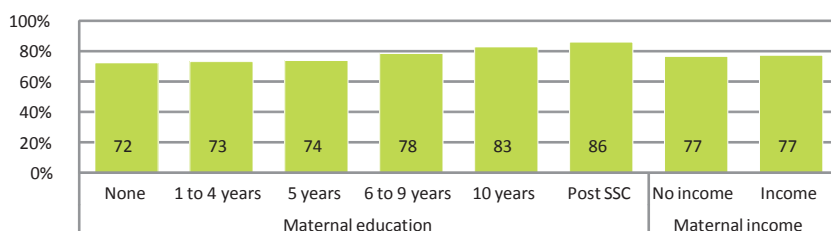
<sup>4</sup> The younger age cohort of six to eleven months is not shown in this graph because recommendations for this age group changed in 2011.



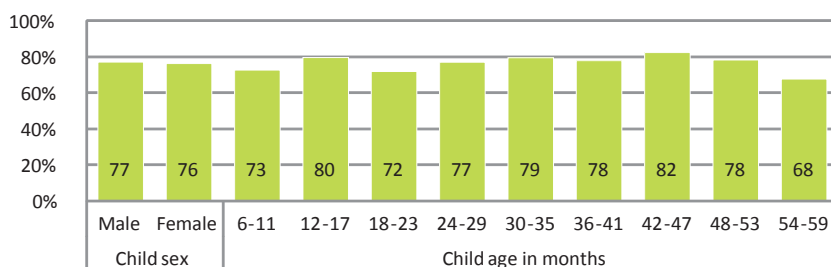
**Figure 8.44: Coverage of the NVAC campaigns by household characteristics (6 to 59 months)**



**Figure 8.45: Coverage of the NVAC campaigns by maternal characteristics (6 to 59 months)**



**Figure 8.46: Coverage the NVAC campaigns by child sex and age**



adequate vitamin A from their diet. Figure 8.46 shows little variation in the proportion of children who received VAC by age, and no significant difference in coverage between male and female children.

### Deworming

Mass provision of allopathic deworming to children is another preventive health care programme linked to the NVAC campaigns. By directly absorbing nutrients from the body, helminthes (worm) infections have a highly detrimental impact on the nutritional status of an individual. In infants and young children, such an impact often results in growth faltering, increased illness, and lower immunity. The burden of these infections falls disproportionately on the poor living in areas with inadequate

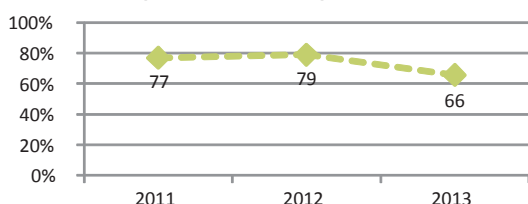
and 2013. Chittagong division had the greatest decrease and Barisal the smallest. In 2013, there was no variation in coverage between urban and rural areas.

There were small differentials in coverage between children from different wealth and food security categories. Additionally, children whose mothers had greater educational attainment received VAC in a higher proportion. This is problematic because children from less wealthy and more food insecure households ate less diverse diets in greater proportion (see Figure 8.26) and thereby had less opportunity to obtain

sanitation. Though the prevalence of helminthes infections for Bangladesh is not available, estimates suggest a combined prevalence above the 20% cut-off for intervention (35).

Treating helminthes infections is inexpensive; multiple effective drugs exist in the market and are provided via the government health services. The Government of Bangladesh recommends regular receipt of allopathic anti-helminthes tablets by all children 24 to 59 months of age as part of the country's anaemia control programme (3), but does not extend the provision of these tablets to children aged 12 to 23 months as stated in WHO recommendations (36). These tablets are often distributed at the same time as, or shortly after, the NID or NVAC days. Troublingly, between 2012 and 2013, the proportion of children who received both VAC and allopathic anti-helminthes tablets decreased 15 percentage points to 62% while the proportion receiving neither doubled from 6% to 12%.

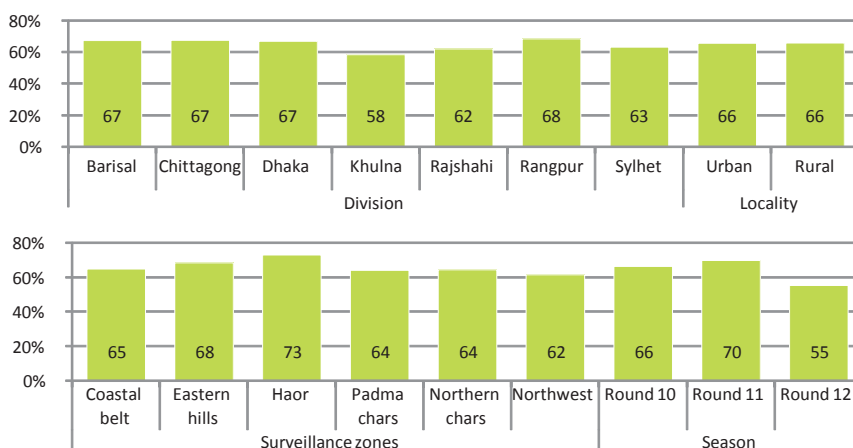
**Figure 8.47: Coverage of allopathic deworming (24 to 59 months)**



Coverage of this programme was measured by the proportion of children 24 to 59 months of age who had received an allopathic anti-helminthes tablet in the six months prior to interview. Troublingly, the proportion of children who received anti-helminthes tablets dropped from nearly four-fifths in 2012 to only two-thirds in 2013. Coverage rates were above 50% in all parts of the country but

round-wise estimates show a drop in coverage rates during Round 12, no doubt due to the shortened nature of this round.

**Figure 8.48: Coverage of allopathic deworming by area of residence**



Similar to the NVAC campaign, the deworming campaign shows a stepwise increase in coverage among the children as we move from less wealthy quintiles to wealthier quintiles, and coverage is higher among food secure households (figure not shown). Coverage rates were also higher among children whose

caregivers had better educational attainment (figure not shown). In line with government guidelines, two times the proportion of children two to four years of age were given allopathic anti-helminthes tablets than children one year of age (30%, figure not shown). Coverage did not vary by child sex (figure not shown).

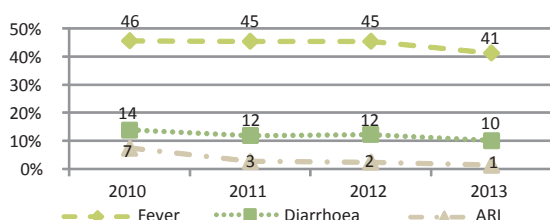
## Illness and recuperative health care

One barrier to child growth and development is inappropriate feeding during illness, particularly during diarrhoea. Government of Bangladesh endorsed infant and young child feeding practices (IYCF) include proper recuperative care when children fall ill (37; 38). During and after illness, children have greater fluid and nutrient requirements to overcome the nutrient loss and mal-absorption that occurred during illness (39; 40). WHO and UNICEF recommend that caregivers continue feeding (or breastfeeding) the child throughout the illness and increase feeding immediately after the illness (39; 40). 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 treatment facility.

### Childhood illness

FSNSP includes estimates of the period prevalence rate of three common childhood illness conditions - fever, diarrhoea, and acute respiratory infections (ARI) - for the two weeks prior to interview. FSNSP defines fever based on a caregiver report of elevated temperature, diarrhoea as three or more loose motions in a twenty-four hour period, and ARI as a cough coupled with difficulty breathing. In 2013, the proportion of children suffering from fever decreased slightly from previous years (Figure 8.49).

**Figure 8.49: Proportion of children ill (2010-2013)**



**Figure 8.50: Proportion of children ill by area of residence**



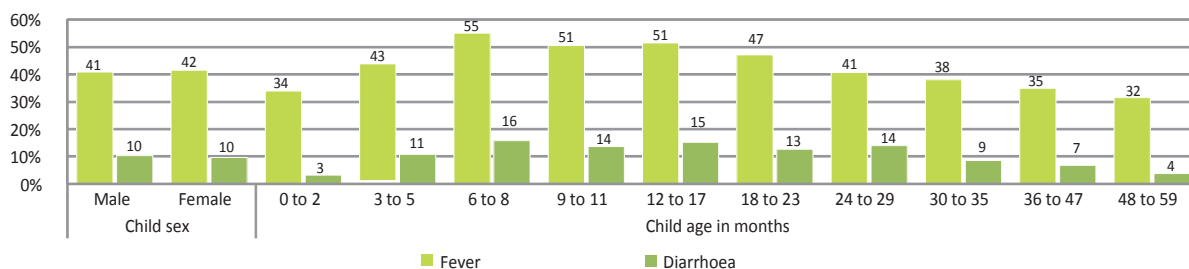
Fever period prevalence was lowest in Dhaka and Khulna and highest in Chittagong. Children in rural areas had slightly higher period prevalence rates for fever. The period prevalence of fever was lowest during the post-aman harvest season (Round 10), while the period prevalence of diarrhoea did not vary greatly over the year. In line with past results, wealthier households and those with more educated mothers had slightly but significantly lower period prevalence

rates for fever (figure not shown). Similar to past years, there was no difference in the period prevalence of fever and diarrhoea between girls and boys, but the age of the child was associated with



prevalence of recent illness (Figure 8.51). Both diarrhoea period prevalence and fever period prevalence peaked at six to eight months of age.

