State of Food Security & Nutrition in Bangladesh 2012

fsnsp
FOOD SECURITY NUTRITIONAL SURVEILLANCE PROJECT

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Foreword

Md. Nojibur Rahman, Secretary, Statistics and Informatics Division
Ministry of Planning, Government of the People's Republic of Bangladesh

Statistics and Informatics Division, Ministry of Planning, through its agency, Bangladesh Bureau of Statistics (BBS), is pleased to be a partner in an important project like Food Security Nutritional Surveillance Project (FSNSP). Our participation in this project has enabled BBS to observe the use of new technology in data collection. This has spurred our organization into use of digital technology namely tablet and laptop etc. for data collection on a pilot basis. Additionally, the use of data from BBS in this report is appreciated. We look forward to forging closer ties between BBS's other projects and FSNSP to create a conducive environment where BBS's data is more widely available and efficiently used which is also an important goal of Statistics Act 2013 and the National Strategy for the Development of Statistics (NSDS).

M. M. Neazuddin, Secretary
Ministry of Health and Family Welfare, Government of the People's Republic of Bangladesh

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

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

The Ministry of Food strives to ensure food security all times to all people of the country. Food security itself has the dimension to have nutritious food for the people specially for women and children. Therefore, the Ministry of Food recognizes the value of reliable and timely food security and nutrition data in order to take policy decision and implementation of the programs which will ensure a safe and nutritious diet for all. The Food Security Nutrition Surveillance Project (FSNSP) by its activity has become a vital source of information on the area of food and nutrition. The data collected by FSNSP is highly important for FPMU of Ministry of Food for preparing Food Situation Report everyday as well as assisting in monitoring of National Food Policy Plan of action and 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 analyst through electronic networks.

William Hanna, Ambassador of the European Union to Bangladesh

The European Union, a development partner of Bangladesh since 1973, with a Delegation to the country since 1982, is currently Bangladesh's largest export market and one of the largest and most reliable development partners. The relationship between the European Union and Bangladesh has grown from one primarily concerned with emergency humanitarian assistance to a focus on long term national goals and sustainable development. FSNSP typifies this transition as it fosters local knowledge. The information gained through this system will enable the creation of more effective policies and programmes through partnership between local and international institutions and the government. We welcome the release of the third year of surveillance findings, and we look forward to this new knowledge being incorporated into government and civil society planning.

Executive Summary

Bangladesh continues to make steady progress in reducing child under nutrition and household food insecurity. Food insecurity, after having increased in 2010 to 2011, likely as a result of globally elevated food prices, has been steadily decreasing across Bangladesh since late 2011. Notably, chronic child under nutrition (stunting) decreased by three percentage points between 2011 and 2012. The downward trend in this indicator suggests that Bangladesh has the momentum to achieve the fifth World Health Assembly global nutrition target of a 40% reduction in child stunting by 2025. However, maintaining this momentum will require continued focus as well as a targeted approach to reach those who are still vulnerable and those whose nutrition is improving at a slower rate.

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, the FSNSP system provides up-to-date information on the food security and nutrition of women and children to support the design, implementation, and evaluation of national strategies and assess progress towards development targets. In 2012, FSNSP surveyed over 27,000 households and 13,500 children.

Food security

In 2012, FSNSP's food security indicators include measures of availability, access, intra-household utilisation, nutrient uptake, and vulnerability. After a sharp increase in the price of rice in 2010, rice prices peaked in mid-2011, slowly declined over the latter half of the 2011, and were very stable in 2012. With the stabilisation of rice prices, FSNSP recorded that the prevalence of behaviours linked to food insecurity (eg. skipping meals, eating less preferred food) fell dramatically between 2011 and 2012. Rates of food insecurity and food deficit showed more seasonality in 2012 than in 2011. The proportion of households with poor or borderline food consumption patterns, based on the food consumption score (FCS) methodology, remained the same between 2011 and 2012.

Within households, in times of food scarcity women and girls were found to reduce consumption at a much higher rate than men and boys. When only one person was required to reduce consumption in the household, this individual was almost always an adult woman. When two people reduced consumption, male adults and female adolescents also sacrificed. Notably, when three or more members had to sacrifice, female children less than ten years of age sacrificed in a much greater proportion than their male counterparts.

Nutrition of women and adolescent girls

In 2012, FSNSP interviewed and measured over 27,000 women and girls aged 10 to 49 years throughout Bangladesh, providing nationally representative estimates of these populations. Women provide a window into the nutritional status of the larger household, as women and girls are usually the first to feel the effects of food shortages. Dietary patterns did not differ much between women/adolescent girls and mothers of children under five years of age. In 2012, dietary diversity increased during the monsoon months, similar to the pattern observed in 2010 and 2011. The consumption of dark green leafy vegetables increased between 2011 and 2012, while the consumption of other vitamin-rich vegetables and sugar remained the same. In line with 2010 and 2011 findings, around 60% of women consumed diets inadequate in micro- and macronutrients. This varied greatly across seasons, and over household wealth quintiles and food security status. Among women in the wealthiest quintile, 34% consumed inadequate diets compared to over two-thirds of women in the poorest three quintiles. In households with poor or borderline food consumption practices, 91% of women did not consume an adequate diet the day before the interview.

In 2012, there was also considerable chronic and acute under nutrition in Bangladesh. Nationally, a little less than one-third of adolescent girls were short for their age and there was little difference between urban and rural areas. Additionally, a little over 10% of adult women were at increased risk during delivery due to short stature. Similarly, 11% 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. There was little variation in the proportion of women and girls who are short across regions of the country or household characteristics but much variation in body mass. About one-third of the women in Sylhet were CED and 13% of the girls in Rajshahi were underweight. Only 8% of women from the wealthiest households were CED, in comparison to 33% of women from households in the least wealthy quintile. The proportion of thin women was highest among those aged 19 to 22 years, stabilising to around 20% after 23 years of age. Women from households facing food insecurity and women with limited dietary diversity were CED in a higher proportion than women from food secure households and those eating more diverse diets. These relationships did not hold for adolescents.

Women's overweight is a growing problem; nationally in 2012, more adult women were overweight than CED. Over half of urban adult women were overweight and the proportion of women overweight increases as wealth increases. Among adult women, overweight slowly increased with age, peaking between 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 (see page 83).

Maternal care and nutrition

Women's health and nutrition is also important due to its impact on child health outcomes. Indicators of maternal care and nutrition show progress and highlight remaining gaps. In 2012, too many girls had children too early. Due to the early age of marriage, over half of first pregnancies occurred among adolescent girls (18 years of age and younger), despite Bangladesh's low fertility rate. While there was a dramatic increase in antenatal care (ANC) coverage from 1993-2012, only a quarter of pregnant women obtained at least four ANC visits in 2012. Moreover, only 12% 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). In 2012, well over a third of women reported never taking iron folic acid (IFA) during their pregnancy. Additionally, IFA supplementation was extremely low during the first trimester (15% daily and 18% in the last week), although this is the period during which folic acid helps to prevent neural tube defects.

Furthermore, diets remained extremely poor even during pregnancy. Dietary diversity was similarly low among pregnant and non-pregnant women, and three out of four women report 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 2011 and 2012. As a result, one in four pregnant women was so thin that their foetuses faced a moderate risk of growth retardation. Shockingly, pregnant women were thinner on average than non-pregnant women when mid-upper arm circumference (MUAC) was used as the measure. The maternal risk factors were highly correlated with low birth weight prevalence.

Child feeding

Child feeding and care are important proximate determinants of child nutritional status. The overall pattern of child feeding practices remained largely consistent between 2011 and 2012, but there were three notable changes. For breastfeeding, unfortunately the overall prevalence of exclusive breastfeeding decreased from 2011 to 2012; and there was an increase in water intake rates for children under six months of age. On a positive note, the proportion of children who continued to receive breast milk at two years of age rose considerably between 2011 and 2012. Half of newborn children continued to be fed pre-lacteal foods and only 48% were breastfed within the first hour of life. The overall rate of exclusive breastfeeding declined by six percent and currently stands at 45%, which ranged from 73% among zero to one month old infants to 22% for infants of four or five months of age. There was little change in the overall proportion of children being fed with bottles (17%) or fed breast milk substitutes (31%).

Complementary feeding indicators also changed little between 2011 and 2012. While 87% 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 52% eating solid foods during the fifth month of life. Poor diets were not limited to the youngest cohort of complementarily fed infants. Overall, among children six to twenty-three months of age, only 39% met minimum dietary diversity targets and this proportion has changed little since 2008. In contrast, the proportion of children eating iron rich foods has increased since 2008 from 29% to 44% in 2012. The proportion of children eating with minimum meal frequency has improved dramatically since 2008, from 52% to 85%. However improvements in minimum adequate diet have been much smaller, from one-fifth to a little over one-third. The eating patterns for older children were also slightly less diverse than for mothers.

Child health and hygiene

The majority of water-borne diseases and helminthes infections are spread through faecal contamination of soil and water. In 2012, FSNSP has begun reporting on hand washing behaviours among mothers of young children. Hand washing interventions are important as they have been shown to be efficacious in reducing episodes of diarrhoeal diseases by one-third. In Bangladesh, hand washing is limited to about half of the time before or after key moments such as after using the toilet, after cleaning the child, before feeding, before eating or before preparing food. In 2012, among households with children younger than five years of age, only 47% had toilet facilities for their individual household, 48% used toilet facilities shared by one or more households, and 5% used completely open facilities such as pen defecation or a hanging toilet.

FSNSP also tracks indicators of child illness and preventative and recuperative care. The coverage of the Government of Bangladesh's vitamin A capsule (VAC) programme declined in 2011 due to both a long gap between the National Vitamin A Campaign (NVAC) event of 2011 and the National Immunization Day (NID) and a lower coverage rate of the two events. However, in 2012 the VAC coverage for children one to five years of age improved from 76% to 84%, while the coverage rates of the VAC among children six to fifty-nine months of age on the day of distribution was 92% on NID and 84% on NVAC day. The VAC coverage rate is lower than the HPNSDP target of 90% by 2016. The coverage of anti-helminthes remained slightly behind, with

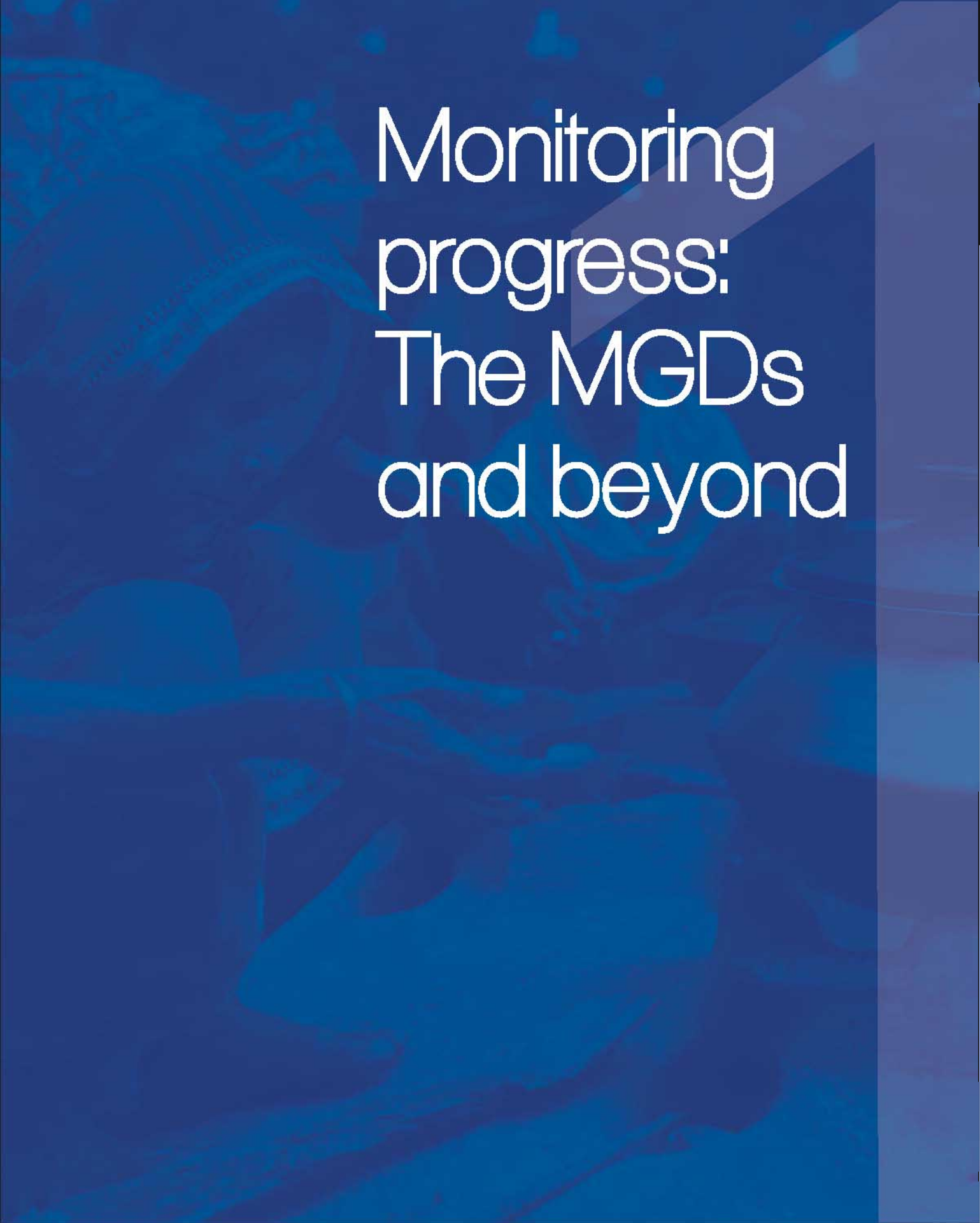
77% of children 24 to 59 months of age receiving a tablet in the six months before the interview. Promisingly, the proportion of children who received both VAC and allopathic anti-helminthes tablets increased by four percentage points between 2011 and 2012. The proportion of children ill with diarrhoea, acute respiratory infections (ARI) and fever did not change between 2011 and 2012.

Nutritional status of children

In 2012, FSNSP measured over 13,500 children aged zero to fifty-nine months throughout Bangladesh. The prevalence of stunting (chronic child malnutrition) was 37%, impacting over six million children under the age of five. While stunting has been declining twice as fast in Bangladesh as in the rest of the world, the rate remains just under the cut-off for "very high prevalence." Additionally, in Chittagong, Rangpur and particularly Sylhet, stunting levels were even higher. Annually, 11% of children were wasted which suggests that approximately 4.6 million children suffered from acute malnutrition at some point during 2012.

Bangladesh remains off target for the MGD 1 goal of reducing child underweight and the historical rate of reduction of one percentage point a year will have to double to slightly over two percentage points a year between 2012 and 2015 in order to reach this goal. Increased action is urgently required, and FSNSP findings serve to justify focused investments in interventions that will impact areas of care and regions of the country that are lagging behind. For example, more attention needs to be given to supporting mothers during pregnancy and their child's infancy. Regionally, increased focus must be given to Sylhet, which is lagging behind in most indicators of child, maternal, and women's well-being. In addition, special efforts are needed to address the large seasonal spikes in wasting, which occur in the Northwest every year.

In addition to focusing on vulnerable groups and areas, focus is also needed on areas where Bangladesh can still achieve high-impact change. For example, although FSNSP does not track birth weight, it uses a proxy indicator, infants ages zero to three months who are underweight. In 2012, 15% of infants in this age group were underweight, suggesting that they may have been born with low birth weight. These infants may be at higher risk of chronic under nutrition in the critical first two years of life. Reducing the prevalence of low birth weight and underweight in the youngest infants can have long-term benefits for these children, their families and communities.
On the population level, simultaneous efforts are needed for the prevention of obesity and related non-communicable diseases. One of the World Health Assembly goals for 2025 is to ensure that there is no increase in the number of children who are overweight. At present, obesity is not a public health problem on the national level. However, as diagnoses of non-communicable diseases such as diabetes and cardiovascular disease continue to rise in Bangladesh, it becomes increasingly important to prevent and control their risk factors, including overweight and obesity. In particular, this means addressing the increasingly sedentary lifestyles and the shift towards diets high in fat and processed foods that accompany urbanisation and economic growth. Without strategic prevention efforts, Bangladesh may well face the double burden of under nutrition and overweight - and the associated health care costs - that so many other countries before it have faced.



Monitoring progress: The MGDs and beyond

In Bangladesh and globally, efforts to combat malnutrition and food insecurity demand monitoring systems that track progress, measure effectiveness, support planning, and critically assess aims and targets in order for these programmes to succeed at the highest levels. As 2015 approaches, governments and stakeholders are examining achievements related to the Millennium Development Goals (MDGs), both within countries and internationally. Additionally, technical developments in our understanding of nutrition across the life cycle require new ways of designing interventions and tracking progress. Systems such as the national Food Security and Nutrition Surveillance Project (FSNSP), which builds on the longest-running surveillance programme in a low income country and is funded by the European Union, offer a strong evidence base to inform policy, planning and action.

The eight MDGs were established in 2000 by the United Nations (UN) with the aim of unifying and mobilising global efforts toward agreed-upon targets by 2015. The first MDG goal (MDG 1) is to eradicate extreme poverty and hunger. While Bangladesh has been successful in meeting many MDG targets and has made substantial progress in halving "the proportion of people who suffer from hunger" based on caloric sufficiency, data from FSNSP and other sources suggest that the country is not on track in terms of the MDG 1 target which relates directly to nutrition: the proportion of children under age five who are underweight (see page 172).

Governments and development agencies are already discussing the post-2015 agenda, including new targets and strategies to maintain the momentum initiated by the MDGs with adjustments to put goal setting in the hands of developing countries. Questions exist about the way to position nutrition within the larger development agenda and about what constitutes the most appropriate nutrition-related targets. Most researchers agree that stunting (low height-for-age) is a more meaningful indicator of nutritional status than underweight, because it measures long-term, chronic under nutrition. They also agree on the need for an integrated, sustainable approach that emphasises equity and human rights for improved nutrition. It is hoped that the post-2015 agenda will promote cross-sectoral programmes that adopt both nutrition-specific and nutrition-sensitive interventions to address the direct and contextual factors affecting nutritional status across the life cycle.

Alongside the MDGs, the UN World Health Assembly (WHA) published global targets in 2012 which focus on improving maternal, infant, and young child nutrition. These targets include reductions in stunting, anaemia, low birth weight, and wasting, as well as an increase in exclusive breastfeeding and no increase in childhood overweight. These targets represent a shift in focus from underweight to stunting and the imperative of addressing non-communicable diseases (NCDs) such as diabetes and cardiovascular disease that can result from overweight, and have likely links with low birth weight and child stunting (1). The end date for these targets, which have been endorsed by the World Health Organization member states, is 2025. These targets are likely to inform the development of a post-2015 global agenda (for more information see page 115 and page 176).

Another important influence on the post-2015 agenda comes from the scientific evidence base. In June 2013, the journal The Lancet published a second series of articles on Maternal and Child Nutrition. This series proposed a framework of actions for optimum foetal and child nutrition and development (2). The framework outlines the practices, interventions and approaches needed to achieve optimum nutrition and its attendant benefits throughout the life course. The framework includes interventions to improve feeding practices, prevent and manage infectious diseases, and improve adolescent and preconceptional nutrition. It also highlights the need for programmes to

focus on nutrition-sensitive areas such as water and sanitation, classroom education, and women's empowerment. Another article in the series includes an analysis of the effect of scaling up seven of these interventions (multiple micronutrient supplementation in pregnancy, promotion of breastfeeding, appropriate complementary feeding, management of severe acute malnutrition, vitamin A supplementation, preventive zinc supplementation, and treatment of diarrhoea with zinc). The authors state that scaling up these interventions by 2016 would avert over 23% of deaths in children under five in Bangladesh (3).

Several articles in The Lancet series specifically mention Bangladesh, highlighting successes and pointing out areas where improvement is still needed. The series describes programmes that have achieved improvements in nutrition indicators in Bangladesh, such as micronutrient supplementation and the Integrated Management of Childhood Illnesses (IMCI) (3). It also references the Nutrition Commitment Index (NCI), which ranks 45 countries on their government commitment to the reduction of under nutrition (4). Bangladesh is near the top of the list, at number five, and the series notes that the countries at the top have seen much steeper declines in stunting than countries further down the list. The same article discussed the role of nutrition champions in Bangladesh, stating that they have played a key role in advancing the nutrition agenda and catalysing action (4). The synergistic effect of successful programmes, dynamic nutrition champions and government commitment to nutrition is likely an important factor explaining the reduction in child under nutrition in Bangladesh.