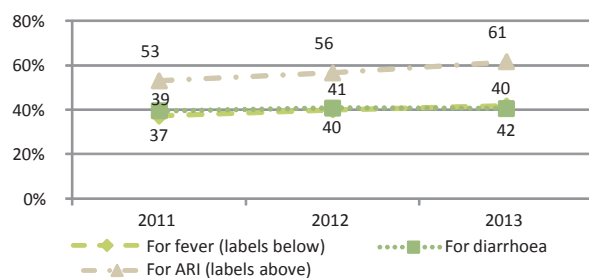
**Figure 8.51: Proportion of children ill with fever and diarrhoea by child sex and age**



### Clinical care for illness

Recuperative care for child illness consists of both seeking guidance from a health care professional, and proper care of the child at home. In line with DHS methodology, FSNP records the proportion of children who were taken to a formal health facility or provider, excluding pharmacies, shops, or traditional practitioners (29). As expected, the proportion of children who are taken to a medical provider when sick varies greatly by the symptoms experienced and characteristics which are related to the ability of the household to access care.

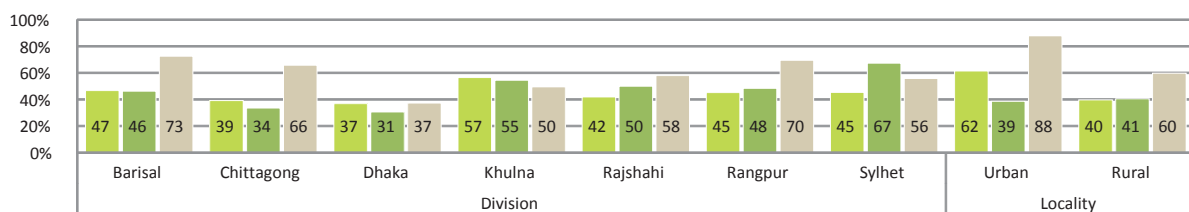
**Figure 8.52: Ill children who were taken to a medical provider <sup>5</sup>**



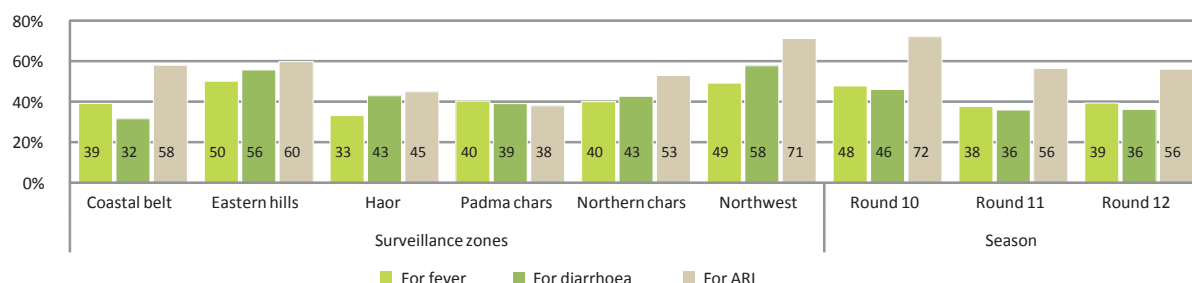
For ARI and fever, the proportion of children taken to a medical provider has increased since 2011. In line with past results, parents take children sick with ARI to a medical provider more frequently than children sick with diarrhoea or fever. There was little congruence between care seeking by illness type 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 proportion of children taken to a medical provider when ill with fever or ARI were significantly higher in urban areas compared to the rural areas, but there was no difference for diarrhoea. Seasonally more children were taken to a medical provider early in the year. This pattern could be due to differences in child age across seasons (see Figure 8.54)

**Figure 8.53: Proportion of children ill who were taken to a medical provider by area of residence**

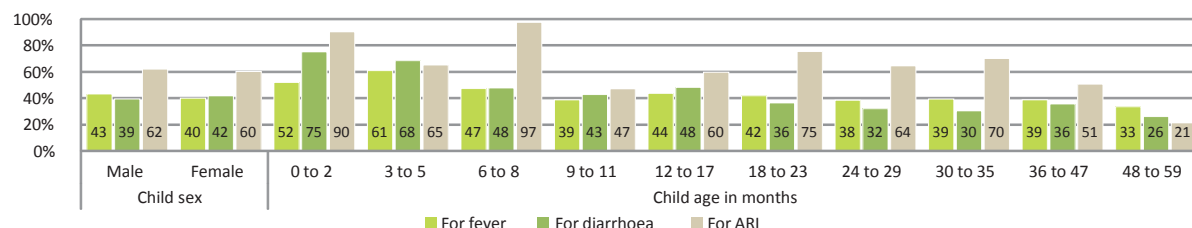


<sup>5</sup> These figures are revised from those in the previous years' reports. While this indicator in 2011 and 2012 assumed that caregivers who did not know where care was sought did not receive care for a medical provider, this indicator now excludes these children from the calculation.



Similar to 2012, in 2013, wealthier and more food secure households accessed medical care for their children in a greater proportion than less wealthy and food secure households (figure not shown). Similarly, rates were higher for the mothers with better educational attainment than their less educated peers (figure not shown). Professional medical care was sought more frequently for children in their first year of life (Figure 8.54). There was no systematic difference in the proportion of male compared to female children who received care for illness.

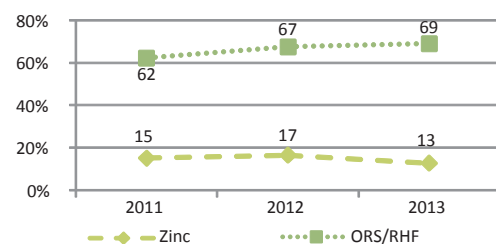
**Figure 8.54: Proportion of sick children taken to a medical provider by child age and sex**



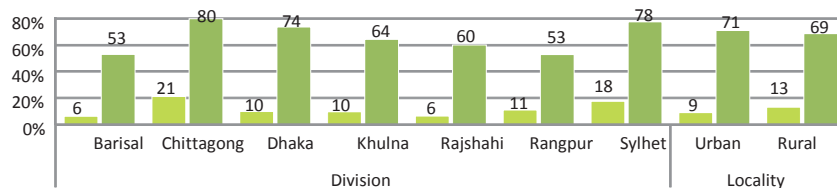
### Home care for diarrhoea

Effective treatment of children during diarrhoea can prevent over 90% of deaths related to diarrhoea. In addition to medical and facility based care, care at home including combination of ORS and Zinc can greatly improve recovery time for children, particularly those suffering with diarrhoeal illness. While ORS is effective at saving lives due to dehydration, zinc has been shown to reduce the time that children over six months of age suffer diarrhoea (34). 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 (40).

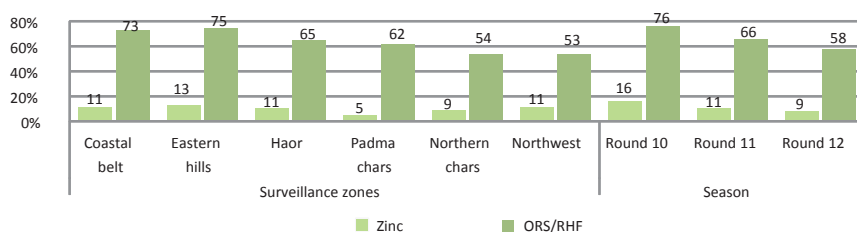
**Figure 8.55: Zinc and ORT for diarrhoea**



**Figure 8.56: Zinc and ORT for diarrhoea by area of residence**



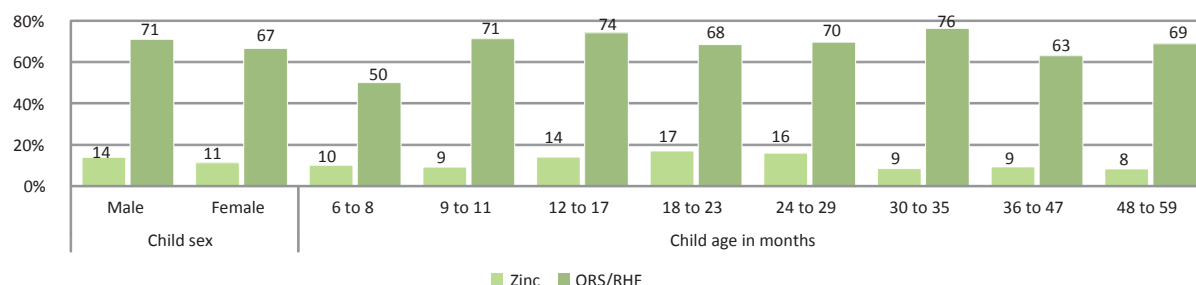
Focusing on home care for diarrhoea, FSNP records the proportion of the youngest children aged six to fifty-nine months among those ill with diarrhoea in the two weeks prior to the interview who were treated with zinc or oral



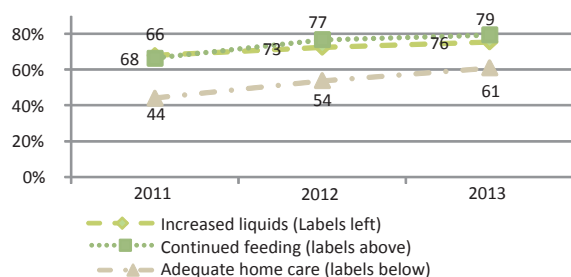
rehydration therapy. Oral rehydration therapy includes both liquids prepared from commercial oral rehydration salts (ORS packets) and rehydration

liquids prepared with homemade ingredients such as salt, sugar, and rice starch. Nationally, a little over one tenth of children who had diarrhoea diagnosed by their caregiver were given zinc supplementation - a slight decrease from past years - while over two-thirds of children were provided oral rehydration therapy - a slight increase from past years. Chittagong and Sylhet had the highest proportion of children treated in line with these recommendations. More children received zinc and ORT in the first season of 2013 compared to later periods. Infants younger than nine months received ORT in a lower proportion than older children. A greater proportion of sick children aged twelve to twenty-nine months were fed zinc than other age groups. Male children were fed both zinc and ORT in a slightly greater proportion than female children, but the difference was not statistically significant.

**Figure 8.57: Proportion of children with diarrhoea given zinc or ORT therapy by child age and sex**



**Figure 8.58: Adequate home care for diarrhoea**



FSNSP also includes more general indicators of child feeding during illness. The caregivers of children six to fifty-nine months of age who were sick with diarrhoea are asked to provide a comparative assessment of the amount of food and liquids that had been given to the child during the recent illness compared to usual practice. Children recently sick with diarrhoea are classified as having received increased liquids if their caregiver reported giving them increased liquids or ORT during their illness. On the other

hand, children recently sick with diarrhoea are classified as having received continued feeding if their care giver 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. All three indicators have improved since 2011 (Figure 8.58), but while over three quarters of children recently ill with diarrhoea were given increased liquids and continued feeding during their most recent illness, only a little under two-thirds of recently ill children received both of these care practices.

Across the divisions the proportion of ill children receiving increased liquids and adequate home care during the course of illness was highest in Chittagong, while the proportion receiving continuous feeding was highest in Barisal. Overall, Rangpur division had the lowest proportion of sick children receiving any of the listed home care. There was little variation between urban and rural areas, but similar to zinc and ORT a greater proportion of sick children received adequate home care in the first season of the year. Except for a lower rate of adherence to these recommended practices for the youngest age group (six to eight months of age), these practices did not vary by age or sex (figure not shown).

**Figure 8.59: Proportion of children with diarrhoea given increased fluids and continued feeding by residence**





# Nutritional status of children

In 2013, FSNSP recorded the height, weight and MUAC measurements of 12,000 under five children to estimate the nutritional status of children under five years of age in Bangladesh.

The rate of under five stunting decreased from 37% in 2012 to 35% in 2013, while underweight fell from 33% to 30%. Annualised rates of wasting did not decrease.

The highest proportion of stunted (45%) and underweight (35%) children under five years of age were found in the Haor zone; the highest rate of wasting (13%) was in the Northern chars zone. Acute under nutrition peaked during the monsoon season across agro ecological zones.

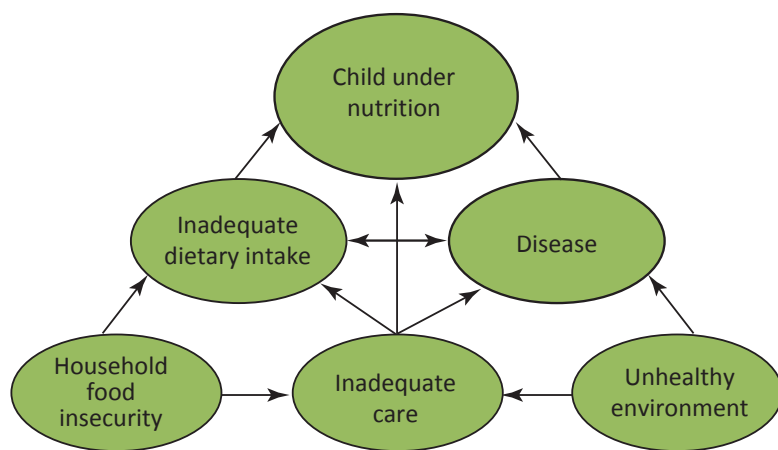
Children of illiterate mothers, and those living in poor and food insecure households were more likely to be under nourished.





As stated in previous chapters, numerous shortcomings in child care, protection, and feeding have contributed to the high rates of child under nutrition seen in Bangladesh (Figure 9.1). Under nutrition has a staggering cost. The Lancet Maternal and Child Nutrition Series estimated that on an aggregate level, under nutrition is the cause of 3.1 million child deaths annually, or 45% of all child deaths in 2011 (1). In addition, about 11% of days lost to illness and disability, and around 35% of the global disease burden in children is due to under nutrition (2). Changes in levels of child under nutrition in developing countries tend to be closely related to mortality trends (3), making health interventions less effective unless nutrition is addressed concurrently (4; 5).

**Figure 9.1: UNICEF conceptual framework of child under nutrition**



In addition, under nutrition during critical periods of child development can result in lower worker productivity in adulthood (6). On a national scale, the aggregate impact of high rates of under nutrition may impede prospective economic growth as the health and nutritional status of the children in a country today represents the productive potential of a nation tomorrow. In particular, the first thousand days of life - beginning with conception up until the age of

two - is the most critical period in a child's development. Even if a child's health and diet improve later in life, damage done during this period is largely irreversible (7). In addition to understanding the major causes of malnutrition and the range of options to combat it, efforts must be focused on increasing the quality and effective coverage of nutrition specific interventions to ensure optimal child development (8).

This report has discussed some of the underlying and immediate determinants of child under nutrition including unhealthy home environments, household food insecurity, and inadequate care practices for pregnant mothers, women, and young children. This chapter details the level of child malnutrition in Bangladesh in 2013. In order to estimate the nutritional status of children, FSNP records the height, weight, and MUAC measurements of all able-bodied children in interviewed households. In 2013, FSNP measured 12,000 children across the country (detailed in Table 9.1). Child nutritional status is calculated by comparing multiple measures from Bangladeshi children to those of a multi-ethnic population of children who grew up under recommended feeding and care conditions in both developing and developed countries (9).

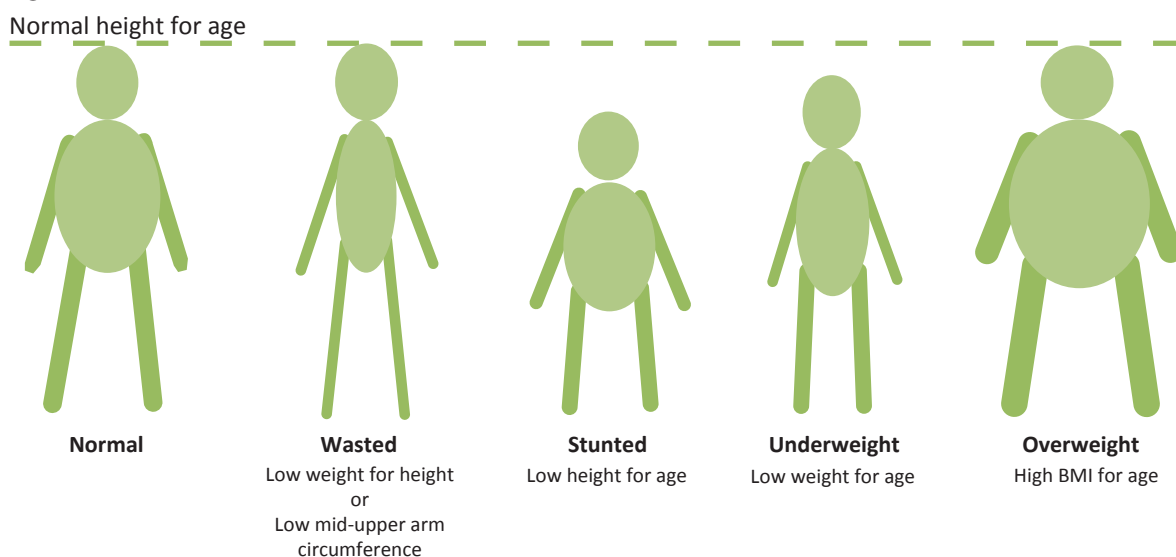
**Table 9.1: Children measured by age**

Age group in months	Number	Weighted proportion
0 to 5	951	8%
6 to 11	1,157	10%
12 to 17	1,173	10%
18 to 23	1,234	12%
24 to 29	1,189	11%
30 to 35	1,165	10%
36 to 41	1,170	10%
42 to 47	1,076	9%
48 to 53	1,124	10%
54 to 59	1,003	9%

FSNSP examines multiple measures of childhood malnutrition using this reference population. To estimate the level of chronic under nutrition, comparisons are made between height/length by age as this measures the cumulative effects of growth retardation. This measure is called "stunting" or low height/length for age. Another comparison is between the child's weight and height/length, irrespective of the child's age. This measure of thinness estimates the levels of acute under nutrition in the population and is referred to as "wasting" or low weight for height/length. Other measures of acute under nutrition use the circumference of a child's upper arm, comparing this measurement to that of a reference population by age or against a static international standard. The final measure of under nutrition, child underweight, compares the weight of children by their age. Child underweight, or low weight for age, is a composite measure of under nutrition and does not distinguish between children who are stunted or wasted, but may include children who are only mildly under nourished based on both of these indicators. For all measures, 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 under nourished. Children who are below negative three standard deviations (-3 SD) are classified as severely under nourished. Taken together, all children who fall below negative two standard deviations (-2 SD) are classified as globally under nourished (10).

In contrast to measures of child under nutrition, levels of early childhood obesity in a population is calculated by comparing BMI scores by age to the WHO reference population in order to determine the percentage of children with a very high ratio between their weight and their length.<sup>1</sup> For this measure, children are considered moderately overweight if their measurements indicate that they are between positive two standard deviations (+2 SD) and positive three standard deviations (+3 SD) from the mean of the reference population. Children who are above positive three standard deviations (+3 SD) are classified as severely overweight (10). A depiction of these indicators is given in Figure 9.2.