The authors also analysed the relationship between nutritional status and gross domestic production (GDP) across countries, and found that Bangladesh had levels of stunting and low birth weight that were higher than predicted relative to its national income (5). This may be related to another finding of the series, namely that "about a fifth of childhood stunting could have its origins in the foetal period (2)." This pattern is evident in Bangladesh, where a sizable proportion of children are stunted from the earliest months (see page 166). A relatively high proportion of Bangladeshi children are born with low birth weight, setting these infants on a lower growth trajectory, leaving them stunted later in childhood and at least partially explaining the higher-than-expected levels of stunting. While FSNSP does not track birth weight, it is an important source of data on the number of infants ages zero to three months who are underweight, an important proxy indicator. The series notes that maternal stunting and low maternal body mass index (BMI) early in pregnancy increases the risk that infants are born with low birth weight (see page #) (2). It also stresses the importance of iron supplementation during pregnancy as this can reduce the incidence of low birth weight by 19% (2; 3), though many Bangladeshi women are still not taking iron-folic acid (IFA) during their pregnancy. The high levels of maternal under nutrition and limits of antenatal care coverage in Bangladesh are well-documented through FSNSP and other data collection systems; it may therefore be argued that until the issue of maternal nutrition is addressed, the problem of low birth weight and subsequent stunting will be difficult to solve.

The Lancet series authors also explore the importance of psychosocial factors, along with good nutrition, in early childhood. They note that poor nutrition often coincides with other developmental risks, particularly inadequate stimulation during early childhood. They advocate for interventions to promote early learning, particularly support to help parents meet their children's psychosocial needs in the home. These findings reflect an understanding that a child's well-being depends in large part on the well-being of his or her mother. Mothers who are well-nourished, well-educated, mentally and emotionally healthy, and empowered to make decisions about their children's care are those whose children will be most likely to grow well. Mothers need time to

spend breastfeeding and bonding with their children. They need to be able to interact with their children in a positive, responsive and supportive way. Mothers who are depressed, under-nourished, ill, or disempowered are less likely to have the energy to be proactive and responsive to their children's needs. Ensuring that mothers have the resources they need to optimally care for their children, including the emotional and physical resources as well as time- in that they are fully available to focus on their children, requires a holistic approach in which the whole family comes together to meet these needs.

The government of Bangladesh (GoB) has already implemented many programmes to improve the nutrition of its population and is working to achieve the targets set in the MDGs and by the WHA. The National Nutrition Services (NNS) within the Institute of Public Health Nutrition (IPHN) has an operational plan for 2011 - 2016 that includes over 20 nutrition-specific and nutrition-sensitive interventions to be implemented nationally. These include several of those mentioned in The Lancet series, such as micronutrient supplementation, dietary supplementation, and treatment of acute malnutrition. IPHN also has a National Communication Framework and Plan for Infant and Young Child Feeding, which focuses on improving practices around breastfeeding and complementary feeding. Finally, the NNS operational plan includes nutrition-sensitive interventions such as school-based nutrition education and gender mainstreaming and coordinates with nearly 20 other government ministries on nutrition-sensitive programmes. As a key partner in FSNSP, the NNS has prioritised nutrition surveillance as a means of assessing progress and making evidence-based programme decisions. The Bangladesh Bureau of Statistics (BBS) has also prioritised nutrition and food security. In addition to being a partner in FSNSP, BBS has included nutritional surveillance in its strategic and operational plans.

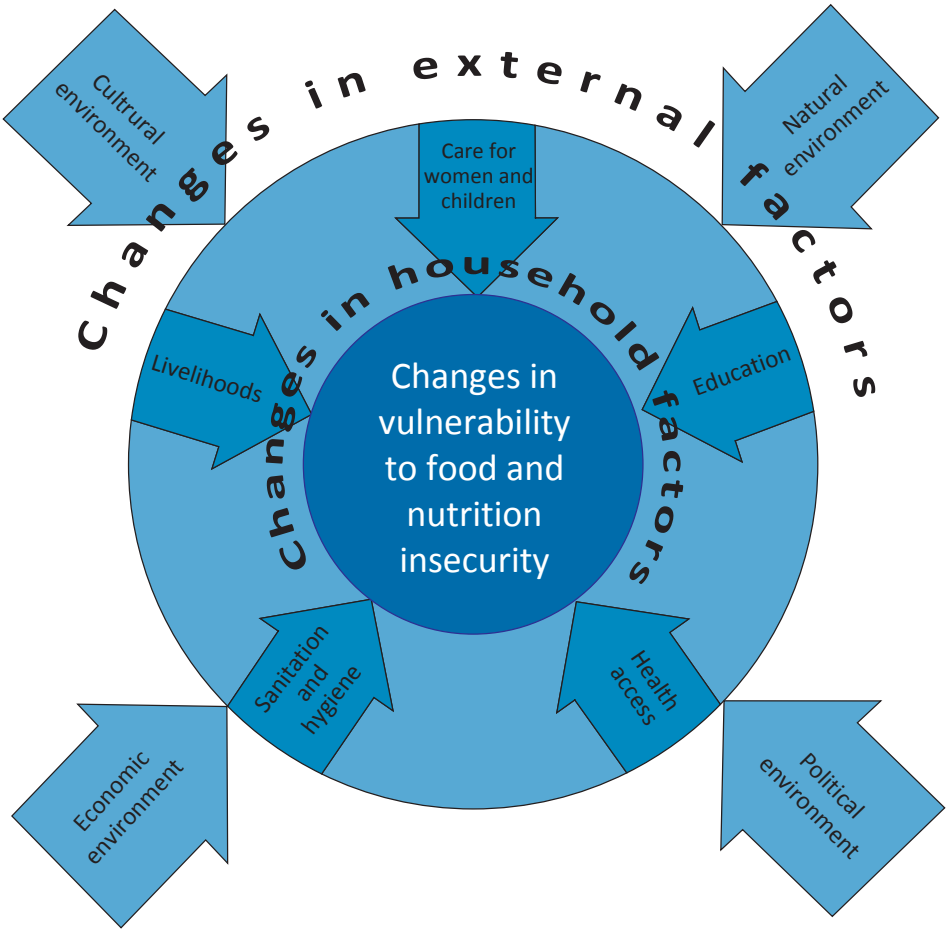
Food Security and Nutrition Surveillance

In support of this effort by the GoB, the Food Security and Nutrition Surveillance Project (FSNSP) provides timely and accurate monitoring of the nutrition situation in Bangladesh. FSNSP builds on the 17 years of the Nutrition Surveillance Programme, managed by HKI and IPHN. 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 (more than 27,000 households and 13,000 children in 2012) 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.[1]

[1] 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 BDHS that capture cultural and policy changes, and associated health effects.

Figure 1.1 : Conceptual framework



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 Lancet nutrition series. For example, recognising the importance of nutrition-sensitive practices such as water and sanitation, in 2013 FSNSP incorporated data collection around handwashing points in the home and observational methodologies to assess handwashing practices. Similarly, FSNSP considered The Lancet findings on the importance of early stimulation and is currently exploring simple approaches which can be incorporated into existing data collection activities (namely weighing and measuring children) to help assess children's levels of cognitive development.

As in previous years, the FSNSP 2012 report emphasises the need to focus on geographically vulnerable groups, and the system will continue prioritising data collection in the most food insecure areas of the country. However, while FSNSP and other data sources continue to find much higher rates of food insecurity in rural areas than in urban areas, there is increasing concern within the development community about urban nutrition, particularly in slum areas. In response, in 2014, FSNSP is incorporating sampling approaches which will enable more in-depth exploration of the levels of inequality within urban areas.

Structure of This Report

This report on the ***State of Nutrition and Food Security in Bangladesh: 2012*** presents selected annual and seasonal findings from three rounds of surveillance conducted during the third year of FSNSP surveillance. Its structure is similar to ***State of Nutrition and Food Security in Bangladesh: 2010*** and ***State of Nutrition and Food Security in Bangladesh: 2011***, enabling comparisons between the three reports (6; 7). Sections of this report, particularly in the description of the indicators used, are taken directly from the 2011 report (7).

The report reviews FSNSP's data collection methods, followed by surveillance results organised around six thematic headings: 1.) Household characteristics, 2.) Food security, 3.) Nutritional status of women and girls, 4.) Maternal care and nutrition, 5.) Child feeding and care, and 6.) Nutritional status of children. The report presents national, divisional, and urban/rural estimates under each theme based on data collected in 2011. 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 FSNSP website: www.fsnsp.net

Methodology

FSNSP is committed to identifying households at greatest risk of food and nutrition insecurity which are often clustered in specific geographic areas.

FSNSP collects data representative of Bangladesh as a whole in addition to areas at greater risk of food and nutrition insecurity.

FSNSP's methodology was largely the same in 2011 and 2012, although there was a redefinition of the sampling frame so that the sample better reflects settlement patterns.

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

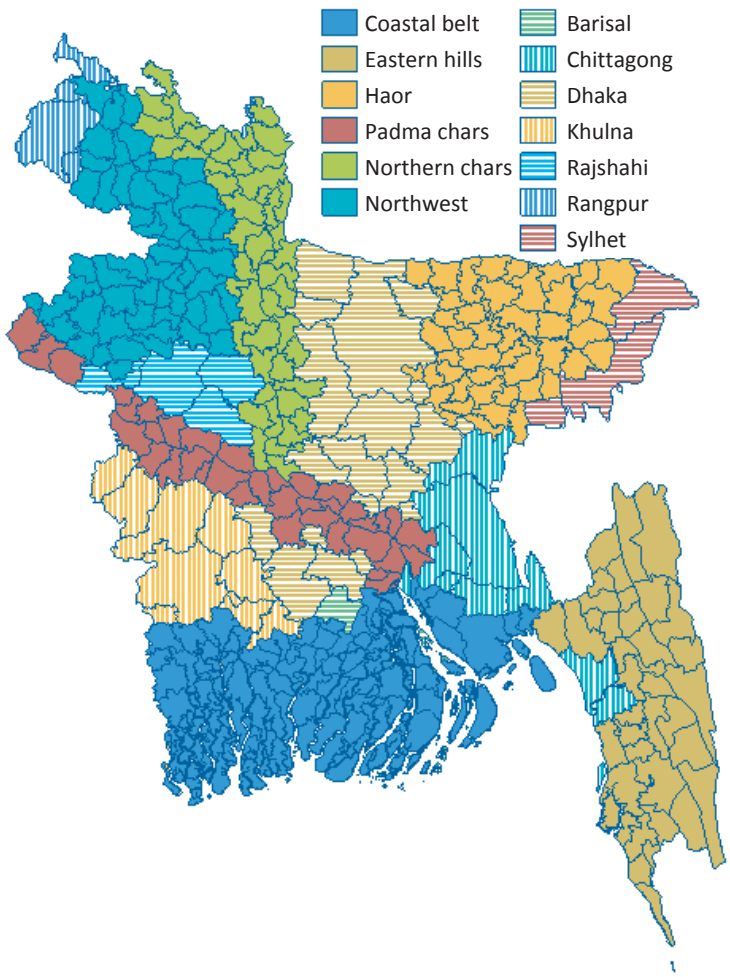
FSNSP collects multiple measures of nutritional status for women and children, including height, weight and MUAC.

In 2012, FSNSP interviewed individuals from 27,068 households in 1,127 communities.

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 can be found in *State of Food Security and Nutrition in Bangladesh: 2010* while details on the second year of implementation can be found in *State of Food Security and Nutrition in Bangladesh: 2011* (1; 2). In the third year of implementation, there were no large changes in sampling structure excepting that the second-to-last sampling unit, the community, was redefined. This change was made to reduce variation in weights, increase the number of communities from which data was collected, and enable the sample to more closely match settlement patterns. This change is detailed below along with a review of the methodology employed in the surveillance system.

Sample selection

Figure 2.1 : FSNSP surveillance zones

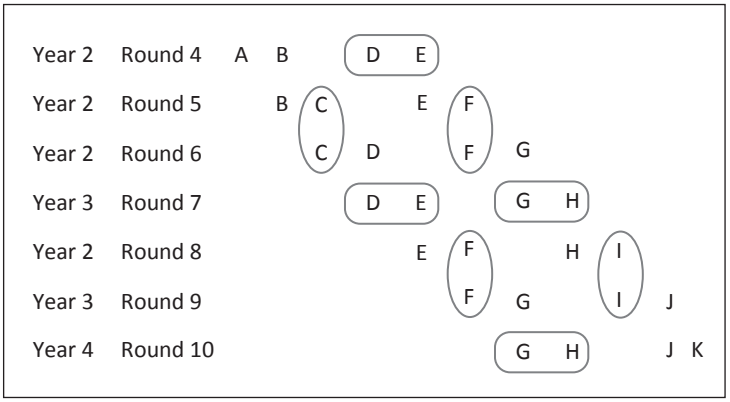


By identifying vulnerable zones for targeted surveillance FSNSP maintains its commitment to
insecurity, the large majority of which
behind and process of defining the

to reduce travel time and provide a
ling, the country was divided into 13
the six surveillance zones, while the
ot included in a surveillance zone,
strata, a set number of *upazila* were
nes, twelve *upazila* were selected in

each round of 2012, 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 1 to 8 (for a list of upazilla see Appendix A).[1]

Figure 2.2 : Rotation pattern for selecting upazila



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 UN and is commonly done in labour participation surveillance (4; 5; 6; 7; 8). This process is detailed in the 2011 report and illustrated in Figure 2.2, where each letter represents a selection of three *upazila* from each zone. Through this method, 50% of the *upazila* in the sample are the same between any two consecutive rounds of data collection and 50% of the *upazila* in the sample are the same between the same season in two consecutive years.

As noted above, in 2012 the number and composition of the second-to-last sampling unit, which is referred to by FSNSP and in this report as communities, was changed. In contrast to 2011, in which three rural villages or urban *mohalla* were selected at random from the census list of each *upazila,* in 2012 the list of villages/*mohalla* in each *upazila* were broken into units of equal size before four communities from this list were selected.[2] This change enabled a sample selection process with roughly probability proportional to size sampling (PPS), thus enabling sampling weights to be much more uniform across areas. In addition the sample in 2012 will more closely match settlement patterns as more households are interviewed in more densely populated areas.

Similar to 2011, in 2012 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*. This change has lowered the design effect of the surveillance system, as the sample is now taken from a greater number of communities. The change did not increase the sample size in each *upazila* as the number of households interviewed per community was reduced from 32 to 24.

The third stage of sample selection was done in the field and did not change greatly from 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 until 24 households were selected systematically and interviewed.[3] The next and subsequent households for interview were chosen systematically by skipping four households from the

1 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.

2 In each selected *upazila*, all villages/*mohalla* listed in the sampling frame as having fewer households than a given cut-off were combined with adjacent villages/*mohalla* in order to create clusters of villages larger than this cut-off. The cut-off was 75 households in the Chittagong Hill Tracts and 150 households in the rest of the country. Subsequently, all villages with a population over twice the given cut-off were split into clusters in the sampling frame.

3 If a selected community was part of a village or *mohalla* of greater than five times the cut-off for community population, the settlement was first divided into roughly equal sections of less than five times the cut-off based on local landmarks, then one section was selected at random and the surveillance was carried out in this area.

previously interviewed household and, in a "zigzag" fashion, selecting households from both sides of the road. In situations where the identified household was not eligible for inclusion or refused participation, the next household that met the inclusion criteria was selected.

A household was defined as a group of related or unrelated individuals that live together and share the same eating and cooking arrangements.[4] 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 five years of age. As implied above, non-response households were substituted with other households in the same village. A record of each household passed in the community was noted on a specially designed sheet which indicated the survey status of the households (either skipped, absent, interviewed, refused, or not eligible). This record enabled monitoring and quality control officers to easily find sampled households when revisiting communities and to verify that data collectors were maintaining the prescribed skip pattern. In addition, these numbers were used to verify the sampling frame and construct weights.

Table 2.1 : Process for sample selection

Selection unit	*Process*
Strata	**All rounds:** The country was divided into 13 areas: Six agro-ecologically based surveillance zones and the rest of the nation by the seven administrative divisions (2).
Upazila (PSU)	**All rounds:** From each agro-ecological zone, 12 *upazilas* were selected with replacement by rotation, while, from the rest of the country, 22 *upazilas* were selected with replacement but without rotation (stratified by division).
Community (SSU)	**All rounds:** The villages/*mohalla* in all selected upazila were divided up into equal sized clusters of households. From this list there was a random draw of four communities from each selected *upazila*; if an *upazila* was selected multiple times, four additional communities were pulled for each time the *upazila* was selected.
Household	**All rounds:** Every fifth household in the plains land and third households in the Chittagong Hill Tracts was selected for inclusion starting with the 1st house in the north, south, east, or west side of the community and moving in a counter-clockwise direction. The direction of entry was randomly assigned.
Women	**All rounds:** All pregnant women in the household plus the random selection of one non-pregnant woman or adolescent girl 10-49 years of age who was home and available at the time of interview.
Children	**All rounds:** All children in the household were selected for measurement, but only the care giver of the youngest child was selected to complete the child morbidity and feeding module.

The system of selecting caregivers, women, and children in each household for questionnaire administration and anthropometric measurements did not change from 2011 to 2012 or between data collection rounds in 2012. In every household sampled, one non-pregnant woman or adolescent girl (aged 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 recorded and were asked about their dietary patterns and care 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.

4 In FSNSP, any family member would be considered a member of the household if they lived in the same dwelling, and ate from the communal arrangements, and spent at least saven contiguous nights in the house at a non-festival period in the past four months. Due to this definition and employment patterns in Bangladesh, it is possible that some individuals could be a de jure household member of multiple households.

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 seven key indicators over different periods.

1. Round-wise estimation of acute childhood malnutrition (based on weight for length/height)
2. Round wise estimation of child underweight (based on weight for age)
3. Annual estimation of child underweight (based on weight for age)
4. Annual estimation of chronic childhood malnutrition (based on length/height for age)
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
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
7. Round-wise estimation of the proportion of households with food insecurity as defined using the Household Food Insecurity Access Scale (HFIAS) (9)
8. Annual estimation of the proportion of households with food insecurity as defined using the HFIAS (9)
9. Round-wise estimation of the proportion of households with "food deficits" as defined using the Food Deficit Scale (FDS) (10)
10. Annual estimation of the proportion of households with "food deficits" as defined by the FDS (10)
11. 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) (11)
12. 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 for childhood acute malnutrition, women's CED, and annual childhood chronic malnutrition. Less precise estimates were deemed sufficient for child underweight (7.5%) and the three indicators of household food insecurity (10%). The formula used to calculate sample size is as follows (12):

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

Where:

n = required minimum sample size
δ = the inter cluster correlation
c = the number of households sampled in each village (16 in this survey)
P = the estimated level of an indicator, and
Z_α = 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 (P2 - P1) would not have occurred by chance (α - the level of statistical significance)

Estimates of the prevalence and inter-cluster correlation (ICC) used in calculating the sample size were drawn from the 2011 FSNSP dataset.[5] Based on this data, it was assumed that children would be present in 46% of households, and women over the age of 18 years would be interviewed in 70% of households. These proportions were used to convert the sample size requirements for individuals (7th column in Table 2.2) into estimates of the number of households that would have to be visited to reach that many individuals (8th column in Table 2.2).

Table 2.2 : Estimated sample size

Indicators	*Estimated Prevalence*	*Desired Precision*	*Desired sample*	*ICC*	*Design effect*	*Required sample*	*Required households (each round)*
Child Indicators							
Acute (wasting, seasonal)	24%	5.0%	277	0.068	1.681	466	1012
Underweight (seasonal)	50%	7.5%	171	0.065	1.655	283	615
Underweight (annual)	44%	5.0%	379	0.057	1.569	595	431
Chronic (annual)	50%	5.0%	384	0.064	1.641	630	457
Women's Indicators							
Women's CED (seasonal)	45%	7.5%	169	0.110	2.737	462	661
Women's CED (annual)	42%	5.0%	374	0.096	2.518	942	448
Household Indicators							
Food insecurity (HFIAS, seasonal)	59%	7.5%	165	0.250	6.739	1112	1112
Food insecurity (HFIAS, annual)	62%	5.0%	362	0.242	6.555	2373	791
Food deficit (FDS, seasonal)	21%	7.5%	111	0.216	5.967	662	662
Food deficit (FDS, annual)	42%	5.0%	374	0.209	5.801	2170	723
Food consumption (FCS, seasonal)	30%	7.5%	143	0.202	5.643	807	807
Food consumption (FCS, annual)	25%	5.0%	286	0.201	5.628	1610	537

The largest sample size required by these indicators was the number of households needed to estimate food insecurity seasonally, which was calculated to be 1,112 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.