**Figure 9.2 : Indicators of childhood malnutrition**

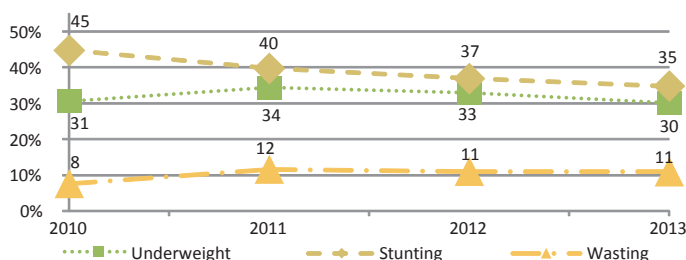


<sup>1</sup> BMI for age is the recommended indicator for determining childhood overweight and obesity according to the WHO (42; 43).



Children grow with slightly different trajectories, and lulls and spurts in growth occur 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 classed as wasted.

**Figure 9.3: Trends in the prevalence of child under nutrition (Global, 0 to 59 months)**

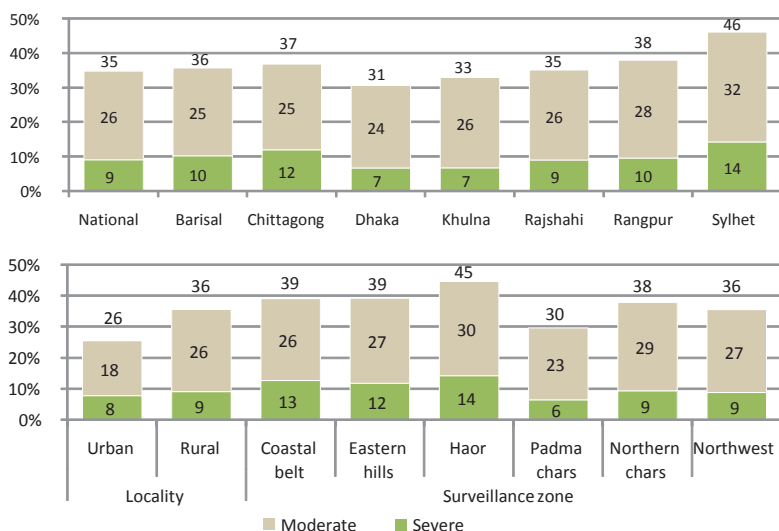


Since independence, Bangladesh has greatly reduced levels of child under nutrition. Since 2010 there has been an incremental reduction in child wasting and more sizable declines in child stunting. The prevalence of stunting fell from 45% in 2010 to 35% in 2013, and the level of stunting in Bangladesh is now below the WHO cut-off for very high prevalence (13).

### Chronic child under nutrition

Chronic child under nutrition is the result of multiple factors, including poor maternal nutrition before birth, infection leading to mal-absorption of nutrients, and/or caloric or micronutrient inadequacy due to a poor diet. Stunting or linear growth retardation increases the child's likelihood of death, due in part to a reduced ability to fight infection, and has been linked to a greater risk of chronic diseases later in life, such as heart disease, diabetes, and kidney damage (14; 15; 16). In line with a decrease of childhood stunting from 40% to 27% globally and from 49% to 28% in Asia between 1990 and 2010 (17), rates of stunting have reduced greatly in Bangladesh. However, Bangladesh is still classified as having a high prevalence of chronic under nutrition; over five and a half million children in Bangladesh are stunted (13).

**Figure 9.4: Prevalence of chronic child under nutrition by area of residence**

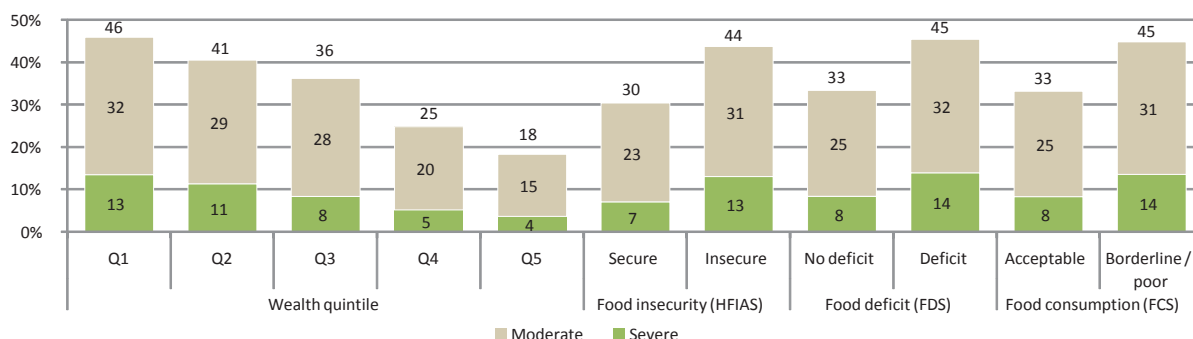


Because stunting prevalence does not change rapidly and only adjusts slowly after changes in dietary intake, this section will only present annual estimates of chronic under nutrition. As shown in Figure 9.4, levels of chronic child under nutrition varied greatly by area of residence. Similar to past results, Sylhet had the highest rates of childhood stunting, but Chittagong, Rangpur and Sylhet were also the areas which had the largest

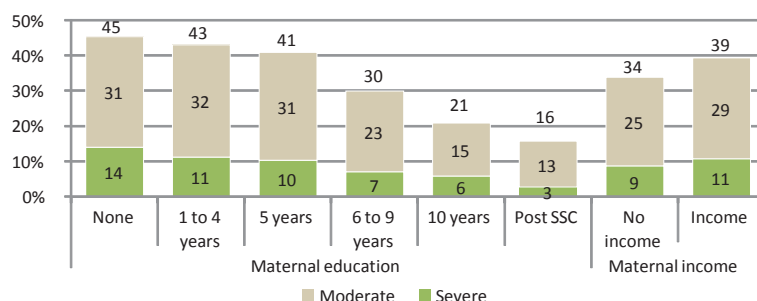
reduction in stunting rates between 2012 and 2013. On average, urban areas had much lower rates of stunting than rural areas. Among the surveillance zones, rates of stunting were lowest in the Padma chars zone, and highest in the Haor zone.

Consistent with previous FSNP results, a lower proportion of children from wealthier households and with more educated mothers were chronically under nourished compared to children from poorer households and those with less educated mothers (Figure 9.5 and Figure 9.6). No matter the metric of food security, children living in food insecure households were chronically under nourished in higher proportion than children from food secure households. However, a sizable proportion of children were chronically under nourished even in the wealthiest and most food secure households.

**Figure 9.5: Prevalence of chronic child under nutrition by household wealth and food security**



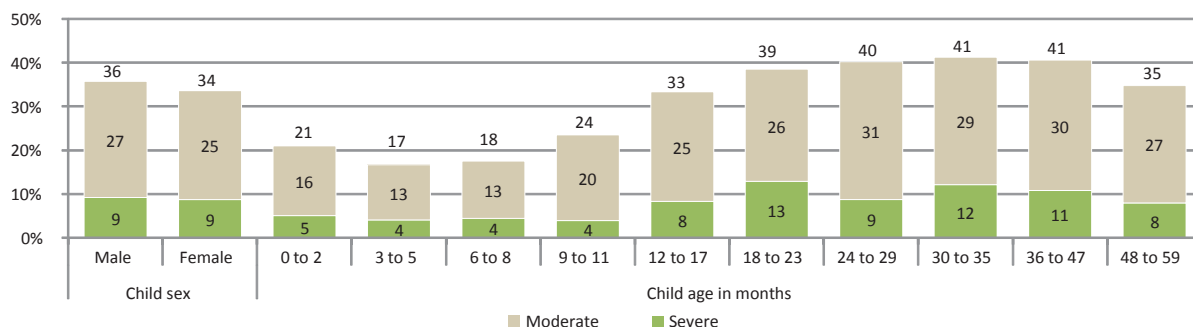
**Figure 9.6: Chronic child under nutrition by maternal characteristics**



There were no differences in rates of under nutrition between male and female children, but some age-related patterns are apparent (Figure 9.7). Chronic under nutrition starts before birth with intrauterine growth retardation, and one-fifth of children zero to two months of age in Bangladesh were stunted. Rates of chronic under nutrition

continue to increase over the first two years of life and the proportion of children with chronic under nutrition peaks in the third year.

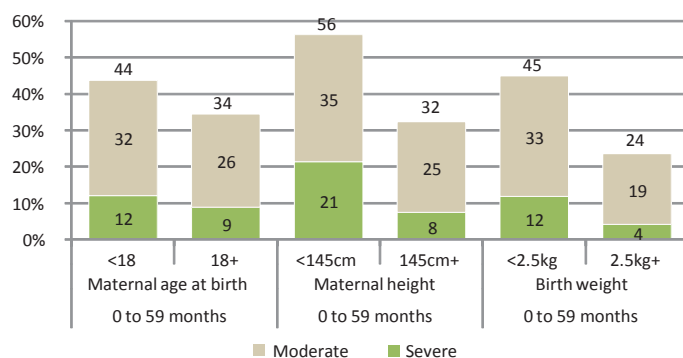
**Figure 9.7: Prevalence of chronic child under nutrition by child's characteristics**





No sizable and significant differences in the rates of stunting among children less than six months of age were found for early initiation of feeding, pre-lacteal feeding, exclusive breastfeeding, predominant breastfeeding, and bottle feeding (results not shown). However, in line with past results, early maternal age at birth, short maternal height, and a low birth weight were significantly associated with greater levels of childhood stunting (Figure 9.8). Among children for whom birth weight was recorded, children whose birth weight was below 2.5 kg (low birth weight) were stunted at almost double the rate of children who were over 2.5 kg at birth (24%).

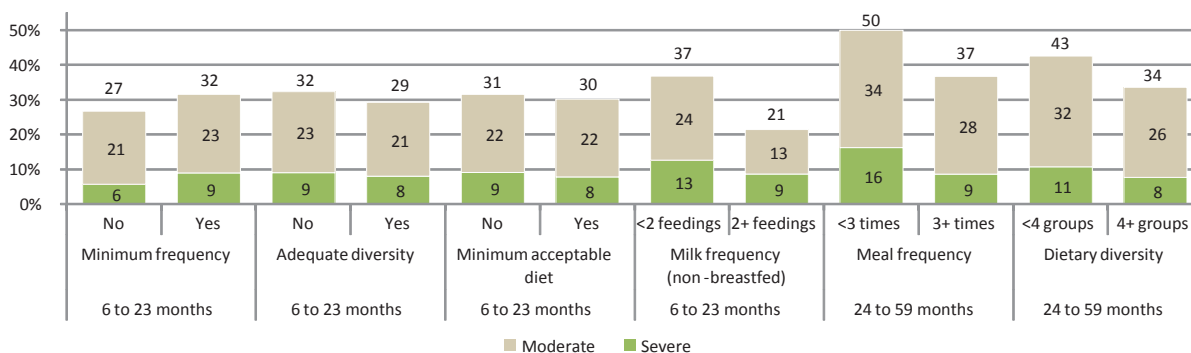
**Figure 9.8: Prevalence of chronic child under nutrition by maternal characteristics**



There were no measureable differences in rates of under nutrition between children who had experienced illness in the previous two weeks and those who had not been ill (graph not shown). Adequate diversity of diet for children six to 23 months of age was associated with slightly lower stunting rates. Minimum frequency, adequate diversity, minimum acceptable diet and milk feeding frequency for non-

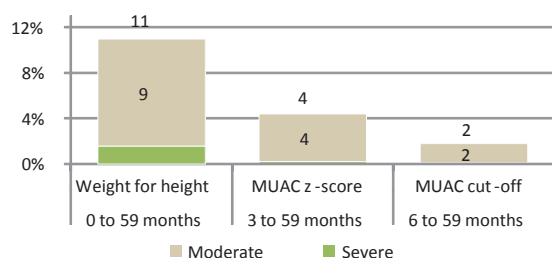
breastfed children six to 23 months of age were not significantly associated with stunting. In contrast, meal frequency and dietary diversity among children 24 to 59 months of age were significantly associated with stunting rates.

**Figure 9.9: Prevalence of chronic child under nutrition by complementary feeding**

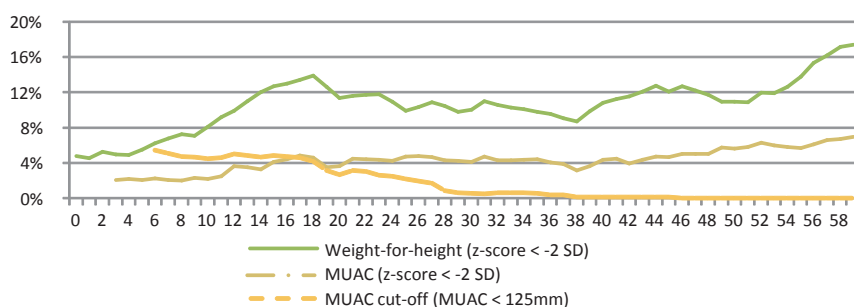


### Acute child under nutrition

Acute under nutrition, caused by a sharp reduction in the absorption of sufficient nutrients required for health, can be prevented through adequate feeding practices and improved hygiene, assuming that households are food secure and able to access health care. A child who suffers from severe acute under nutrition has a risk of death up to 20 times greater than that of a healthy child. Once acute under nutrition develops, it is treated in line with WHO protocols which have been regulated by the Government of Bangladesh.

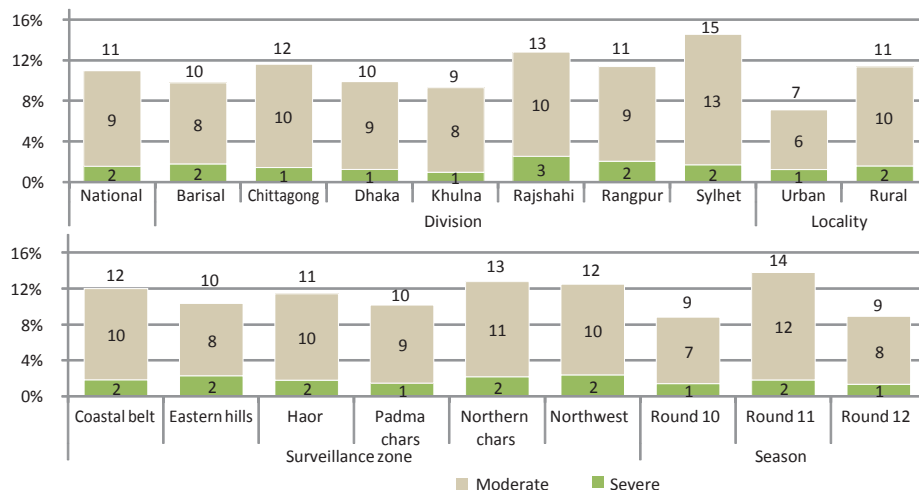
**Figure 9.10: Comparison of measures of acute child under nutrition**

As mentioned at the outset of this chapter, acute under nutrition can be measured in a population through three means: 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 in terms of standard cut-offs, with moderate acute under nutrition defined as a MUAC < 125mm and severe acute under nutrition defined as a MUAC < 115 mm (18). While weight-for-age z-scores can be calculated for even the youngest children, MUAC z-scores are only available for children over three months of age and MUAC cut-offs should only be used for children over six months of age (18; 10).

**Figure 9.11: Comparison of measures that estimate the prevalence of GAM by age in months**

Rates of acute under nutrition in Bangladesh vary considerably depending on what classification system is used (Figure 9.10). These differences were also apparent when prevalence was examined over age in months

(Figure 9.11). While the MUAC cut-off and weight for height prevalence rates are similar from six to ten months of age, beyond 28 months of age very few children are found to be acutely under nourished using the MUAC cut-off criteria. In contrast, the proportion of children identified as acutely under nourished by MUAC for age z-scores was roughly constant across all ages. These patterns are consistent with past findings in Bangladesh but are not universally true (19; 20). For the rest of this section, weight for height z-score criteria will be used to determine acute under nutrition.

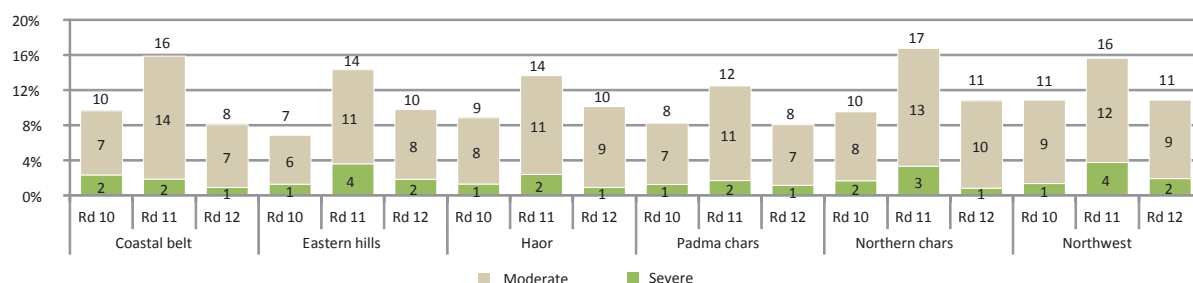
**Figure 9.12: Prevalence of acute child under nutrition by area of residence and season**

Though harder to discern in Figure 9.3, it is likely that Bangladesh has experienced reductions in the proportion of children acutely under nourished once seasonality is taken into consideration. In 2013, Bangladesh had a serious public

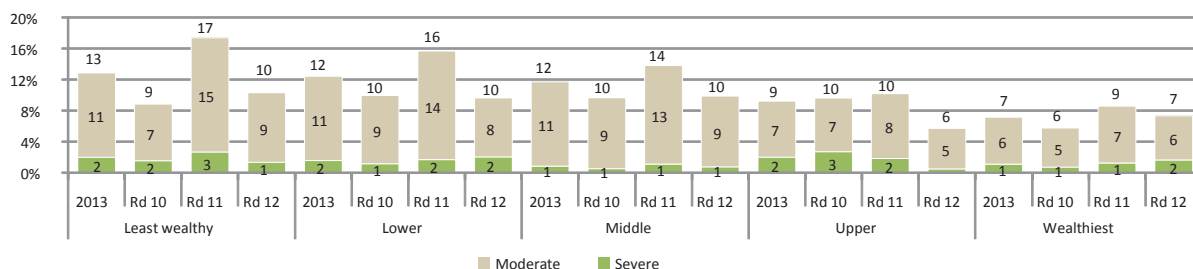
health problem with respect to acute child under nutrition, according to the WHO classification system (13). Moreover, in the monsoon months, rates of acute under nutrition increased to the level of a critical public health problem in certain regions of Bangladesh (13). Due to the transient nature of wasting, where children move into and out of this status over the year, it is estimated that over 4.3 million children suffered from wasting at some point during 2013 (21).