5 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. This was done in order to maximise sample size as estimates were expected to vary both between rounds and between seasons, and to facilitate data collection activities by making the sample size target uniform across zones and rounds of data collection. 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) (20).

Measurement

Surveillance data were collected through structured interviews by means of paper questionnaires and proprietary survey software (Surveymaster v1 & v2, 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. Approximately 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 website (www.fsnsp.net), and key indicators are described in the relevant sections of this report and in the glossary or provided in the companion book: *State of Food Security and Nutrition in Bangladesh: Summary statistics 2012*. The questionnaire used in the third year of FSNSP closely matches the format and structure of the questionnaire used in the first year and second year, details of which can be found in past reports (1; 2). The questionnaire did not change between the three rounds of surveillance in 2012.

Enumeration team training

An experienced staff of 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-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 (15).

Consent and ethical clearance

To obtain informed consent, FSNSP 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 consent statement to all respondents, informing 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.

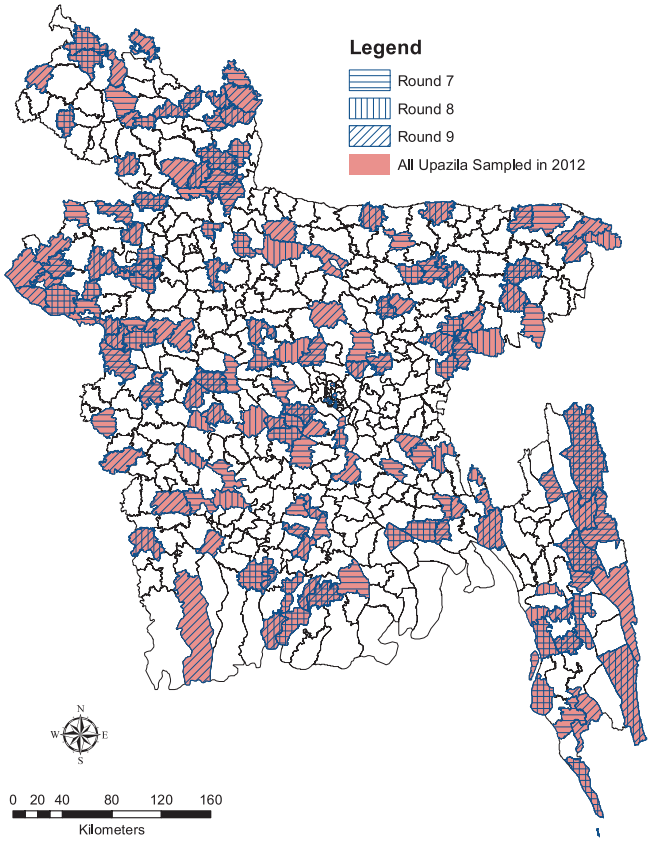
Field work

In 2012, 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 2011. Monitoring officers supervised the activities of every team and two field managers provided oversight of the data collection process.

Table 2.3 : Dates of data collection

Round	*Dates*
7	February 22 – May 05
8	June 4 – August 12
9	September 26 – December 15

Figure 2.3 : Sampled upazilas by round



All rounds of data collection were divided into two phases with a break between data collection periods. 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 least once a week to check questionnaires and ensure adherence to the questionnaire protocol in the field.

During 2012, 27,068 households were interviewed in 987 rural communities and villages and 130 urban communities (1,127 communities in total) of 169 *upazilas* (figure 2.3). Overall, refusal rates remained very low, with only 487 households declining to participate in the survey (1.8%). As expected, refusal rates in urban areas were greater than in rural areas (rural: 1% and urban: 6%). In selected households, a total of 21,985 women aged 19 to 49 years of age and 5,472 adolescent girls aged 10 to 18 years of age were interviewed. Of these 27,457 women and girls, 1,622 were pregnant (6%). Additionally, 13,648 children were measured and 11,387 caregivers were interviewed about the care and feeding practices of the youngest child in the household. Table 2.4 breaks these aggregate figures up by surveillance round.[6] Notably, there has been a sizable reduction in the number of children and pregnant women

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

	Round 7	*Round 8*	*Round 9*
Communities	375	376	376
Households	9,024	9,022	9,022
Women and girls	9,151	9,170	9,147
Young children	4,580	4,521	4,547

6 Further information about sample size attainment for various indicators can be found in the companion report, *State of Nutrition and Food Security in Bangladesh: Summary Statistics 2012* or on the website.

included in the system. It is not clear if this reduction is because of the slightly more urban nature of the sampling caused by the modified community selection criteria, or if this is due to a continued fall in Bangladesh fertility rates.

Quality control

Data quality was ensured through multiple procedures of review and cross-checking. Monitoring officers reviewed all questionnaires on the day of completion by the data collectors so that any errors or inconsistencies identified 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 second field year of FSNSP, internal FSNSP quality control operations were supplemented by BBS staff performing a ten percent post-enumeration check using a shortened questionnaire.

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, v16.1).

Data management officers reviewed, edited, and cleaned the data by performing a series of logic, frequency and data range checks.[7] 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, v11.0). In this report, the data are described using proportions with confidence intervals and means with standard deviations. 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 which is housed at BBS (2011 census, 2nd field sampling frame). All analysis and estimations were performed utilising the svy commands in Stata, to take into account the complex sampling design.

7 The manual which guides these routine operations is available upon request.

Strengths and limitations

Revisions to the design and sampling strategy of FSNSP 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, FSNSP 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 variation of data weights has been greatly reduced by modifying the selection process for secondary sampling units. However, this change has also resulted in the sample being drawn from more urban and rural areas of higher population density, which may have slightly reduced the comparability of the estimates from 2011 to 2012. This result is mitigated through the consistent use of weights.

The limitations of the system in 2012, as was the case in 2011, 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 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.

Household characteristics

The proportion of households with children fell from 46% in 2011 to 42% in 2012, with the fewest children under five in Khulna division and the most children under five in Sylhet 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 surveillance zones.

An estimated 97% of households had access to improved sources of drinking water in 2012, and use of surface water for drinking purposes has decreased from 4% in 1993 to only 1% in 2012.

By 2012, rates of open defecation declined to 5% in rural areas and 1% in urban areas in 2012 (half of all households practiced open defecation in 1993).

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

Across divisions, the highest levels of maternal education (post SSC) were in Dhaka division (9%) followed by Barisal division (6%). The lowest levels of maternal education were in Sylhet division.

In 2012, the mean household size estimated through the FSNSP system was 4.8 members - slightly smaller than the 2011 estimate but larger than the 2011 Census (4.4) and the 2011 BDHS (4.6) (1; 2). The difference between these results and FSNSP is likely due to the exclusion of households without a woman 10-49 years of age in the FSNSP system (and thereby the *de facto* exclusion of single member households) and/or the *de jure* definition of households employed by FSNSP (see page 31). Estimates of household size have been consistent since FSNSP began (3). Additionally, the ranking of divisions by household size is similar between FSNSP estimates and the 2011 census (1), with the largest average household size found in Sylhet, and the smallest in Rajshahi and Rangpur. Average household size among the surveillance zones was around the national average except for the Eastern hills and Haor (figure 3.1). As expected, no differences in household size were observed across seasons (graph not shown).

Figure 3.1 : Average household size by area of residence

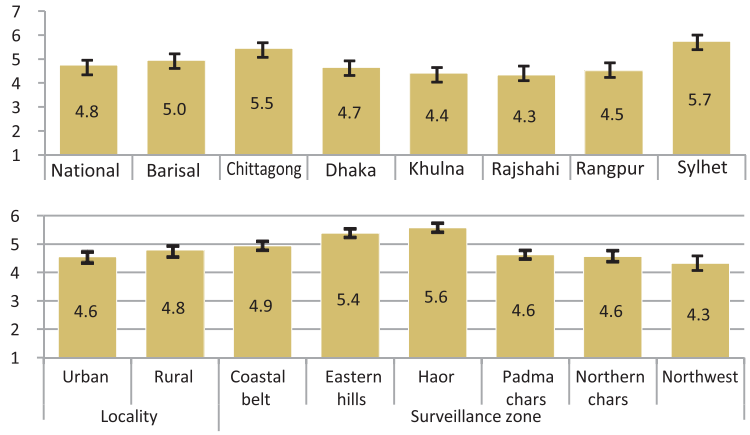
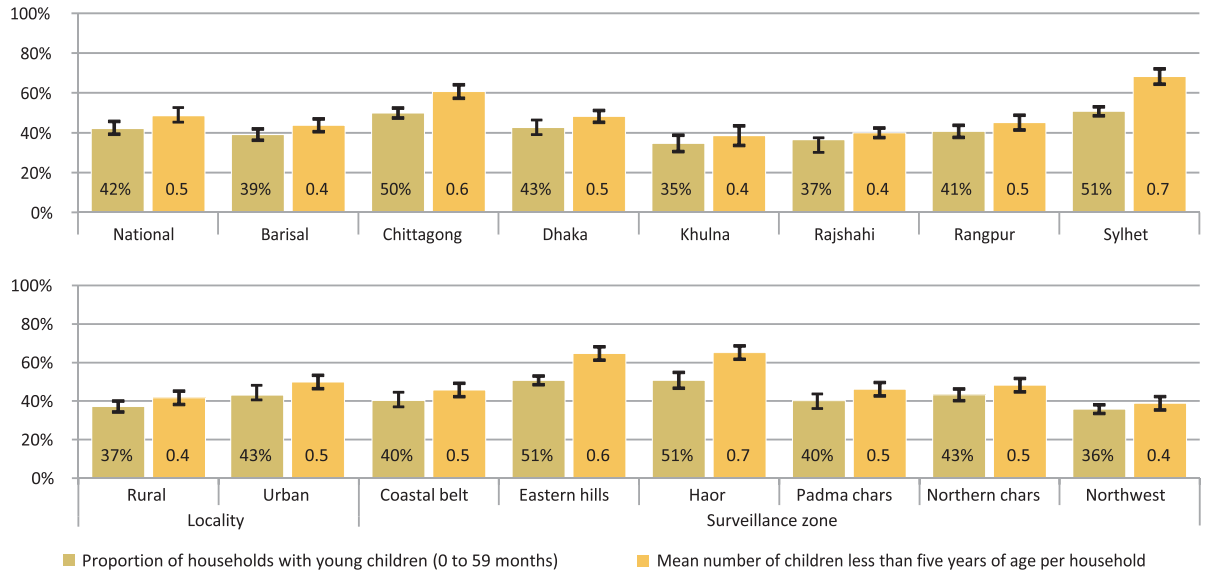


Figure 3.2 : Proportion of households with children and the mean number of children per household



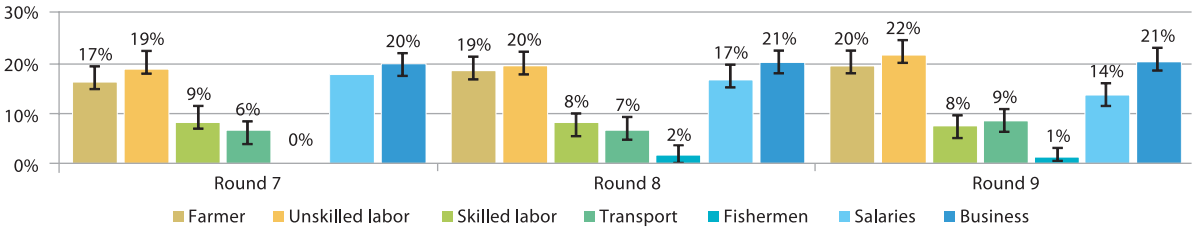
Fewer than half of households included a child younger than five years of age, and the proportion of households with children has fallen from 46% in 2011 to 42% in 2012. Around 20% of households with children under five had more than one child in this age range, leading to an overall average of 0.5 children less than five years of age per household, roughly the same as in 2011. The number of children under five and the proportion of households with young children varied greatly across

different regions of Bangladesh. Divisionally, the fewest children under the age of five were found in Khulna, where only 35% of households had young children, and the average number of children under five per household was 0.4. In contrast, Sylhet had both the highest proportion of households with young children, 51%, and the greatest number of children under the age of five per household, 0.7. These patterns are the same between 2011 and 2012, though the numbers of children have declined slightly in all areas. In contrast to 2011, in 2012, rural areas had a higher proportion of households with young children compared to urban areas. Among the surveillance zones, almost all the regions had household size similar to the national average with the exception of the Eastern hills and the Haor.

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.[1] 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 7.) business - trade in any good, including petty trading.

Figure 3.3 : Occupation of principal income earner by season

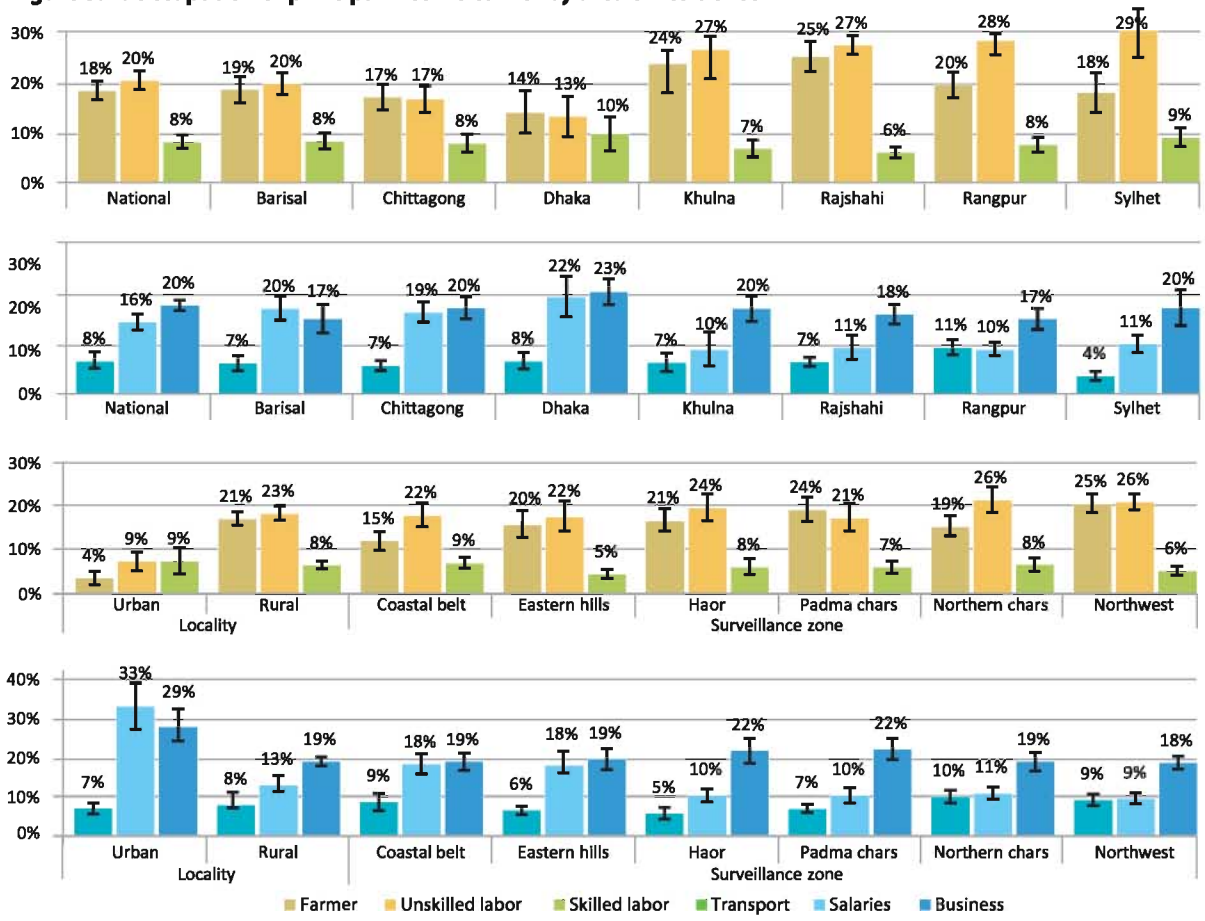


Distinct occupational patterns were apparent for some occupations across the regions of Bangladesh. For example, reliance on skilled labour was similar across areas but rates of unskilled labour varied from over 25% in the three western divisions of the country (Khulna, Rajshahi, and Rangpur), to only around 15% in Chittagong and Dhaka divisions, and in urban areas nationally. The north-western divisions of Khulna, Rajshahi and Rangpur also had the greatest proportion of households involved in farming, while Dhaka and Chittagong had fewer farming households than the national average. With the exception of the Coastal belt, all surveillance zones had greater proportions of households reliant on farming as a main source of income than the national average. Nationally, there were no clear seasonal trends in main sources of income for households (Figure 3.3).

1 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.

The only areas with a sizable proportion of households primarily reliant on fishing were Barisal and Sylhet (5% and 2% respectively, not shown). However, this income source was seasonal, with most households dependant on this livelihood during and after the monsoon. Together, business and salaried employment constituted the principal source of income for almost 40% of households nationally; however, in urban areas almost three-quarters of households were dependent on these sources of income. Salaried income was prevalent in Dhaka, Barisal, and Chittagong. Prevalence of salaried income was much lower in surveillance zones except for the Coastal zone and Eastern hills. On average, the proportion of households earning income from business was much lower in all the surveillance zones than in the rest of the country.

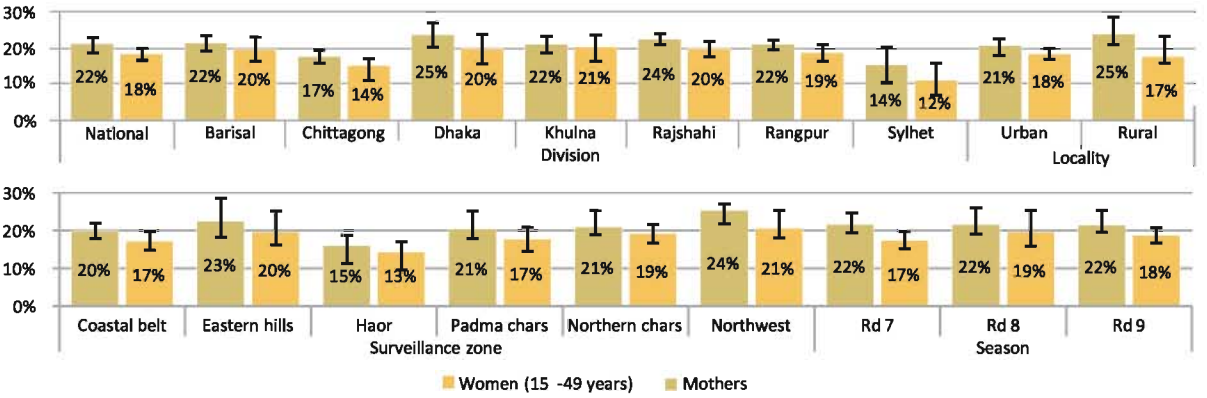
Figure 3.4 : Occupation of principal income earner by area of residence



FSNSP also captures women's contributions to household income even if these women primarily identify as housewives. Nationally, 22% of women 15 to 49 years of age earned income while only 18% of mothers with a child younger than five years of age did so. Both of these estimates are slightly lower than 2011. These proportions varied greatly across divisions, with more women engaged in income-earning activities in Dhaka, Rangpur, Rajshahi, and Khulna, and very few women earning income in Sylhet. For mothers there was little difference in income earning status between rural and urban areas, but women in urban areas earned less frequently than did their rural counterparts. The proportion of mothers earning income was lower than the proportion of women

earning income in both urban and rural areas. Among the surveillance zones, the proportion of women and mothers earning income was lowest in the Haor.

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



Household assets and wealth

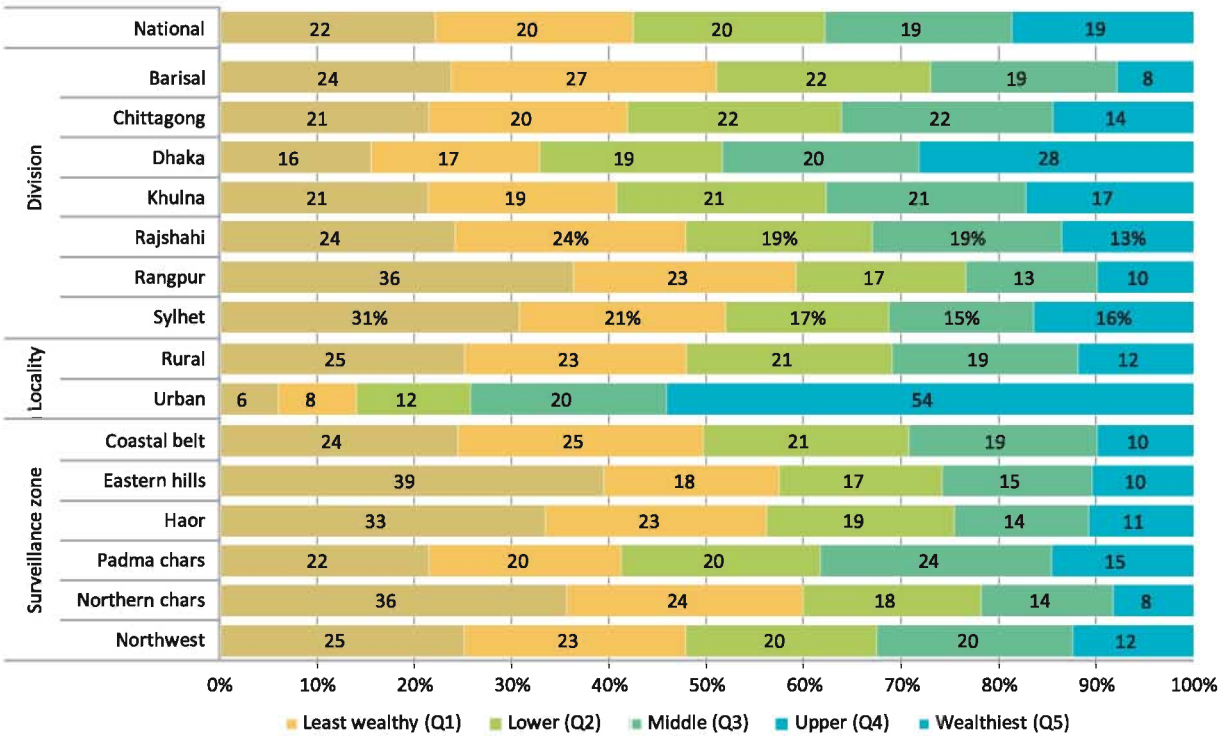
The surveillance system collects information on the quality of household structures, cooking, water and sanitation systems, and asset ownership. These household characteristics are typically associated with overall health and nutritional outcomes and the ability to weather periods of crisis. Additionally, using standard methodology, these assets can be used to determine the relative wealth status of households (4). In 2012, 62% of households had access to electricity (connection or solar generation) which was a small but significant increase from 2011 (58%). Similar to 2011 findings, houses were largely constructed of unfinished materials; for example, 74% of houses had mud floors and only 24% of households had floors, walls, and roofs all made of finished materials such as cement, wood, tiles, or tin. A sizable proportion of houses were single room dwellings (26%). In Bangladesh, there is a variety of cooking fuels used nationwide, which differ in terms of cost, availability, and their impact on health and climate. In rural areas, wood, straw and animal dung were the main source of cooking fuel (31%, 50% and 13% respectively) whereas in urban areas the use of natural gas piped to households was prevalent (45%).

Based on these characteristics and the assets that households owned, a composite wealth index was derived using the new DHS method which consists of area specific indexes that are combined into a national model (4). [2] The wealth index was then divided into five quintiles, each containing an equal population of household members. Dhaka division had both the lowest proportion of households in the poorest wealth quintile and the greatest proportion in the wealthiest quintile. In contrast, Rangpur had the highest proportion of households in the least wealthy quintile and the fewest numbers of households in the most wealthy quintile. Unlike 2010 and 2011, Barisal had the lowest proportion of households in the wealthiest quintile in 2012 (8%). Rural areas were much poorer than urban areas. In rural areas, 12% of households fell into the upper-most wealth category, while over half of urban households were in the wealthiest quintile. Among surveillance

2 This wealth index was constructed using the same methodology that the DHS system has used from 2010 (2; 4) and not the methodology used in past FSNSP reports. 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 B

zones, the least wealthy was the Northern chars with only 8% of people in the wealthiest quintile. Eastern hills had the highest number of people in the poorest quintile (39%) followed by the Northern chars (36%). Only the Padma chars were wealthier than the national average for rural areas.

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



Water and sanitation

Access to safe drinking water and sanitation is one of the basic determinants of good health. Unsafe water and inadequate sanitation are linked to skin diseases, acute respiratory infections (ARIs), and diarrhoeal diseases. The disease burden from water, sanitation, and hygiene has been estimated as 4.0% of all deaths and 5.7% of the total disease burden (in Disability Adjusted Life Years or DALYs) occurring worldwide (5). FSNSP uses two indicators to assess basic water and sanitation which are included in MDG Target 7: "Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation" (6). Sources of drinking water and basic sanitation have been categorised following the WHO/UNICEF Joint Monitoring Programme for water supply and sanitation (JMP) guidelines (7).

For both measures, two broad indicators of improved and unimproved facilities have been further categorised in four sub-groups. For sanitation, there is proportion of people with no 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 facilities which include flush toilets, water sealed toilets, and closed pit toilets. 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. These sub categories enable a clearer view of the current situation of access to water and sanitation across the country.

Figure 3.7 : Trends in source of drinking, 1993-2012

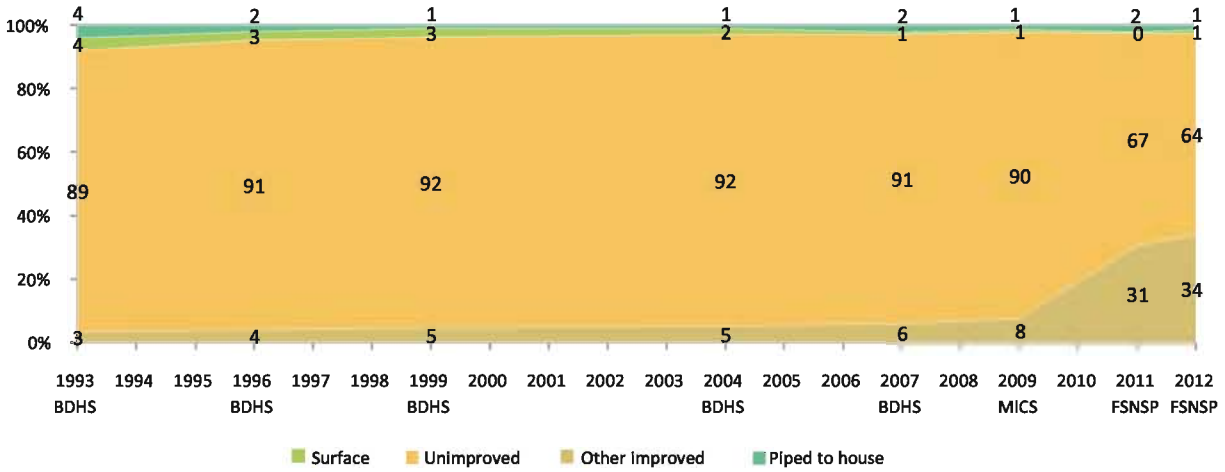


Figure 3.7 displays trends in sources of drinking water from 1993 to 2012. Use of the most improved source of drinking water- a piped water connection into the household, has increased from 3% in 1993 to 34% in 2012. Other improved sources, such as a piped connection outside the premises or a tube well, decreased from 89% in 1993 to 64% in 2012. Use of surface water for drinking purposes decreased from 4% in 1993 to only 1% in 2012. Altogether, around 97% of households had access to improved sources of drinking water in 2012 (figure 3.8). Although improved sources of drinking water may be free from outside contamination, this does not guarantee that the water is safe and free from natural contaminates such as heavy metals like arsenic (6).

Figure 3.8 displays the proportion of households having access to safe drinking water across divisions in 2011 and 2012.[3] In 2012, over 90% of households in all divisions except Sylhet had access to an improved water source. In Khulna, there has been a remarkable improvement in the proportion of households with access to an improved water source between 2011 and 2012. This improvement is even more apparent when comparing 2012 data with results from the MICS 2009 survey for Khulna division, which reported only 80% people in Khulna using improved sources of drinking water (8).[4] However, it should be noted that Khulna is one of the regions facing scarcity of safe drinking water due to arsenic contamination and salinity, which is not directly measured through this indicator.

3 Results from 2011 are displayed because these were not included in the 2011 report (3).
4 In MICS the improved drinking water sources are the same as FSNSP indicators used to denote improved water source (10).

Figure 3.8 : Proportion of households having access to safe drinking water by area of residence

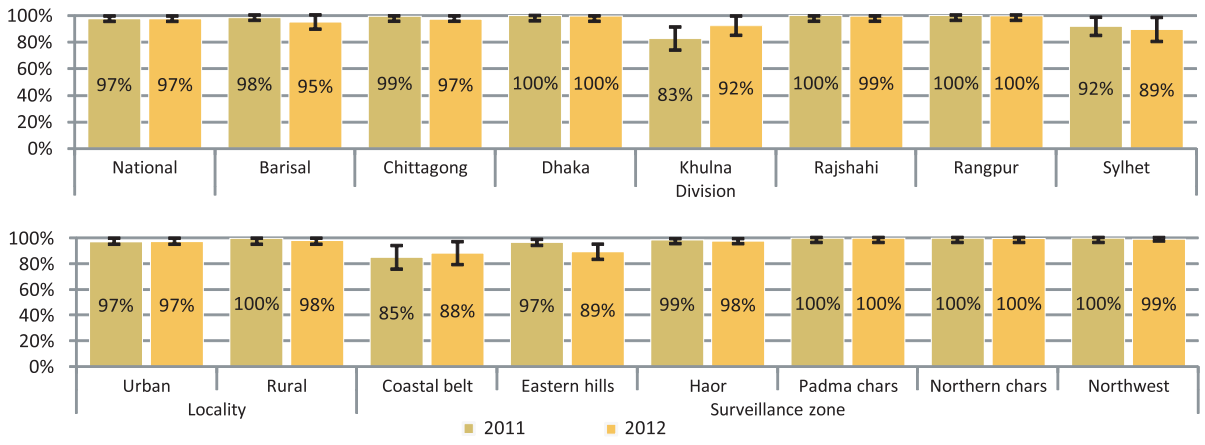


Figure 3.9 : Trends in the proportion of households without toilet facilities, 1993-2013

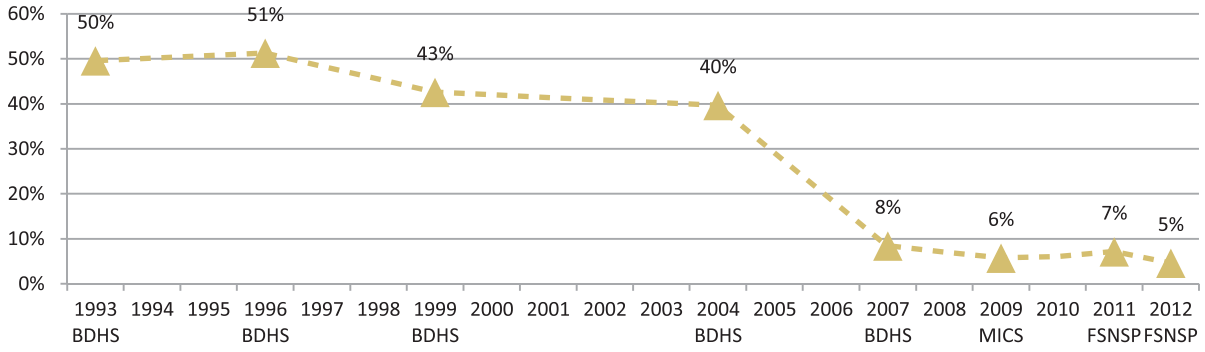


Figure 3.9 displays the trend of the percentage of households without access to any toilet facilities from 1993 to 2012. In 1993, half of all households were using open defecation which has declined gradually to 7% in 2011 and 5% in 2012. In 1993, open defecation was as high as 54% in rural areas compared to 14% in urban areas. By 2012, rates of open defecation declined to 5% in rural areas and 1% in urban areas.

Figure 3.10 : Trends in latrine use, 2007-2012[6]

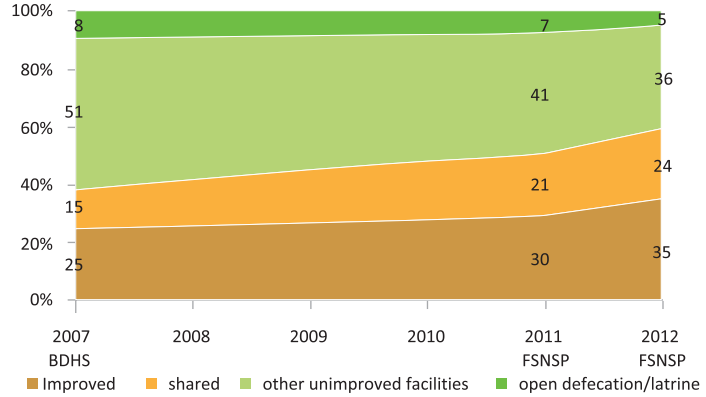


Figure 3.10 shows trends in the proportion of the population using four different categories of sanitation facilities from 2007 to 2012.[5] There have been improvements across all categories. In 2012, 35% of households were using any improved facility compared to 25% in 2007. Only 5% of

5 A longer time series for this indicator could not be created as early DHS surveys did not record if household toilet facilities were shared prior to 2007(11).
6 The MICS data could not be added to our sanitation ladder as they have not mentioned the proportion of the population using shared facilities (10).

households in 2012 were using open defecation compared to 8% in 2007. The proportion of households using any other unimproved source has reduced greatly, from 51% in 2007 to 36% in 2012. However, the use of shared toilets has increased from 15% in 2007 to 24% in 2012.

Figure 3.11 : Proportion of households having access to improved sanitation by area of residence

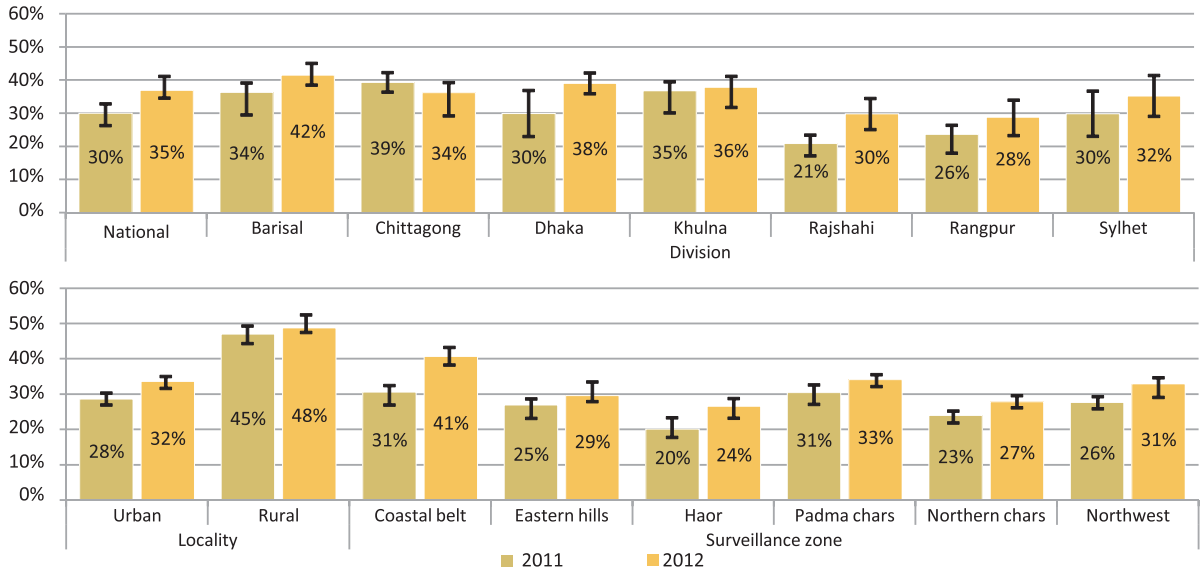
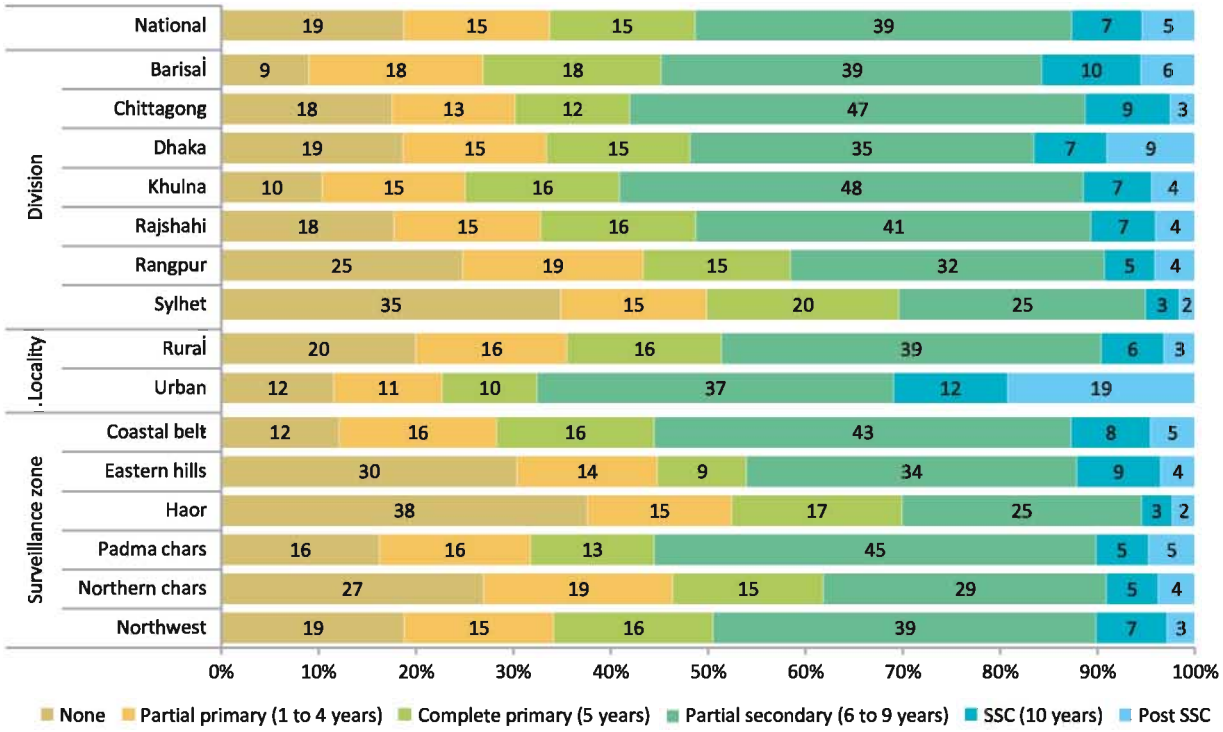


Figure 3.11 displays the proportion of households with access to improved sanitation facilities in 2011 and 2012. While some progress is apparent over the year, rates of improved sanitation in 2012 are almost identical to the 2011 BDHS (34%), which was completed in the later seasons of 2011 (2). The proportion of households using improved sanitation sources is highest in Barisal district, and lower in Rajshahi and Rangpur. The rate of improved sanitation is higher in urban than rural areas.