Dhaka and Khulna had significantly lower rates of wasting than Rajshahi and Sylhet. Wasting rates in urban areas were markedly lower than rural areas of the country and there was less variation in wasting rates across surveillance zones than across the divisions of Bangladesh. However, seasonal variations within zones were more remarkable (Figure 9.13). In line with historical variation, rates of wasting spiked during the monsoon months. In 2013, this pattern was prevalent in all the zones.

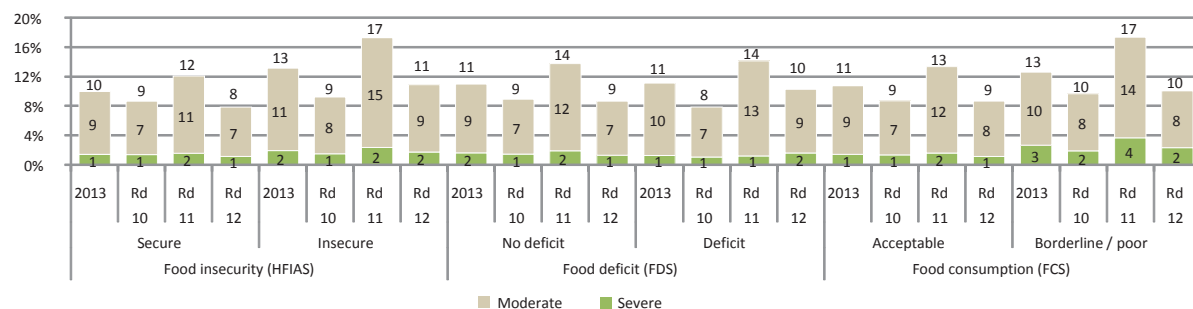
**Figure 9.13: Seasonal variation in the prevalence of acute child under nutrition by surveillance zone**



**Figure 9.14: Prevalence of acute child under nutrition annually and seasonally by household wealth**

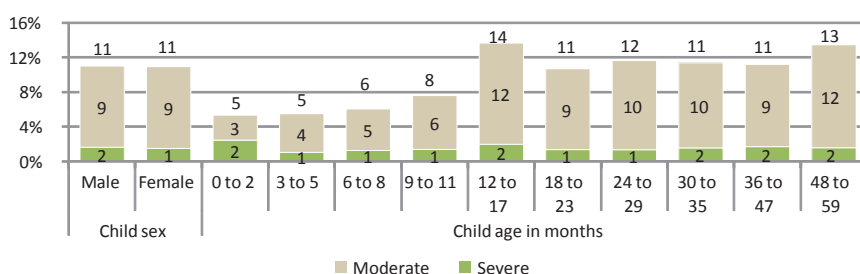


**Figure 9.15: Prevalence of acute child under nutrition annually and seasonally by household food security status**



Patterns of acute child under nutrition by household and maternal characteristics were similar to those for chronic under nutrition. A smaller proportion of children from wealthier households were wasted compared to children from poorer households, with stepwise increases in the rates of wasting with decreasing wealth. Seasonally, children from households in the lower wealth quintiles showed a sharp peak in wasting rates in the monsoon months, reaching critical levels (Figure 9.14). Children from food insecure households had higher rates of wasting annually than food secure households by almost every measure (Figure 9.15); with disparities becoming even more apparent during the monsoon season. However, the differences in acute under nutrition rates between food secure and food insecure household were much less than that for chronic under nutrition and, in case of food deficit, not statistically significant. In line with the past results, children with more educated mothers were wasted in a lower proportion than those with less educated mothers. For the year as a whole, maternal income earning status had no association with child wasting rates (graph not shown).

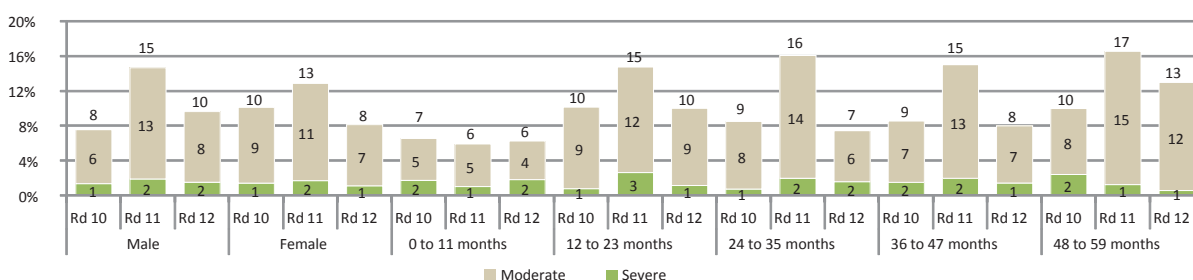
**Figure 9.16: Prevalence of acute child under nutrition annually by child sex and age**



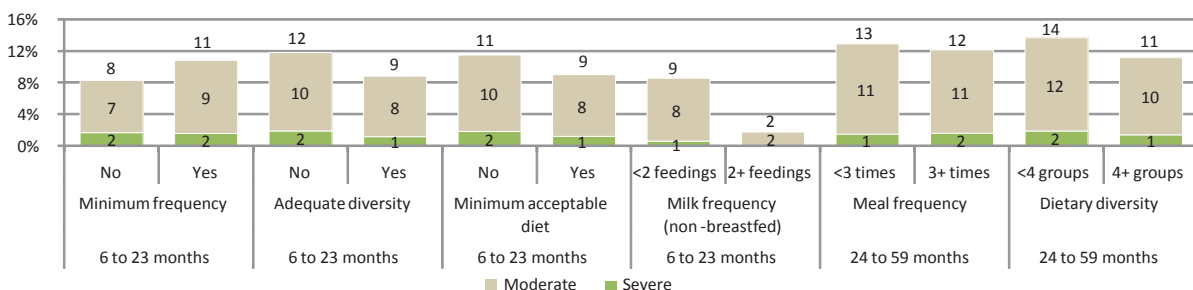
While there were no differences in the proportion of male and female children wasted annually (Figure 9.16) and seasonally (Figure 9.17), there were differences by child age. Rates of wasting were greater after one year of age and there was

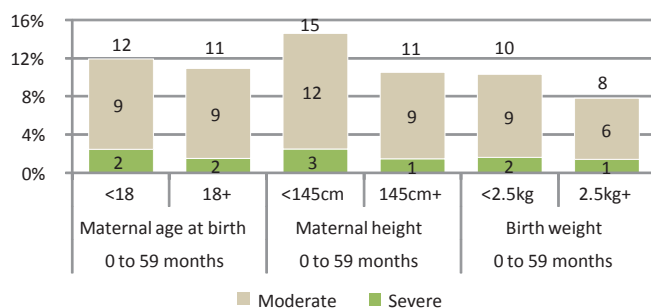
seasonal variation; wasting peaked during the monsoon season, for every age group except the youngest.

**Figure 9.17: Prevalence of acute child under nutrition seasonally by child sex and age**

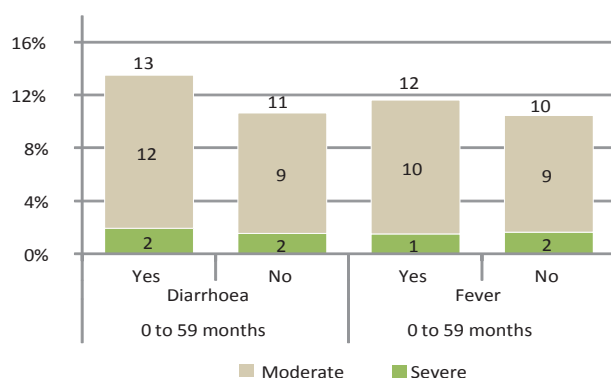


**Figure 9.18 : Acute child under nutrition by complementary feeding**



**Figure 9.19: Acute child under nutrition by maternal characteristics**

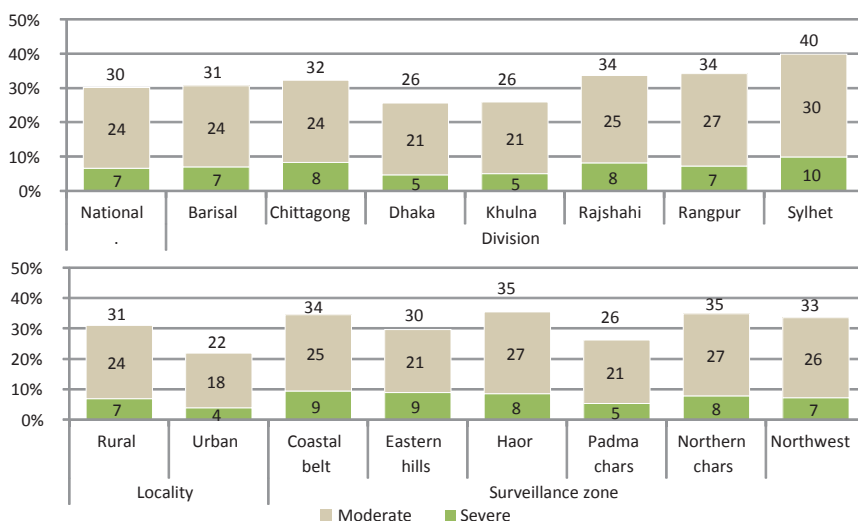
Few indicators of maternal and child care were significantly associated with acute under nutrition. Early breastfeeding behaviours such as early initiation, no pre-lacteal feeding, exclusive breastfeeding, predominant breastfeeding and bottle feeding were not linked to reduced rates of wasting in children zero to six months of age (not shown). No statistically significant differences in rates of wasting across complementary feeding indicators were apparent (Figure 9.18).