Education levels

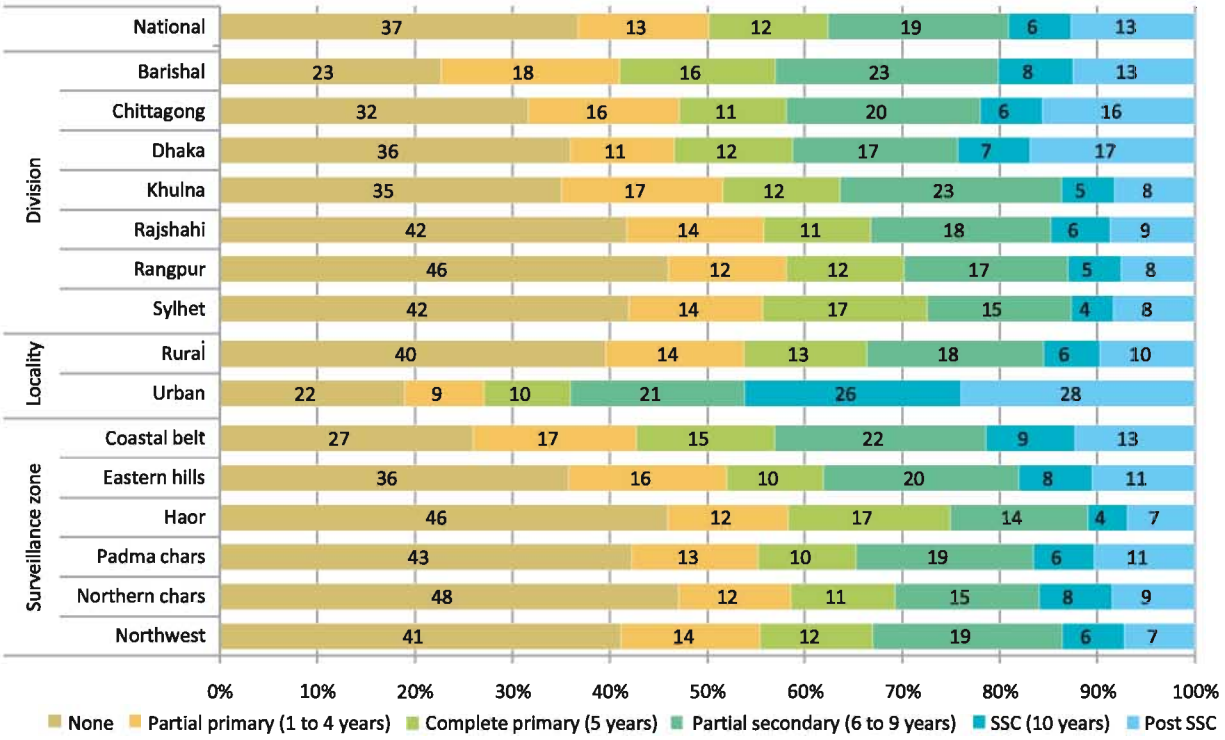
The educational attainment of all household members is recorded in years of education passed and later categorised into six groups as follows: 1.) none - 0 years; 2.) partial primary - 1 to 4 years; 3.) primary completion - 5 years; 4.) partial secondary - 6 to 9 years; 5.) SSC certificate - 10 years; 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. Educational attainment level of the mother is used to examine child care and feeding practices, given the known importance of maternal education as a protective factor against childhood malnutrition and illness; the 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 the woman's own educational attainment.

Figure 3.12 : Educational attainment of mothers by area of residence



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 19% 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 Dhaka (9%) followed by Barisal (6%). A somewhat similar scenario was found for principal income earners, with the highest level of education reported in Dhaka (17%) followed by Chittagong and Barisal (16% and 13% respectively). A greater proportion of people with the lowest level of educational attainment was found in Rangpur 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 lower than the national average; however this was not the case for the Coastal belt.

Figure 3.13 : Educational attainment of principal income earners by area of residence



Food security

The proportion of households reporting signs of food insecurity - such as insufficient food stocks, consuming less preferred foods, eating only rice, skipping meals, etc - declined in 2012. This likely relates to the decline in food prices in 2011.

Food insecurity was highest in households which relied on unskilled labor as their main income source and lower in households with businesses or salaried jobs. However, this disparity significantly decreased between 2010 and 2012.

Though varying across divisions, the rate of food insecurity was over 150% higher in rural areas than in urban areas.

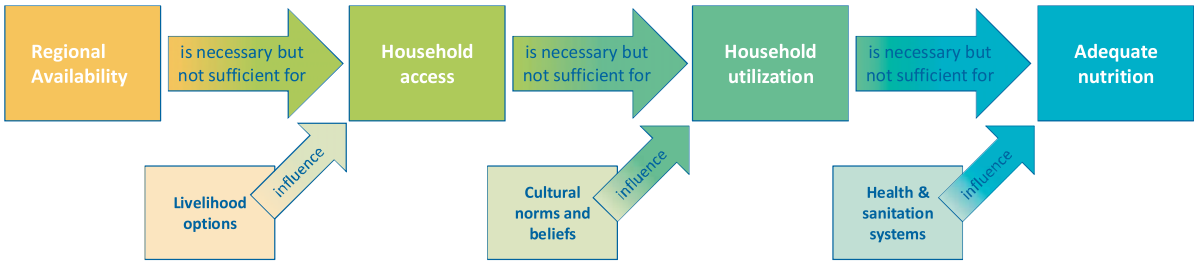
In Bangladesh, the impact of food insecurity is not experienced equally by all members of the same household. Social and cultural norms likely have a negative effect on the food intake and dietary diversity of women and female children.

FSNSP remains the only source of seasonal, household-level information on the food security status of Bangladesh, using internationally standardised questions to estimate the prevalence of food insecurity.

A household and its members are food and nutrition secure when: 1) food is present nationally, regionally, and/or locally (availability); 2) food can be purchased or produced (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 change in the near future (vulnerability) (1). The unit of reference for these components of food security becomes smaller over these conditions - moving from regional indicators to household indicators to individual indicators - and each of these components is a necessary though not sufficient condition to achieve the subsequent aspect of food security (figure 4.1). For example, if food is not available in local markets or through harvest of local fields, households will be unable to access sufficient food no matter their income or production capability. Similarly, in households without the purchasing or production power to access food, household members will not be able to obtain a balanced and adequate diet. Moreover, even within households, individual members will be food insecure if they do not receive an adequate portion of the food prepared and will not be nutrition secure if illness prevents their bodies from utilising nutrients in the foods they eat.

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 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 surveillance data from 2010 along with historical national surveys.[1]

1 FSNSP does not measure directly whether levels of food insecurity are a consequence of low availability, low access, inadequate utilisation, a lack of stability in the food economy, or a combination of these factors. Instead, it relies on contextual information and directly measures household perceptions of and experiences with food insecurity. However, when paired with complementary datasets, FSNSP can provide information about what factors may be bottlenecks to greater food security in Bangladesh (36).

Availability

In line with goals laid out in the *National Food Policy*: Plan of Action and the *Country Investment Plan* (CIP), the Government of Bangladesh is committed to increasing and diversifying the foods available in all regions of Bangladesh through improved agricultural production and maintenance of trade relations (3; 4). Since 2008, the proportion of rice land cropped with high yielding varieties of rice has increased steadily, from 72% in 2008 to 77% in 2012 (5). As shown in Figure 4.2, the only crops which have not had increases in production over the five years between 2007 and 2012 are pulses, banana, and jackfruit (6). For animal source food, the growth has been even larger, the average annual production increase from 2007/2008 levels has been 10% for eggs and milk and 41% for meat (6). 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 (5). Overall, production of fruits and vegetables in Bangladesh is less than half of that needed to promote optimal nutrition and health (7).

Figure 4.2 : Average annual growth rates for selected crops (2007 to 2012) and animal source foods (2008 to 2012)[2]

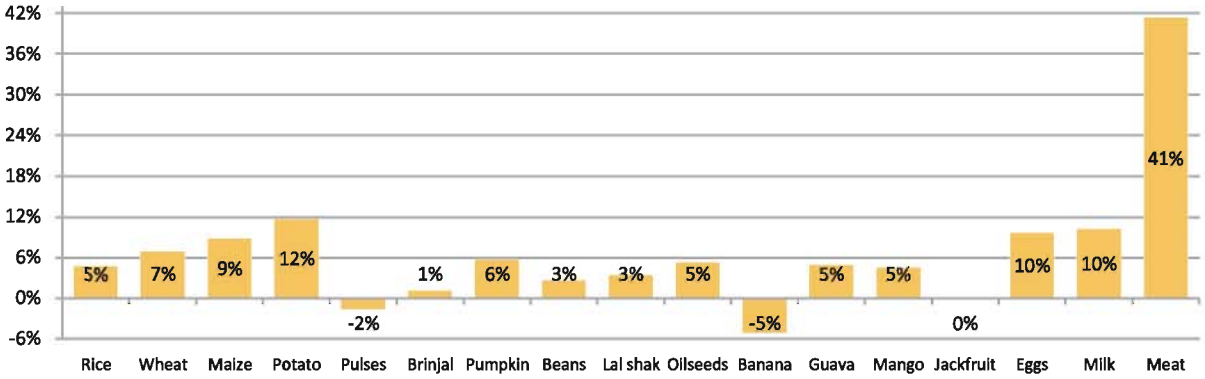
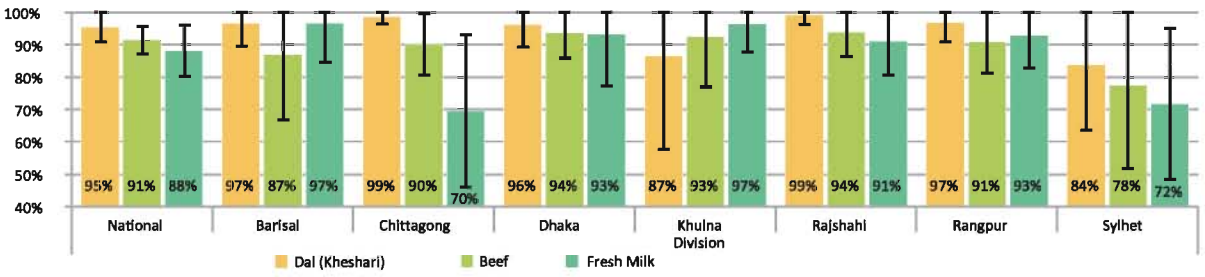


Figure 4.3 : Proportion of markets at which commodities are available[3]



Because food availability through markets, barter-systems, and/or subsistence agriculture is adequate to meet current levels of demand in most areas of Bangladesh (8; 9), FSNSP does not seek to quantify market and production adequacy, focusing instead on household level indicators. Instead, the surveillance system monitors differences in food prices across regions of the country

2 This graph was constructed from Table 8 on page 34 and Table 15 on page 59 of the *National food policy: Plan of action and Country investment plan: Monitoring Report 2013* (5).

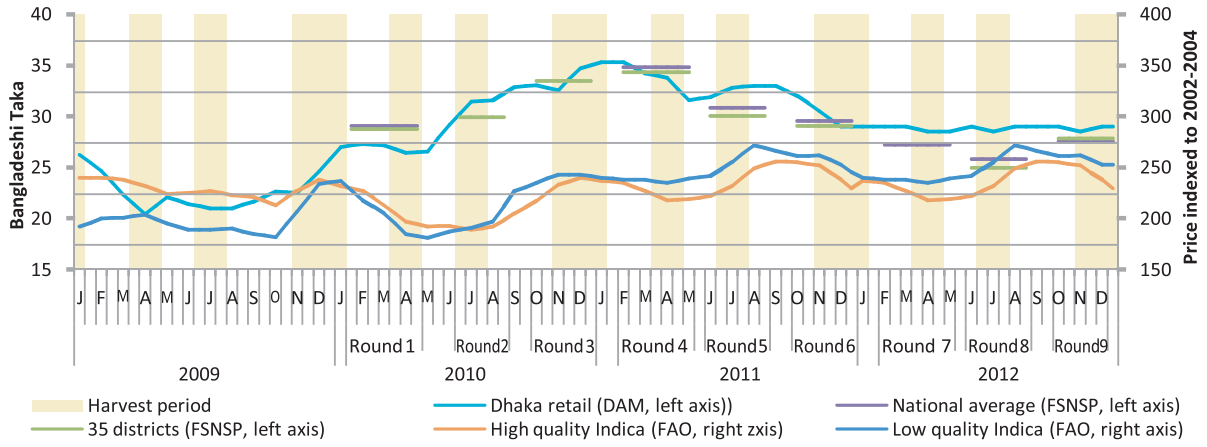
3 These estimates are only a proxy of the actual availability of commodities since items may be obtainable at the household through own production or barter, or not found on the market due to weak local demand and not due to lack of regional availability.

and over time, recording the price at which common food items are available in every community visited.[4] The vast majority of these items were found to be ready for purchase in over 95% of the markets surveyed in the nation as a whole, with the exceptions of fresh milk (88%) and beef (91%). However, in some regions of the country, such as Sylhet, markets appear to be less well stocked, as illustrated in Figure 4.2.

Economic access

As noted at the outset of this chapter, the mere availably of foodstuffs in markets does not ensure household access as the 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 as sharp increases in the cost of food disproportionally affect household food security in South Asia, where food spending typically comprises 50% of household income (10). 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 2011 the proportion of Bangladeshi households in poverty fell from 40% to 32% (11; 12). Nevertheless, food price spikes place balanced diets beyond the reach of many, particularly the urban poor and rural landless.

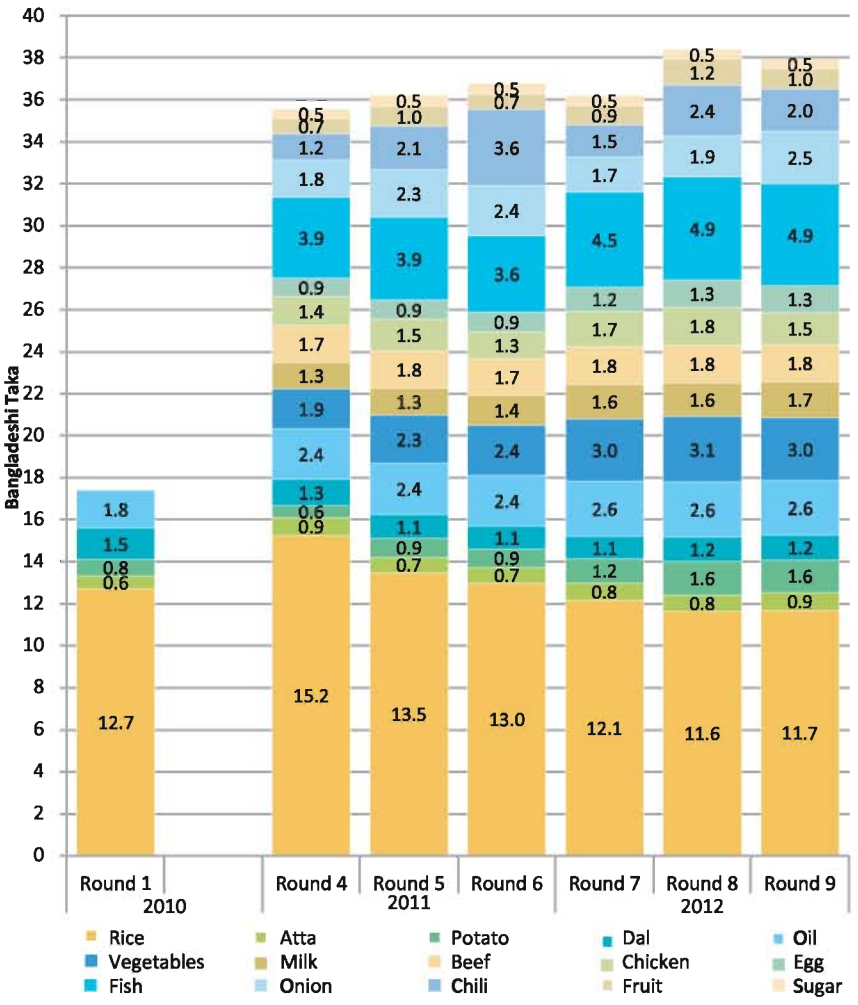
Figure 4.4 : Changes in the average price of rice over 2009-2012



Since its inception, FSNSP has tracked the average market price of several food commodities in local markets nationwide. In contrast to recent years, the price of rice was comparatively stable in 2012 especially on the Dhaka retail market. Figure 4.4 charts the price of rice in Dhaka's retail market, the average price of rice in local markets as measured by FSNSP, and the relative price of South Asian rice in international markets (13; 14; 15; 16). Bangladesh experienced a general increase in rice prices from August 2009 until December 2010, followed by a slow reduction in prices during 2011 and a stabilisation of prices in 2012. During the periods in which both data sources are available, there was a close congruence between Dhaka retail and local market prices. While the average local price of rice was 29 BDT in January-April 2010, it had risen 25% to 35 BDT by February-April 2011, before falling again to between 28 and 29 BDT for the entirety of 2012.

4 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 4.5 : Cost of items in the average basket by season[5]



The cost of the average per-capita, daily amount of each food commodity, as reported in the *Report of the Household Income & Expenditure Survey (HIES): 2010* (11), is added together to create the price of the average daily, per capita Bangladeshi food basket.[6] The food basket included in this report includes almost all items listed in the 2010 HIES report.[7] The components of the food basket over the seasons of 2012 are detailed in Figure 4.5. 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 2012 as the price of rice fell. However, the cost of onions and green chillies has increased significantly, and the cost of vegetables and milk increased slightly, over 2012. The overwhelmingly most costly item in the average food basket was rice, due to the large amount of rice consumed on a daily basis. Other, more expensive items, were fish and vegetables. 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 average cost of the average 2005 HIES food basket was 35.2 BDT in comparison to 36.6 BDT for the average 2010 HIES basket.

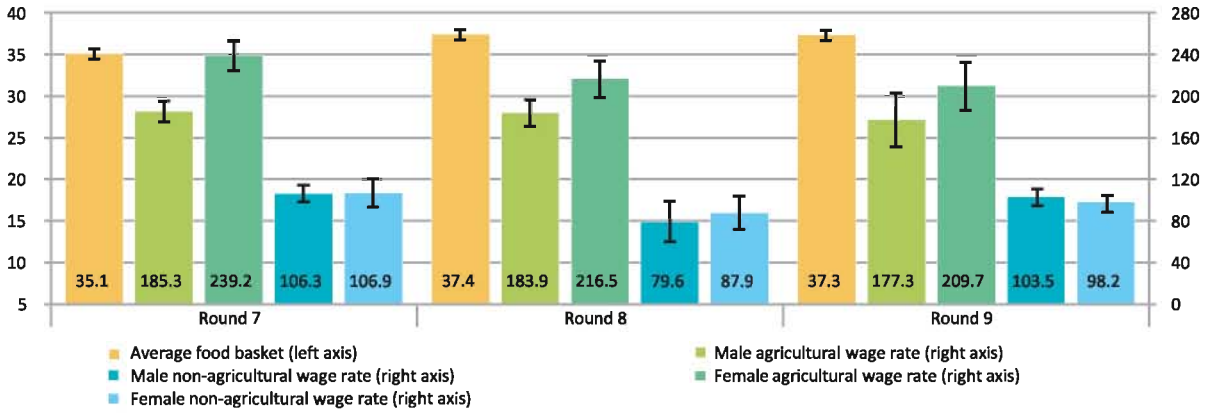
FSNSP also tracks the average wage rates earned by one of the most vulnerable populations in the country - day labourers. Labour wage rates were calculated by asking all households that reported

5 This graph excludes the cost of miscellaneous items, and therefore the overall cost is lower than that given in Figure 4.6.

6 See page 48 of *HIES report: 2010*

7 For all items, the cheapest variety available is recorded. In order to estimate the price of the food basket in areas where one or more items was not available for purchase on the date of data collection, values for missing items were imputed. If a food basket was missing five items or less (out of 23 items in the index), the mean price of the missing items in the division for that round of surveillance was substituted for the missing values. Slightly over one-fifth of markets were missing one or more items, but only five markets (less than 1%) were missing more than five items.

Figure 4.6 : Seasonal variation in mean food price and daily labour wages by gender and category of work



that one or more member was working for a daily wage in the month prior to the interview to disclose the cash wage that male and female household members received on the last day worked for both agriculture and non-agriculture occupations. Figure 4.6 displays seasonal variations in the average costs of the food basket as well as the wage rates for men and women, by the category of labour. It is apparent from this figure that women's daily wage rates are half that of men's,[8] and that there is less difference in the daily wage rates paid to women between agricultural and non-agricultural occupations. Over the course of 2012, the male agricultural daily wage rate stayed relatively constant, while the male non-agricultural wage rate fell somewhat. Women's wages were much lower during the monsoon months.

Figure 4.7 : Ratio of daily wages to the cost of the average food basket

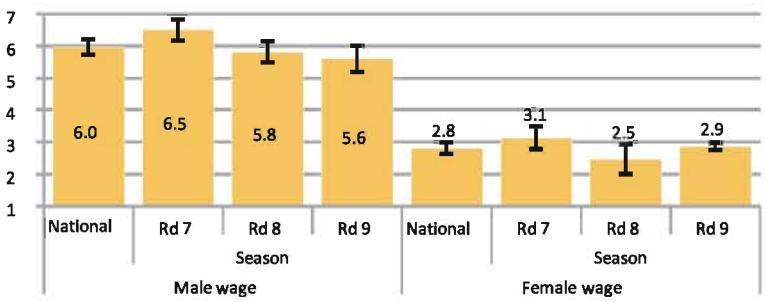


Figure 4.7 examines these figures as a ratio between the male and female daily wage rates and the cost of food. By both wage rates, the food-purchasing power of the daily wage fell slightly over the course of 2011, with a more sizable dip for the women's wage rate during the monsoon. This change is in contrast with longer term trends; since 2009 the ratio of wages to the price of rice has risen over 5% annually when based on a three year moving average (6). Between 2011 and 2012, the purchasing power of the male daily wage increased but the female wage did not. This has strong implications for all households, as women's income is more likely to be spent on household nutrition and care for children.

8 This difference is slightly greater than has been reported elsewhere (6; 33; 5), but this difference is most likely due to both differences in the spread of the FSNSP sample and the types of day laborers included in this assessment. Additionally, FSNSP asks households throughout the country about their wage from any source, unlike other statistical systems that limit the review to particular industries or to more urban sections of the country (34). As such, it is likely that the labour for which men and women reported working is somewhat different and this may count for some of the difference in wage rates.

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 the interview. Food insecurity results in a typical range of responses independent of whether the episode of food insecurity is chronic or acute, or whether it is due to low availability of food stocks, a household's limited access due to poverty, or inequitable utilisation within the household. 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 (17). 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 retarded 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 4.8 displays the national prevalence of selected behaviours in the month prior to interview averaged over all surveillance rounds of 2011 and 2012. Remarkably, the prevalence of all indicators fell between these two years. The overall height of the bars with the confidence interval 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 without confidence intervals are estimates of the proportion of households who practiced the behaviour with a given frequency. The remainder of this section will tie these indicators to the types of responses to food insecurity listed above: uncertainty or worry, unacceptable or unsustainable strategies, and reducing food intake.

There are two questions which capture the extent of household uncertainty or anxiety over food: 1.) worry about the amount of or source of food for the household and 2.) food stored in the house ran out and there was no money to buy more that day. Anxiety includes both acute worry about not being able to obtain food in the immediate future and long term concerns about obtaining food if a shock occurs. Levels of worry fell dramatically between 2011 and 2012, with the largest reduction among those who reported frequent episodes of worry (three or more days each week). 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 by ten percentage points.[9] Furthermore, a frequent lack of sufficient food or cash in the house with which food could be purchased fell to one-third its 2011 level.

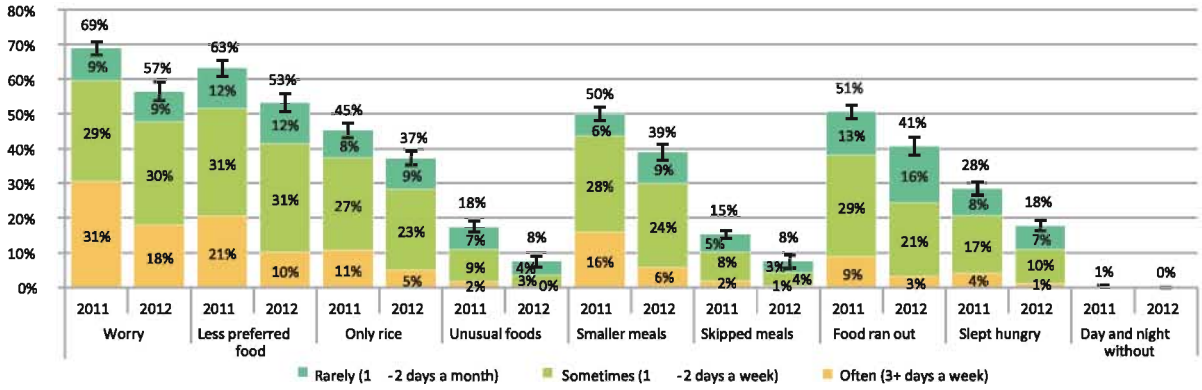
Three questions elicit the household food manager's perceptions of how food insecurity has affected the quality of food eaten by one or more household members in the month prior to interview: 1.) inability to eat preferred foods such as whole instead of broken rice, or vegetables instead of fish; 2.) meals limited to only rice or to rice and spices (chilli, salt, and onions); and 3.) eating foods that are usually not eaten such as water lily or small game.[10] In 2012, a little over half

9 Food running out included instances where there was not money to buy more food that day, but food was able to be borrowed or taken on credit; this indicator did not imply that households had to go without food.

10 For all these questions, responses were only coded if the reason for the change in behaviour was a household food shortage.

of households reported eating less preferred foods, while this estimate was almost two-thirds of households in 2011. The proportion of households consuming less preferred foods frequently fell by half between 2011 and 2012. The proportion of households which contained a member or several members who were reduced to eating a meal of only rice also declined from 45 to 37%, with the sharpest decline among the group that ate this constrained diet frequently. The consumption of unusual foods was quite rare in both 2011 and 2012, but the overall prevalence fell by half between 2011 and 2012. In 2012, less than 1% of households frequently sought out these foods.

Figure 4.8 : Households reporting behaviours linked to food insecurity during the month prior to interview



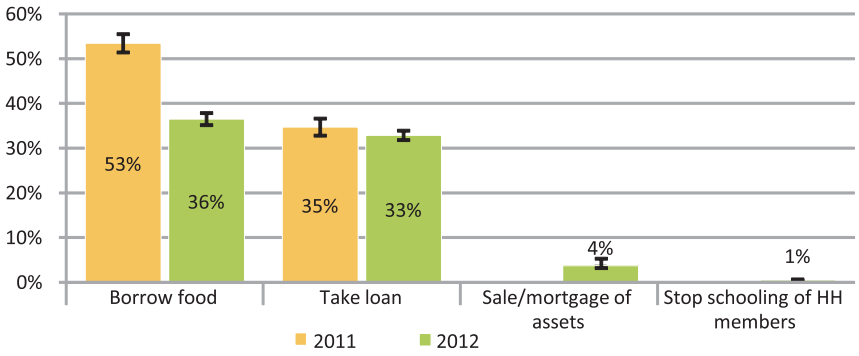
Insufficient quantity of food or reduction in the intake of food are assessed through three questions that record if one or more household member has, due to food insecurity in the month prior to interview: 1.) eaten a smaller amount of food at any meal time than they felt they needed;[11] 2.) eaten fewer meals than usual (i.e. skipping meals); and 3.) gone day and night without eating.[12] In 2012, less than two-fifths 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 eaten insufficient meals frequently declined from 16 to 6%. The proportion of households which reported having members skip entire meals fell by 50% between 2011 and 2012, from 15% to 8%. Less than 1% of households in 2012 contained members who had ever had to go the entire day and night without eating.

Only one question examined the consequences of inadequate diet in the food security module: the frequency with which any household member had to go to sleep at night hungry, even if they had eaten something prior to sleep. Less than two-fifths of households responded that one or more household members had experienced this in the month prior to the interview, and only 1% of households had experienced this frequently. The physical consequences of an insufficient diet are assessed using anthropometric measures and are reported in later chapters.

11 Notably, eating smaller meals is in comparison to the amount of food the individual feels they need and not in comparison to typical practice, as such it does not imply a recent reduction in meal size but instead insufficiency of meal size. This is the same as asking if the individual was unable to eat a full-stomach meal at any time in the last month.

12 For all these questions, responses were only coded if the reason for the change in behaviour was a household food shortage, and not due to other reasons such as being ill or too busy to eat.

Figure 4.9 : Households to resorting unsustainable means to obtain food



In 2012, the final behavioural response type, resorting to socially unacceptable or unsustainable means to obtain food, was examined using four indicators: 1.) directly borrowing food/rice; 2.) taking a loan to purchase food; 3.) selling or mortgaging assets in order to purchase food; or 4.) stopping the schooling of household members. The first two of these behaviours were also asked in 2011. Of these behaviours, households borrowing food directly was the most common response in both 2011 and 2012, though the proportion of households resorting to this means in the month prior to interview fell dramatically during the two rounds. In both years, around one third of households reported taking a loan of money to purchase food. Even less common were selling or mortgaging assets, or stopping the schooling of household members in order to afford food.

Figure 4.10 : Behaviours linked to food insecurity among households with young children (2010 - 2012)

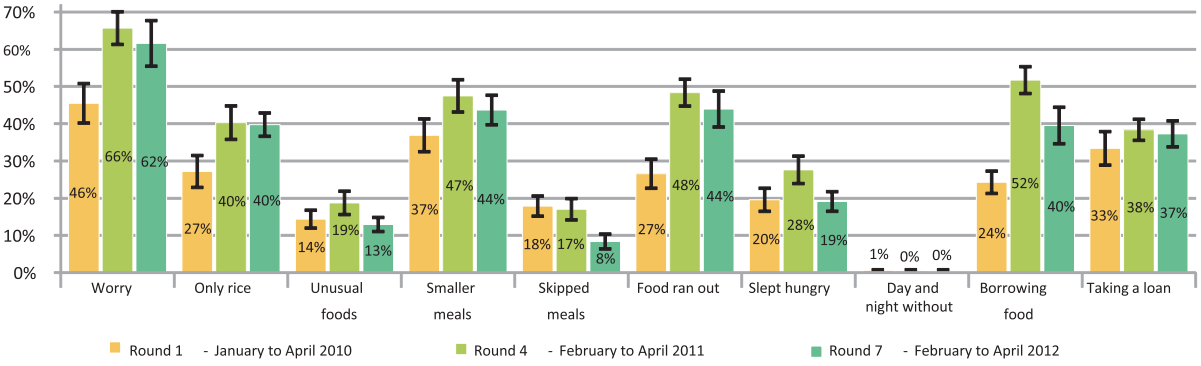


Figure 4.10 presents the proportion of households which reported practicing behaviours linked to food insecurity among households with children less than five years of age, the sub-group which is comparable to those surveyed in the 2010 FSNSP sample.[13] This graph indicates that though rates of all of these behaviours have declined from 2011, most are still greater than they were in 2010. This difference was likely due to the after effects of the increase in rice prices during 2010, and the fact that households are reactive to prices, basing their behaviour on recent events and not on forecasts for the future. Preliminary results from 2013 indicate that indicators have continued to fall and were lower in 2013 that in 2010 (18).

13 In 2010, the FSNSP system limited its surveillance to households with children (22). As such, comparisons between 2010 and subsequent years must be made only including the households with children.

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.[14] HFIAS is based on the premise that some coping responses to inadequate food access are more severe than others and indicate a greater level of food insecurity; households are categorised based on the most "severe" coping mechanism they have employed.[15] HFIAS includes indicators that run the gamut from mild household stressors, such as worry about providing food, to severe coping behaviours, such as going day and night without eating; HFIAS includes all nine indicators in Figure 4.8. In figure 4.7, the order of the indicators is identical to their ranking from least to most severe in the HFIAS hierarchy. 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 (19; 20). 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) and the indicators are not ranked for severity during scoring. FDS has been validated for comparing food access across cultures (19).

Figure 4.11 : Seasonal variation in food insecurity and food deficits among households with children

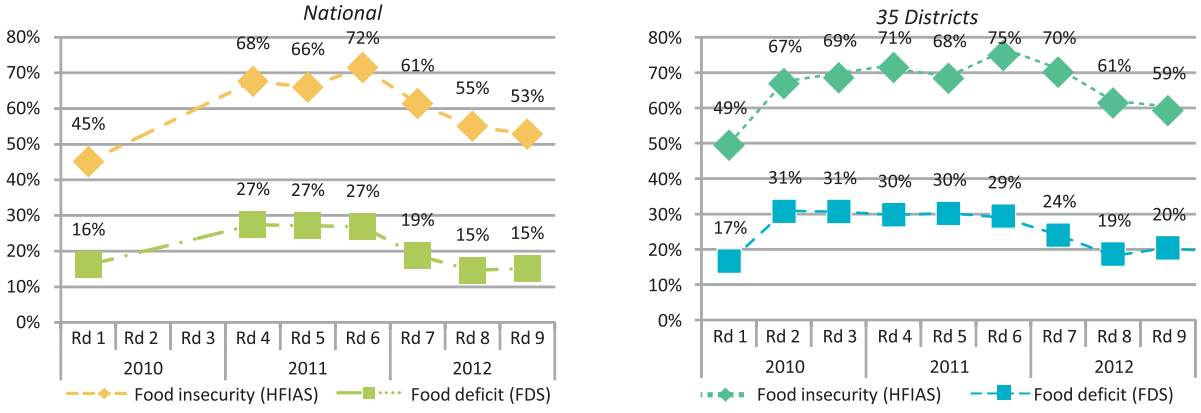


Figure 4.12 : Seasonal variation in food insecurity and food deficits among all households

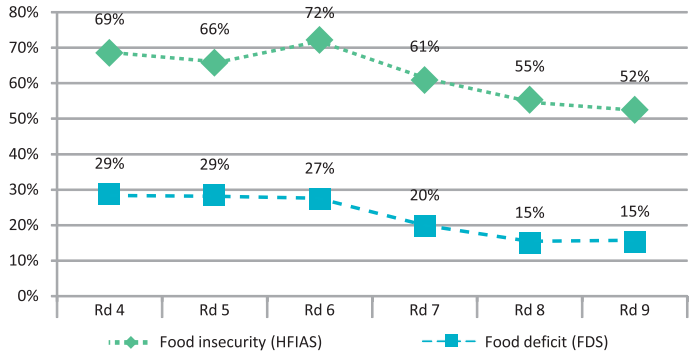


Figure 4.11 displays the seasonal prevalence of food insecurity and gaps in food provisioning among households with children, from the first to the ninth round of FSNSP. In the graph on the left, the dashed lines indicate national estimates (only available from the first round of FSNSP during 2010), while the solid lines in the graph on the right display

14 This measure is identical to the Household Hunger Score. In Bangladesh, the word hunger translates to a famine condition, and thereby does not accurately reflect the commonly reported items included in this indicator. For more information see the 2011 report (35).

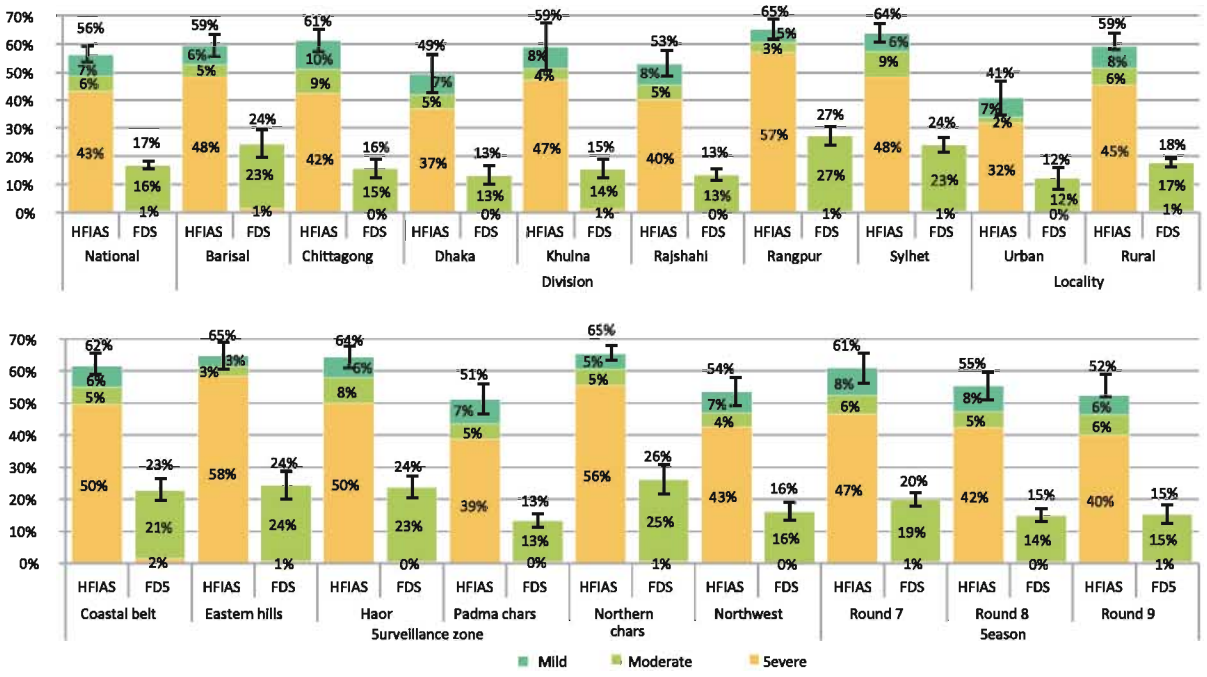
15 HFIAS deems a household food insecure if the food manager has worried about providing food more than twice in the month prior to interview.

the estimates from the 35 "food-insecure" districts that were included in all three rounds of data collection in 2010. [16] The proportion of households who were food insecure or had a deficit in food provisioning was greatest during the latter part of 2011, before trending downward through 2012 and into early 2013 (18). By the end of 2012, the level of food deficit was as low as observed in 2010, though milder responses to food insecurity remained elevated. Figure 4.12 depicts the same indicator across all households. As was seen in 2011, in 2012 the difference between perception based estimates of food insecurity was not significantly different between households with and without children.

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. The proportion of households with food insecurity and food deficits was notably higher in Rangpur and Sylhet. Between 2011 and 2012 the only division in which rates of food insecurity did not fall dramatically was in Chittagong. As in 2011, rates of food insecurity and households with food deficits in rural areas were over 150% greater than the rates in urban areas.

Variation in the rates of food insecurity and households with food deficits across the surveillance zones was noticeably less than that across divisions. Only the Padma chars and the Northwest had lower proportions of households' food insecure or with food deficits than the rural average. 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 the food insecurity and food deficit scales (FDS).

Figure 4.13 : Proportion of households food insecure or with deficits by area of residence and season



16 The level of food insecurity and households with food deficits in the nation as a whole was very similar to that estimated in 35 districts. Because of this congruence, it can be assumed that the national change in the prevalence of food insecurity and food deficits reported between the fourth round of surveillance (2011) and the first round of surveillance (2010) actually occurred between rounds 1 and 2 (both in 2010).