**Figure 9.20: Acute child under nutrition by recent illness**

No variation was found in the level of wasting based on maternal age but wasting was related with maternal height (Figure 9.19). Rates of wasting were significantly greater among children whose mother had height <145 cm compared to children with taller mothers. Low birth weight babies were wasted at a slightly greater rate, and both diarrhoea and fever were insignificantly associated with wasting (Figure 9.20).

### Child underweight, overweight, and obesity

Child underweight is a measure of child under nutrition that encompasses all children who have a low weight for their age. This could be due to stunting or wasting or a combination of the two. Nationally, the rate of child underweight was 30%. Based on the WHO cut-off values for public health significance, this very high prevalence rate indicates a critical situation (13).

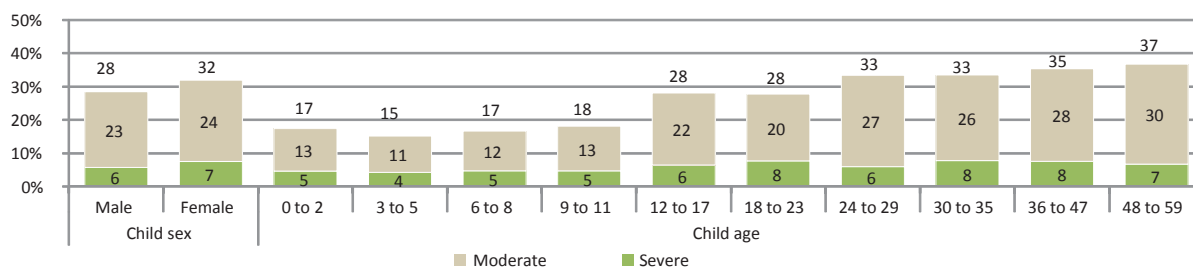
**Figure 9.21: Prevalence of child underweight by area of residence**

Sylhet had the highest proportion of children underweight in 2013 as was the case in 2012. Less than one quarter of children in urban areas were underweight, while almost one-third of children in rural areas were underweight. In contrast to age patterns in stunting and wasting, rates of child underweight rapidly

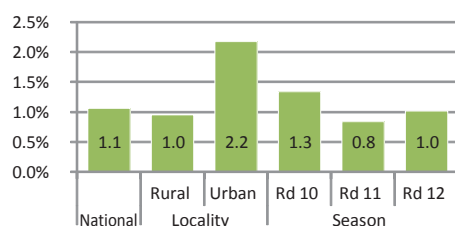


increased at around the twelfth month of age and stabilised above 30% after two years (Figure 9.22). Variations by household characteristics were very similar to those observed for wasting and stunting and are therefore not presented.

**Figure 9.22: Prevalence of child underweight by child age and sex**



**Figure 9.23: Early childhood obesity**

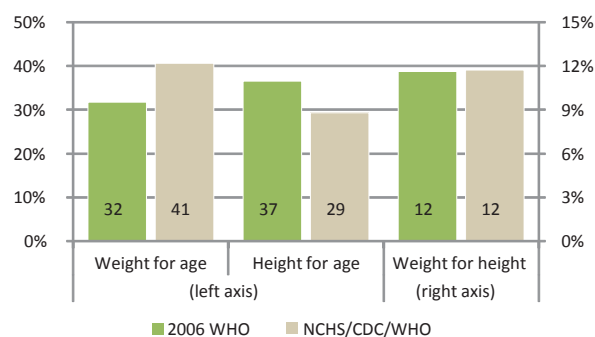


In contrast to child underweight, overweight and obesity among young children is not yet a large concern in Bangladesh. In 2013, similar to past years, 1.1% of young children were moderately overweight and almost no young children were severely overweight (Figure 9.23). However, the proportion of young children in urban areas who are overweight was 2.2%; in line with what is expected in a well-nourished population.

### Tracking global development targets

The practice of setting global development targets has a long history dating back to before the Second World War. The systematic tracking of targets with quantifiable indicators has a much shorter history, and was most notably employed in the process leading up to the articulation of the Millennium Development Goals (22; 23). As the 2015 target date for the MDGs approaches, new goal setting processes are being discussed that differ from those used at the turn of the 21st century. Future targets will be further imbedded within country contexts and increasingly led by southern partners. This section will review progress towards MDG 1 - Child Hunger and the World Health Assembly goals.

**Figure 9.24: Rates of global child under nutrition (6 to 59 months)**



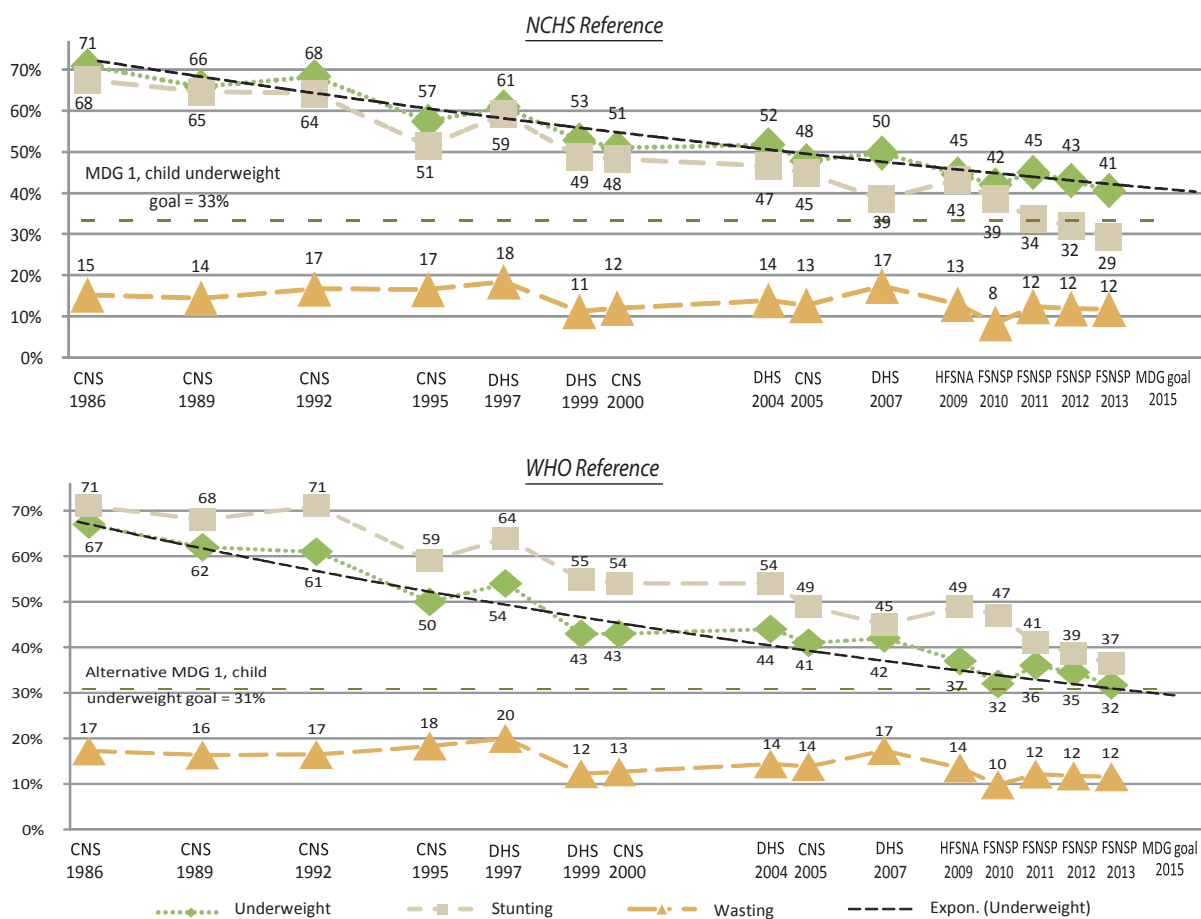
### MDG 1 - Child hunger

Given that the MDG goal to reduce child underweight was set in 2000 with the base year of 1990, long before the 2006 WHO reference population was established, the older NCHS/CDC/WHO reference population was used. As a result, the prevalence estimates presented in Figure 9.26, based on the NCHS/CDC reference population, do not correspond with earlier estimates based on

the WHO reference population that have been used elsewhere in this chapter. These differences are demonstrated in Figure 9.24, which shows global levels of child under nutrition as determined by the two reference groups for children aged 6-59 months of age - the age group used in the MDG 1 child hunger goal in Bangladesh. Notably, use of the NCHS reference group results in higher levels of underweight and lower levels of child stunting than use of the WHO reference group (24).

Figure 9.25 graphs FSNSP alongside past survey results in order to track Bangladesh's progress toward the MDG 1 child underweight goal - to halve rates of child underweight from 66% in 1990 to 33% by 2015 (25; 26; 27; 28; 29; 30; 31; 32; 33; 34; 35; 36). Because of the seasonality of these estimates, care in interpretation is required. Results indicate a reduction of around two percentage points per year from 2011 to 2013. In order to reach the MDG goal, the rate of reduction would have to double in each of the next two years. Therefore, it is unlikely that Bangladesh will reach the MDG one goal if the NCHS reference group is used. However, if the goal had been set using the WHO standard, Bangladesh would have likely reached the target. This is due to the fact that the children in the NCHS reference group were overly heavy for their ages compared to the WHO reference.