Figure 4.14 : Regional variation in household food insecurity by season (HFIAS)

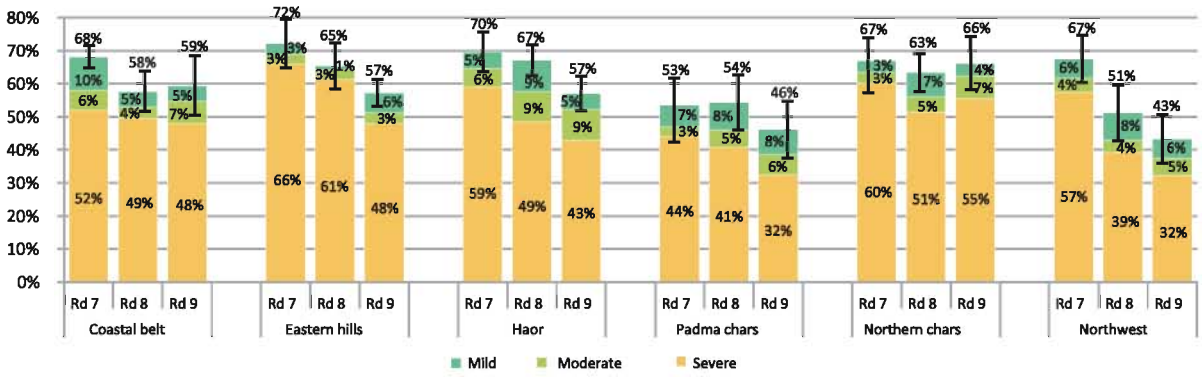
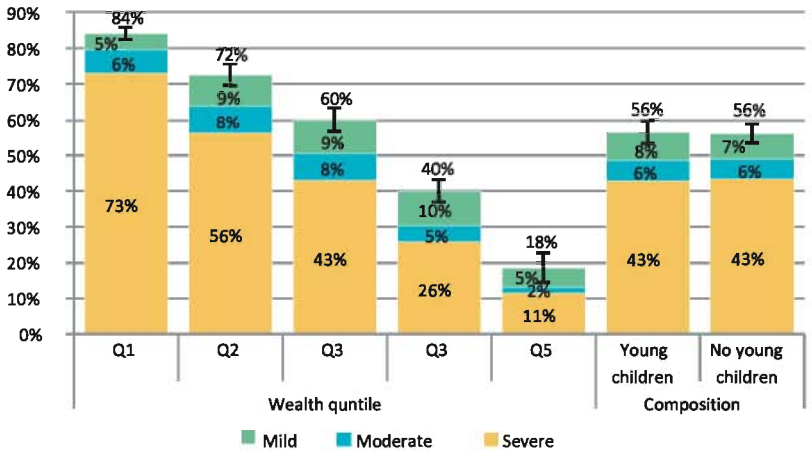


Figure 4.14 displays seasonal variation in food insecurity by surveillance zone. Three of the six surveillance zones - the Eastern hills, the Haor, and the Northwest - had a declining proportion of households food insecure as seasons progressed, while the other zones had a much lower level of decline. Notably there was almost no decline in food insecurity in the Northern chars. These differences underline the diverse seasonal and harvest patterns across the country, which are important in predicting when lean periods are experienced. These differences could also be due to differences in the way in which the 2010 price spike affected different groups of people.

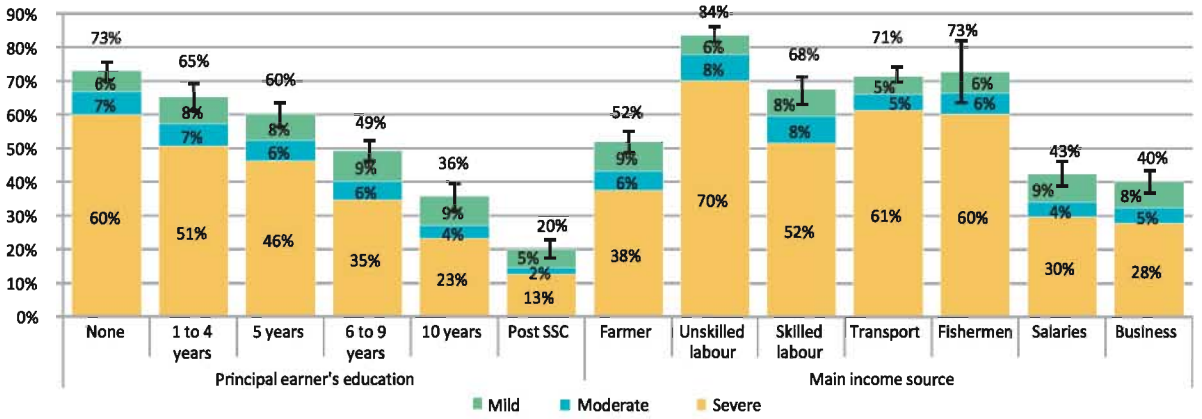
Figure 4.15 : Household food insecurity by household wealth and composition



Similar to past results, the proportion of food insecure households was much lower in wealthier quintiles in 2012, and this pattern was a step-wise almost linear decline. Between 2011 and 2012, declines in the proportion of households that were food insecure were apparent in all quintiles except the poorest. However, as in past years, significant levels of food insecurity were apparent in even the wealthiest quintile.[17] This trend suggests that while overall levels of food insecurity have fallen, the poorest have yet to recover completely. As in 2011, the presence of an under-five child in the household had no impact on the rate of food insecurity either seasonally or annually, suggesting that the food security estimates from FSNSP 2010, which focused only on households with children under five, may have been relatively representative of the nation.

17 This could be due to weaknesses in the measure (HFIAS is strictly based on respondent perceptions and thereby is subject to response bias), but it is more likely due to real constraints faced by individuals who have assets but limited income. A wealth index classifies household by the physical and not liquid assets they hold.

Figure 4.16 : Household food insecurity by education and main income source of principal income earner



Similar to past results, the proportion of households that were food insecure was much lower among households with more educated principal income earners in 2011. The level of food insecurity declined in households of all occupational groups and from all educational levels between 2011 and 2012. While the relationship between occupational category and food insecurity was similar to that observed in the past, the relative difference in food insecurity rates between farmers and those involved in business or salaried work was much smaller post 2011. In 2010, households with unskilled labour as their main income source were food insecure at three times the rate of households earning income from business or salaried work, while in 2011 and 2012, the difference was less than double.

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. Poverty and culturally-based food preferences lead households to subsist on diets consisting mainly of rice, which provides an estimated 69% of food energy in Bangladesh but is low in fat, essential amino acids and micronutrients (21; 22). Animal source foods, which furnish good quality protein and bio-available iron and vitamin A, make up less than 2% of total energy intake (23). It is therefore not surprising that a large proportion of the population in Bangladesh suffers from the hidden hunger of micronutrient malnutrition even among those who have attained caloric sufficiency (4).

Beginning in 2011, FSNSP includes 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 (24).[18] To create the FCS, responses are weighted by a rough approximation of their nutritional content - standardised across countries by WFP - then summed (25; 26). 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.[19]

18 These items are included as these food groups do indicate access to a disposable income from which households can purchase food.
19 For FSNSP, cut-offs are drawn from the HFSNA survey (25).

Figure 4.17 : Households with poor or borderline food consumption (2009-2012)

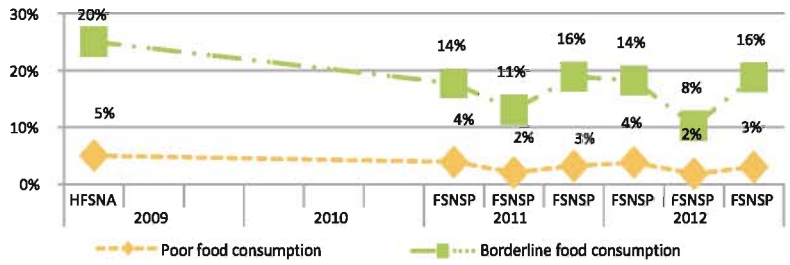


Figure 4.17 compares 2011 and 2012 seasonal FSNSP estimates of the proportion of households consuming poor and borderline diets to the results of the Household Food Insecurity and Nutrition Assessment (HFSNA) from 2009 (25). There is a clear decrease in the proportion of households with unacceptable food consumption patterns from one-quarter of households in 2009 to less than one-fifth in 2011 and 2012. This pattern fits with observed changes in household diversity as reported through the HIES system (12; 11). However, there has been almost no further reduction between 2011 and 2012, in spite of the reduction in the proportion of households reporting constraints to managing food. The only difference was a small reduction in the proportion of households with borderline diets in the monsoon season. Even between 2009 and 2011 the reduction in the proportion of households with poor or borderline diets has not been consistent across the country. There has been little or no change in Barisal, Rajshahi, and Rangpur, but a reduction to around half of 2009 rates in Dhaka and Chittagong (25).

Figure 4.18 : Regional variation in proportion of households with limited food consumption

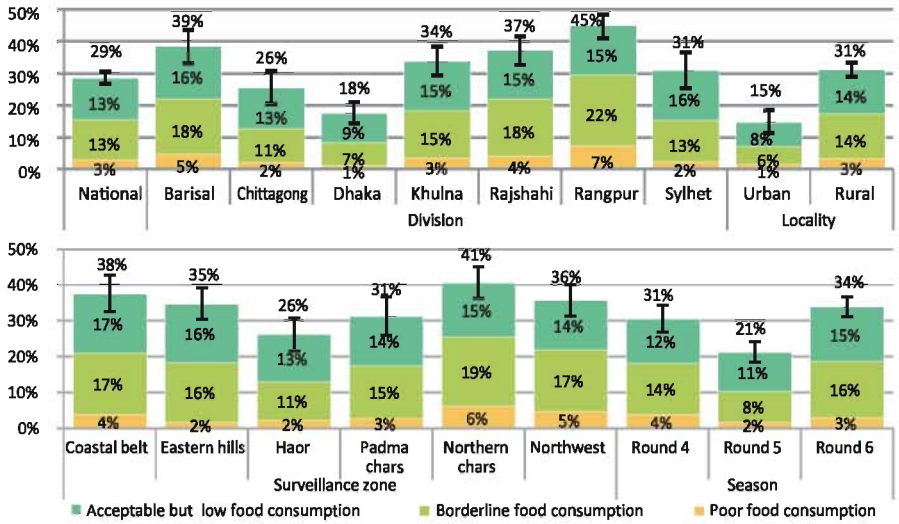


Figure 4.18 depicts regional variation in the proportion of households with sub-optimal diets - defined here as a diet categorised here as poor, borderline, and acceptable low. Nationally, around 30% of households consumed sub-optimal diets with Barisal and Rangpur reporting the highest level of limited food consumption. These estimates are nearly identical to those reported in 2011 across divisions, though all surveillance zones except the Northwest experienced a reduction in the proportion of the population with poor or borderline diets.

Some of this variation was indicative of real differences in food insecurity and some of the differences were the result of culturally-based differences in food habits.[20] This difference becomes

20 Even within Bangladesh, some populations eat more varied diets than other groups so that when examined at one time point across regions, these indicators may not indicate differences in food access but instead differences in food habits. For example, Sylhet and Barisal have similar high levels of food insecurity but much greater variation in the proportion of households with sub-optimal diets. Similarly, Rangpur division, in the heart of the rice growing belt, has the highest proportion of households eating sub-optimal diets but a lower level of food insecurity.

more apparent when the FCS indicator is examined over seasons. Interestingly, the proportion of households with inadequate diets varies much 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 zone. This difference may have been 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 (27; 28).

Figure 4.19 : Seasonal and regional variation in proportion of households with limited food consumption

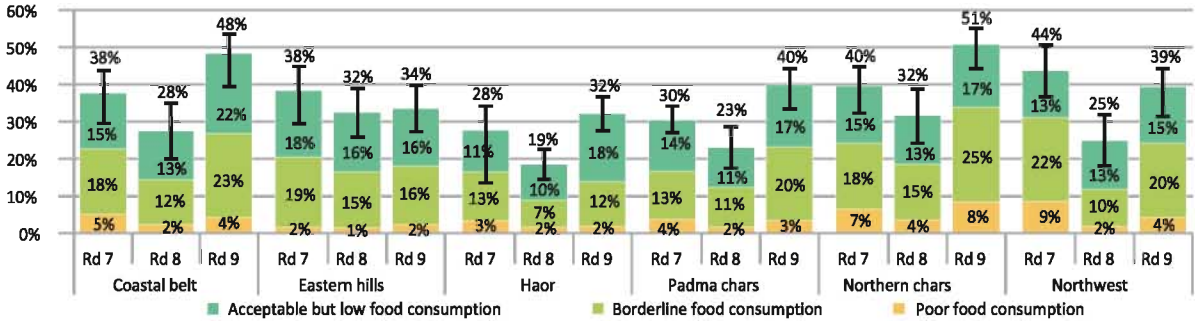
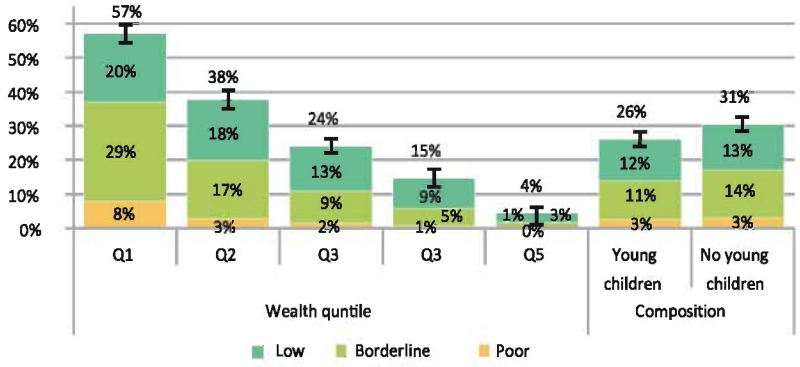
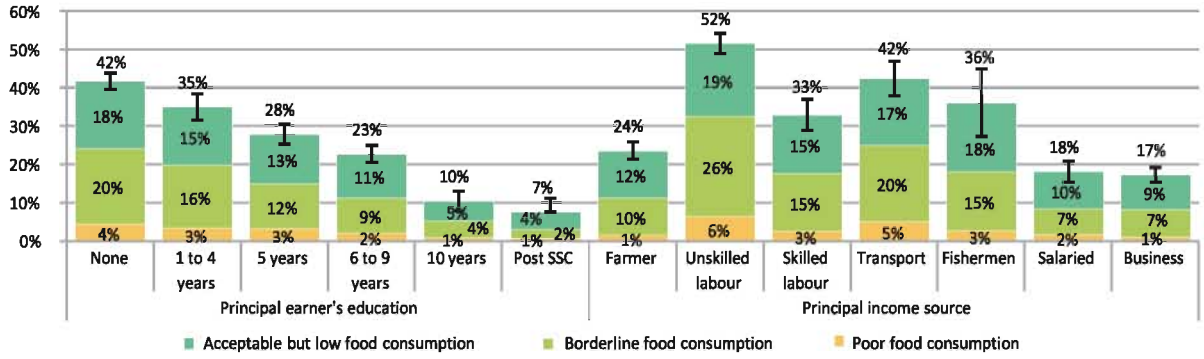


Figure 4.20 : Limited food consumption by household wealth and composition



There was a stepwise decrease in levels of sub-optimal food consumption with increasing household wealth and educational attainment of the principal income earner (figure 4.20 and figure 4.21). However, the proportion of households eating sub-optimal diets increased among the poorest quintile and reduced among all other quintiles. This reduction could be due to poor households choosing to consume more rice as the price fell, reducing dietary quality while increasing calories. Households reliant on income from farming, business, or salaried employment had more diverse diets than other occupational groups. The overall level of sub-optimal diets among different occupational categories did not change substantially between 2011 and 2012. However, in contrast to the food security (HFIAS) results, households without children consumed significantly less diverse diets than households with children in each season and annually. This may indicate that better-off households are self selecting to have children or, more likely, that households with children take greater care to provide a more diverse household diet.

Figure 4.21 : Suboptimal food consumption by education of principal income earner and main income source



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 secure as diet may vary among household members. For example, women and children are typically more food insecure and micronutrient-deficient than men, because societal norms dictate that higher value food, which is often more nutrient rich, be fed first and in greater quantities to men (29; 30). Additionally, 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 4.22 : Coping strategies by category of household members practicing

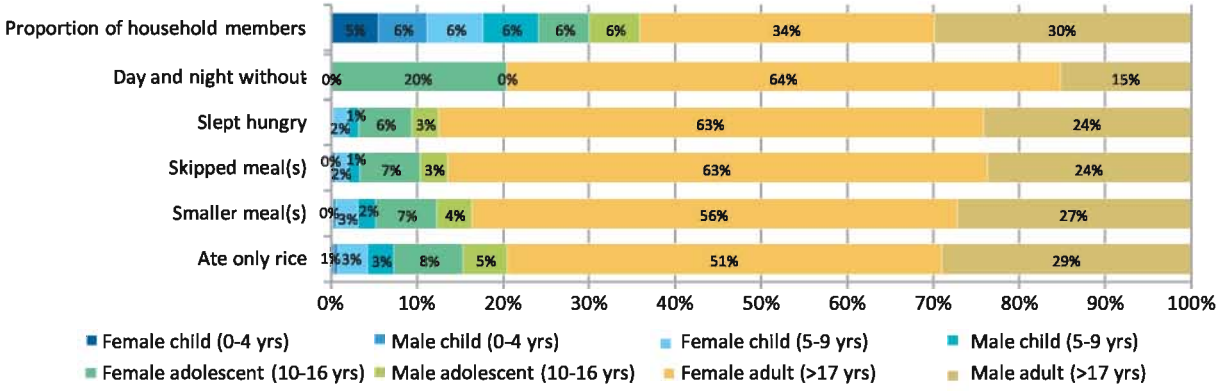
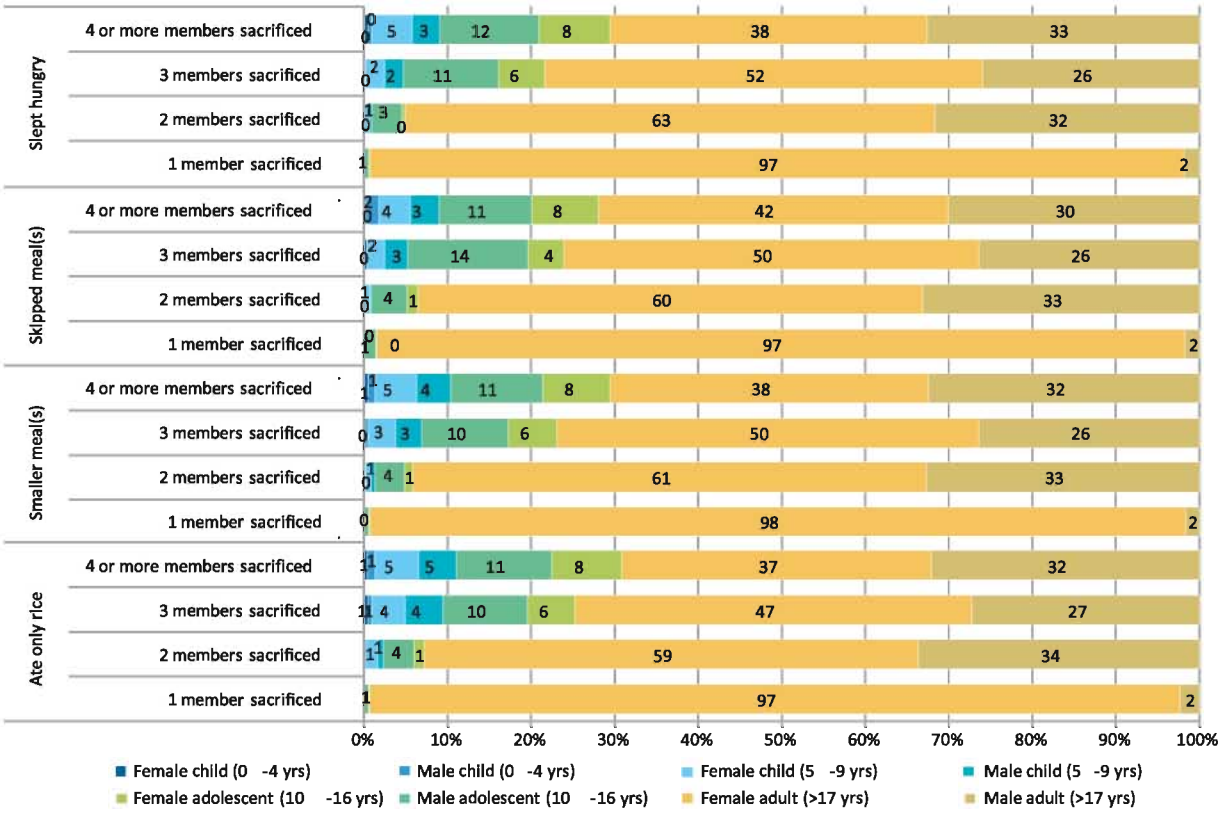


Figure 4.22 displays the proportion of household members by age and sex categories who undertook coping behaviours when the whole household did not reduce consumption. Notably, adults sacrificed their consumption in a much higher proportion than their underlying population proportion, implying that they protected younger individuals in the household. More troublingly, across all age groups a greater proportion of females sacrificed consumption compared to males.

This pattern is even more apparent in households where only a few members had to reduce or change their consumption practices. 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 for children under five years of age.