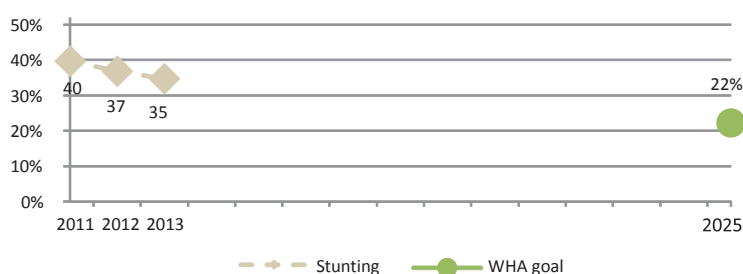
**Figure 9.25: Trends in child under nutrition in Bangladesh (6 to 59 months)**



### World Health Assembly goals

In May 2012, the Sixty-Fifth World Health Assembly endorsed the Comprehensive Implementation Plan (2012-2025) on Maternal, Infant and Young Child Nutrition, which included global targets on six nutrition indicators: stunting, anaemia, low birth weight, overweight, breastfeeding, and wasting (37). These six targets are aimed at improving the nutritional status of mother, infant and young children. More specifically, the targets are, by 2025, to reduce by 40% the number of under five children who are stunted, to achieve a 50% reduction in anaemia in women of reproductive age, to achieve a 30% reduction of the number of infants born with low birth weight, to ensure that there is no increase in the number of children who are overweight, to increase to at least 50% the rate of exclusive breastfeeding in the first six months and to reduce, and maintain childhood wasting at less than 5% (37).

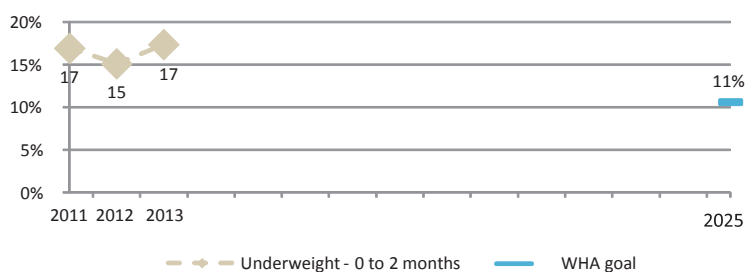
**Figure 9.26: Trends of stunting for under five children in Bangladesh**



Stunting in children was included as the first World Health Assembly global nutrition target. Stunting is also one of the key indicators recommended by both the Countdown to 2015 for Maternal, Newborn and Child Survival (38) and the *Commission on Information and Accountability for Women's and Children's Health*

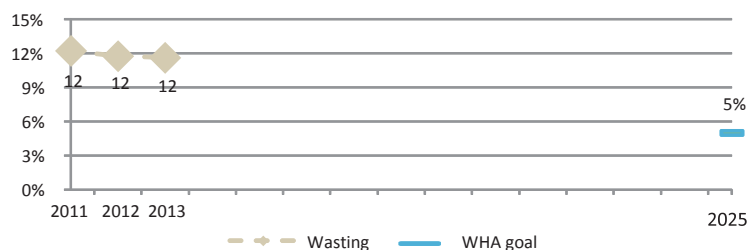
(39). The specific goal is to reduce the prevalence of stunting by 40% of its 2011 level by 2025. If the current trend continues, this goal will be met (Figure 9.26). In the year between 2012 and 2013 alone, the prevalence rate of stunting reduced from 37% to 35%.

**Figure 9.27: Trends of underweight for infants zero to two months of age in Bangladesh**



The second goal is to reduce low birth weight by 30 percent between 2010 and 2025. Globally, more than 20 million infants, an estimated 15 percent, were born with low birth weight in 2011 (40). Though FSNP cannot track the incidence of low-birth weight

directly because too few babies in Bangladesh are weighed at birth, it can examine changes in the proportion of young infants underweight for their age. This indicator has been used as a proxy for low birth weight, but unfortunately no trend is seen (Figure 9.27).

**Figure 9.28: Trends of wasting for under five children in Bangladesh**

reach this goal. The final nutritional status related World Health Assembly target is to reduce and maintain childhood wasting to less than 5% by 2025. Currently, Bangladesh is very far from this goal and has had only a very small decline in wasting rates in recent years.

The fourth target is to ensure that there is no increase in the number of children who are overweight between 2010 and 2025. In recent years there has been no measureable increase in child overweight in the nation as a whole (see Figure 9.23). If this continues and the worsening rates of obesity in urban areas are mitigated (41), Bangladesh will

# Appendices





## Appendix A: Composition of surveillance zones

**Table 7.1 : Upazila in agro-ecological zones**

Zone	Upazila (organised by district)
Coastal belt	Bagerhat (Bagerhat Sadar, Kachua, Mongla, Morrelganj, Rampal, Sarankhola); Barguna (All 5 upazilas); Barisal (Babuganj, Bakerganj, Banaripara, Barisal Sadar, Hizla, Mehendiganj, Muladi); Bhola (All 7 upazilas); Chandpur (Haimchar); Chittagong (Sandwip); Feni (Sonagazi); Jhalakhati (All 4 upazilas); Khulna (Batiaghata, Dacope, Dumuria, Koyra, Paikgachha); Lakshmipur (Kamalnagar, Lakshmipur Sadar, Ramgati, Roypur); Noakhali (Companiganj, Hatiya, Kabirhat, Noakhali Sadar, Subarnachar); Patuakhali (All 8 upazilas); Pirojpur (All 7 upazilas); Satkhira (Assasuni, Debhata, Kaliganj, Satkhira Sadar, Shyamnagar, Tala)
Eastern hills	Bandarban (All 7 upazilas); Chittagong (Banshkali, Chandanaish, Fatikchhari, Lohagara, Mirsharai, Rangunia, Satkania); Cox's Bazar (Chakaria, Cox's Bazar Sadar, Maheshkhali, Pekua, Ramu, Teknaf, Ukhia); Khagrachhari (All 8 upazilas); Rangamati (All 10 upazila)
Haor	Brahmanbaria (Bijoynagar, Nasirnagar, Sarail); Habiganj (Ajmiriganj, Bahubal, Baniachong, Habiganj Sadar, Lakhai, Madhabpur, Nabiganj); Kishoreganj (Austagram, Bajitpur, Hossainpur, Itna, Karimganj, Katiadi, Kishoreganj Sadar, Kuliari Char, Mithamain, Nikli, Tarail); Maulvibazar (Maulvibazar Sadar, Rajnagar); Netrokona (Atpara, Barhatta, Durgapur, Kalmakanda, Kendua, Khaliajuri, Madan, Mohanganj); Sunamganj (All 11 upazilas); Sylhet (Balaganj, Bishwanath, Companiganj, Gowainghat, Sylhet Sadar)
Padma chars	Chandpur (Chandpur Sadar, Matlab Dakshin); Chapai Nawabgonj (Chapai Nawabganj Sadar, Shibganj); Dhaka (Dohar, Nawabganj); Faridpur (Char Bhadrasan, Faridpur Sadar, Nagarkanda, Sadarpur); Kushtia (All 6 upazilas); Madaripur (Shib Char); Manikgonj (Harirampur, Shibhalaya); Munshigonj (Lohajang, Munshiganj Sadar, Sreenagar, Tongibari); Natore (Lalpur); Pabna (Ishwardi, Pabna Sadar, Sujanagar); Rajbari (All 4 upazilas); Rajshahi (Bagha, Charchat, Godagari); Shariatpur (Bhedarganj, Damudya, Gosairhat, Naria, Zanjira)
Northern chars	Bogra (Dhunat, Sariakandi, Sonatola); Gaibandha (Fulchari, Gaibandha Sadar, Saghatta, Sundarganj); Jamalpur (Bakshiganj, Dewanganj, Islampur, Madarganj, Melandaha, Sarishabari); Kurigram (All 9 upazilas); Lalmonirhat (All 5 upazilas); Manikgonj (Daulatpur); Nilphamari (Dimla, Jaldhaka, Kishoreganj); Pabna (Bera); Rangpur (Gangachara, Kaunia, Pirgachha); Sirajganj (Belkuchi, Chauhali, Kazipur, Shahjadpur, Sirajganj Sadar); Tangail (Bhuapur, Delduar, Gopalpur, Kalihati, Nagarpur, Tangail Sadar)
Northwest	Bogra (Adamdighi, Bogra Sadar, Dhupchanchia, Gabtali, Kahaloo, Nandigram, Shajahanpur, Sherpur, Shibganj); Chapai Nawabgonj (Bholahat, Gomastapur, Nachole); Dinajpur (Biral, Birampur, Birganj, Chirirbandar, Dinajpur Sadar, Fulbari, Ghoraghat, Hakimpur, Kaharole, Khansama, Nowabganj, Parbatipur); Gaibandha (Gobindaganj, Palashbari, Sadullapur); Joypurhat (All 5 upazilas); Naogaon (All 11 upazilas); Nilphamari (Domar, Nilphamari Sadar, Saidpur); Panchagarh (Boda, Debiganj); Rajshahi (Baghmara, Durgapur, Mohanpur, Tanore); Rangpur (Badarganj, Mitha Pukur, Pirganj, Rangpur Sadar, Taraganj)

## Appendix B: Wealth Index construction

In 2012, FSNSP began using 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 FSNSP used the guidance given in this report to construct the specific guidelines described below.

FSNSP 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 in one or more of the rural or urban localities were assigned to that area. Table A.2 provides a listing of index assets and household facilities, and assigns them 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 7.2 : 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				
Land ownership	Homestead land				
	Agricultural land				
	Total decimals of land owned				
Livestock	Any livestock owned				
	Large ruminants (cow/buffalo)				
	Small ruminants (sheep/goat/pig)				
	Poultry (chicken/duck/geese)				
	Small game (rabbits/pigeons)				

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## **Chapter 9: Nutritional status of children**

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