Figure 4.23 : Coping strategies by number and category of household members practicing[21]



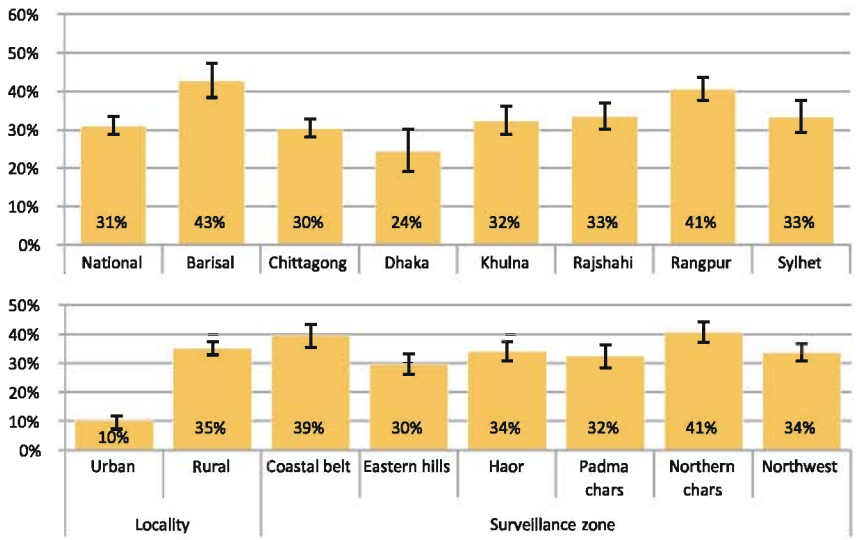
21 This disaggregation is not shown for the proportion of household members who reported going day and night without eating as too few households reported this coping strategy.

Vulnerability

As noted in the introduction to this section, the final element 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 FSNSP 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.[22] As such, FSNSP cannot separate the population of the country into those who are food secure at the time of interview but 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, as has been done throughout this chapter. 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.[23] 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 (31; 32).

Figure 4.24 : Households who received cash from a social safety net programme by area of residence



Encouragingly, almost one-third of households in Bangladesh reported receiving a cash benefit from a social safety net programme; the vast majority from the cash for education programme (25%) followed by the old age allowance programme (4%).[24] Overall, a greater proportion of households in rural areas reported receiving benefits than in urban areas. This is expected as the Cash for Education programme targets poor, rural households in less wealthy areas of the country. These estimates are virtually unchanged from 2011.

22 Additionally, FSNSP does not revisit households due to the high possibility of response bias.

23 FSNSP does not ask about any in-kind benefit programmes.

24 Differences between the proportion of households reporting access to social safety net programmes in the 2010 HIES compared to FSNSP is likely due the fact that FSNSP only includes households containing women 10 to 49 years of age or children in its sample, leading to an increased proportion of households with school age children, thereby eligible for the cash for education programme, and a decreased proportion of households with older adults without other means of support, thereby fewer households eligible for the Old Age Allowance programme (35)

Nutrition of women and adolescent girls

In 2012, FSNSP interviewed and measured over 27,000 women and girls aged 10 to 49 years throughout Bangladesh, providing nationally representative estimates of nutritional status and dietary patterns for women and adolescent girls.

Dietary patterns changed little between 2011 and 2012, though there was dramatic change in diets across the seasons of 2012. Over 60% of women continue to consume diets inadequate in macro- and micro-nutrients.

Nationally, the proportion of adolescent girls short for their ages declined from 32% to 30% between 2011 and 2012, but the proportion of underweight girls remained the same at two-fifths.

Both the height and BMI nutritional outcomes for adolescent girls did not vary much over wealth status or area of residence, indicating similarly poor care for adolescent girls in diverse settings.

An increasing number of women in Bangladesh are overweight. While over one-fifth of the women were undernourished, an even larger proportion, over one-third, was overweight.

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 that individual's nutrient intake, stores, and requirements. Since FSNSP cannot feasibly monitor the nutrition security of all people in Bangladesh, the system 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 (see page 65) 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 comparisons across countries. Additionally, women's nutrition is important because it is closely linked to child nutrition and health outcomes; even before pregnancy takes place, women's nutritional status and micronutrient stores can have a large impact on the health and well being of her future children. This chapter focuses on women's diet and nutritional status as a proxy for adult household members who are more vulnerable to food and nutrition insecurity, while women in their reproductive role will be covered in the next chapter.

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 2012, FSNSP interviewed and measured over 27,000 women and girls aged 10 to 49 years throughout Bangladesh.

Table 5.1 : Women interviewed and measured by age

Age group in years	Interviewed		Measured (BMI)	
	Number	Weighted proportion	Number	Weighted proportion
10 to 14	2119	11%	2102	12%
15 to 19	4150	18%	3629	18%
20 to 24	5175	16%	4530	15%
25 to 29	5402	16%	4935	16%
30 to 34	3929	14%	3746	14%
35 to 39	2926	11%	2863	11%
40 to 44	2313	9%	2297	9%
45 to 49	1443	5%	1438	6%

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 six of this report. As shown in Table 5.1, and consistent with recent BDHS reports, the sample distribution is uneven across age groups (2), 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.

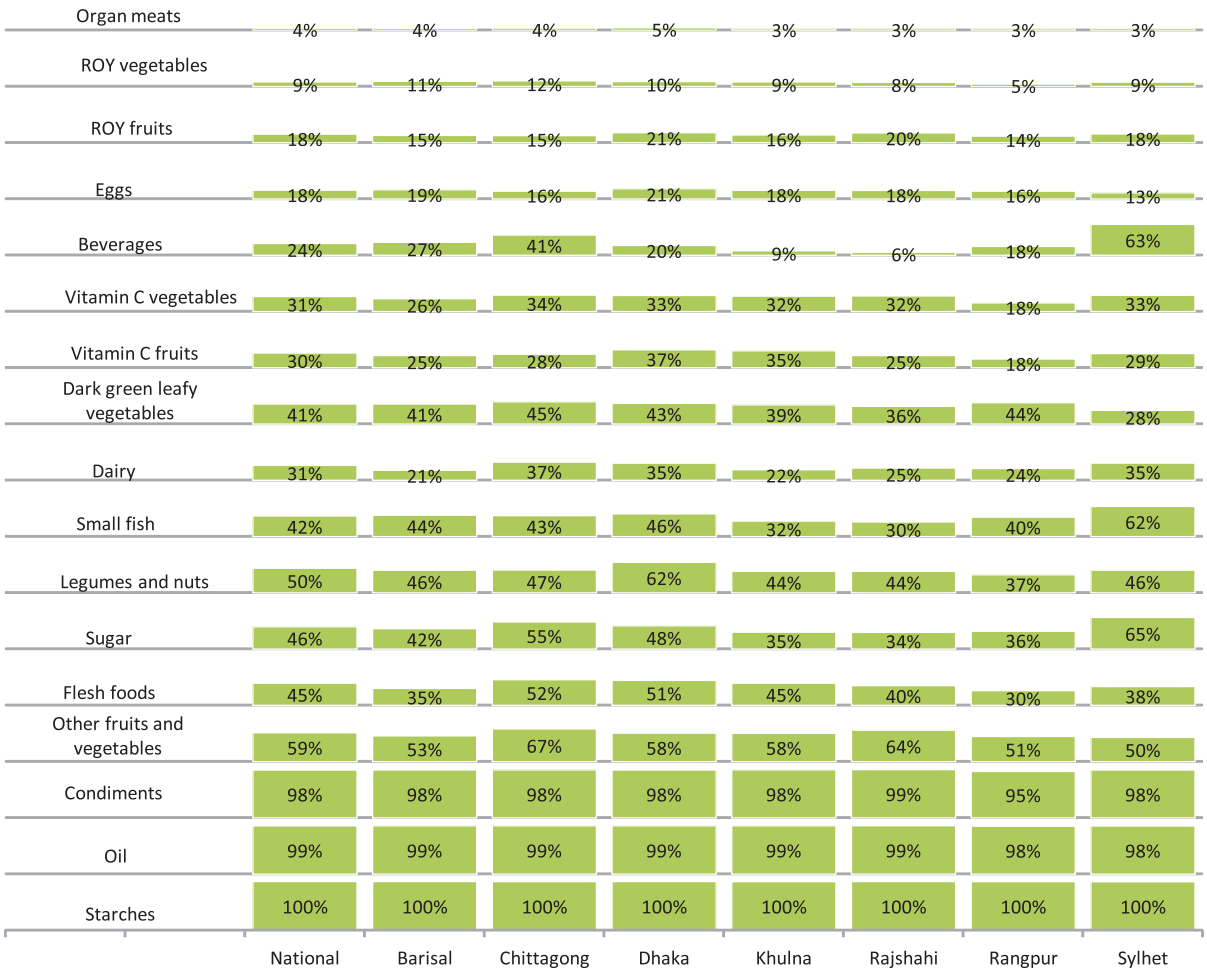
Dietary assessment

In each household, one woman between the ages of 10 to 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 17 pre-coded food groups (3; 4). These 17 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 fizzy drinks or soda (5). This enables FSNSP to observe dietary patterns and estimate the quality and adequacy of women's diets in Bangladesh.

Dietary patterns and diversity

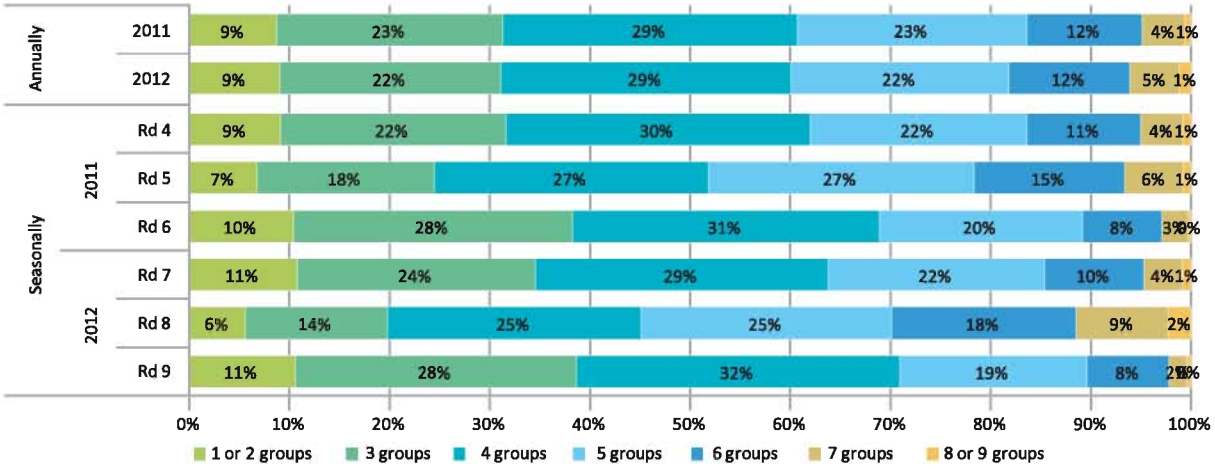
Figure 5.1 presents the proportion of all women who ate any items from the 17 food types by division. Though typical rural diets in Bangladesh are rice based and largely lack diversity, sizable differences in consumption patterns exist across divisions. In line with past findings, the tea-producing areas of Chittagong and Sylhet had the highest levels of beverage consumption and items from the dairy and sugar food groups. Small fish were consumed by a greater proportion of the female population in Sylhet than in the rest of the country while consumption of large fish and other flesh foods were much more prevalent in Dhaka and Chittagong. Compared to 2011, consumption of dark green leafy vegetables and legumes and nuts increased in Dhaka, Khulna and Rajshahi as well as at the national level in 2012. Overall, diets were most monotonous in Rangpur.

Figure 5.1 : 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 (3; 4; 6; 5). The measure of dietary diversity is derived by clustering the 17 questionnaire food types into a nine-item scale that has been validated for women in Bangladesh and was developed to ascertain the quality of a woman's diet in light of her nutritional needs (3). 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.

Figure 5.2 : Trends in dietary diversity score seasonally and annually (2011 and 2012)



Trends in the dietary diversity score for women across 2011 and 2012 are provided in Figure 5.2. As was the case in 2011, in 2012 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 less than four food groups. Between 2011 and 2012, the proportion of women consuming six or more food groups increased slightly, due mostly to a lower proportion of women consuming five food groups. In spite of the reduction in the price of rice between much of 2011 and 2012, the proportion of women consuming a diet of four or fewer groups remained the same. Seasonal variation was very similar between 2011 and 2012 and in line with the household food consumption score; more diverse diets were consumed during the monsoon period (see page 76). In 2012, this pattern became even more pronounced; a slightly greater proportion of women consumed monotonous diets (three or fewer food groups) in the first and third seasons of the year in 2012 compared to 2011, while a slightly lower proportion of women consumed monotonous diets (three or fewer food groups) in the monsoon season 2012 compared to 2011.

Figure 5.3 displays the distribution of dietary diversity scores among all women and adolescent girls regionally. Divisionally, women in Chittagong and Dhaka stand out for having diets more diverse than other areas, with half the proportion of women eating diets of only one or two food groups in these divisions compared to the rest of the country. Urban women consumed a diet much more diverse than rural women, and only in urban areas did the plurality of women consume five food groups. Among the surveillance zones, women consumed slightly more diverse diets in the Eastern hills, Haor, and Padma chars zones.

Figure 5.3 : Regional variation in dietary diversity scores

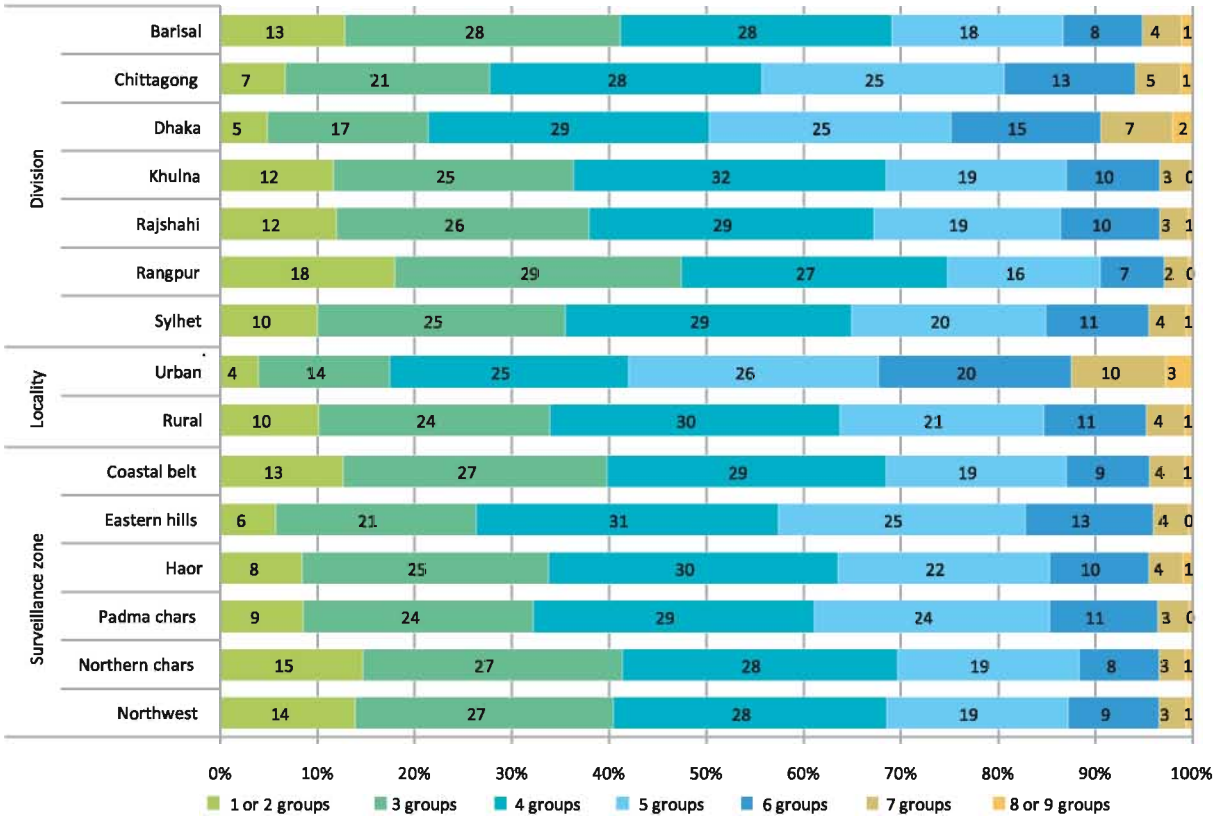
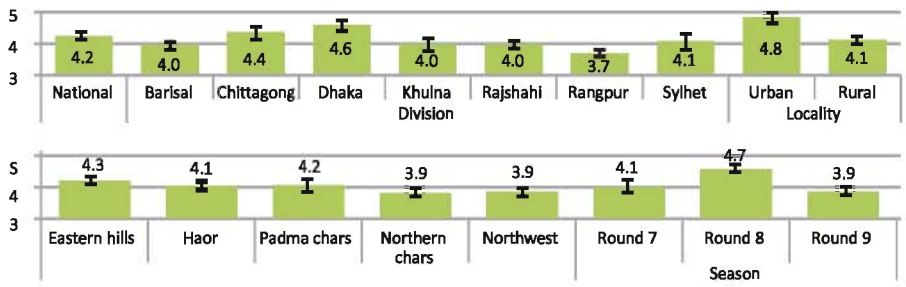


Figure 5.4 : Regional variation in mean dietary diversity scores

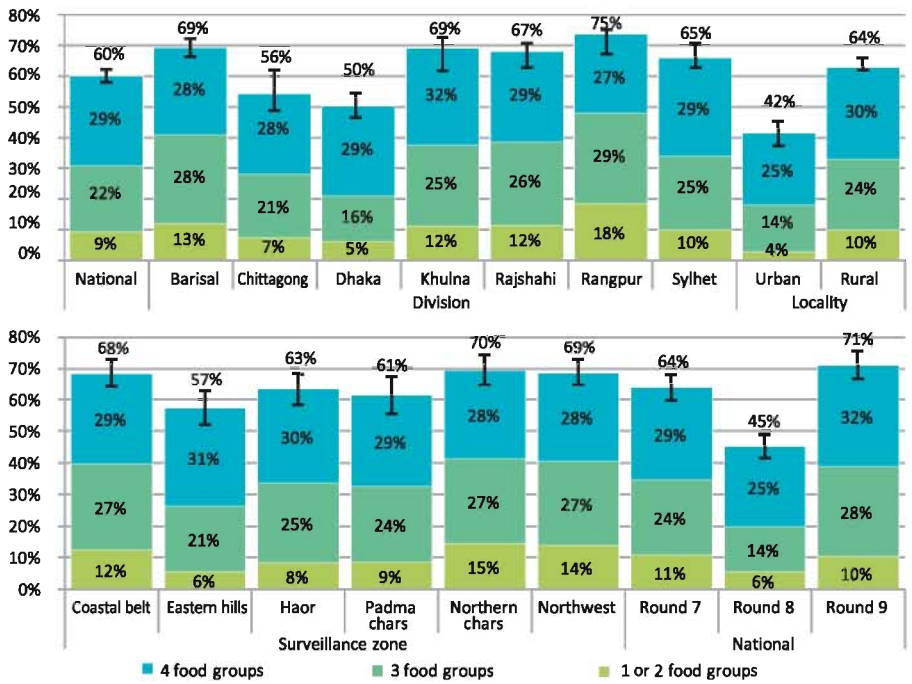


As expected, regional differences in eating patterns remain apparent when dietary diversity is expressed as an average score (figure 5.4). Similar to 2011, Chittagong and Dhaka have the highest average score, while the other divisions are around a half of a food group lower. There has been very little change in these values between 2011 and 2012.The mean dietary diversity score of urban areas is nearly a whole food group higher than that of rural areas, and the dietary diversity scores of the surveillance zones are in line with the national average for rural areas. More than half of a food group more has been consumed during the monsoon season compared to the other seasons.

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 of an average woman. Given the extent of micronutrient inadequacy in women's diets in Bangladesh, FANTA-2 has adopted a minimum cut-off approach, below which non-pregnant and non-lactating women were unlikely to have received a diet adequate in micro- and macro-nutrients, identifying dietary insufficiency instead of dietary sufficiency (3)[1]. FSNSP employs the FANTA-2 cut-off of fewer than five food groups as indicating a diet inadequate in micro- and/or macronutrients. 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 5.5 : Women consuming inadequately diverse diets by residence



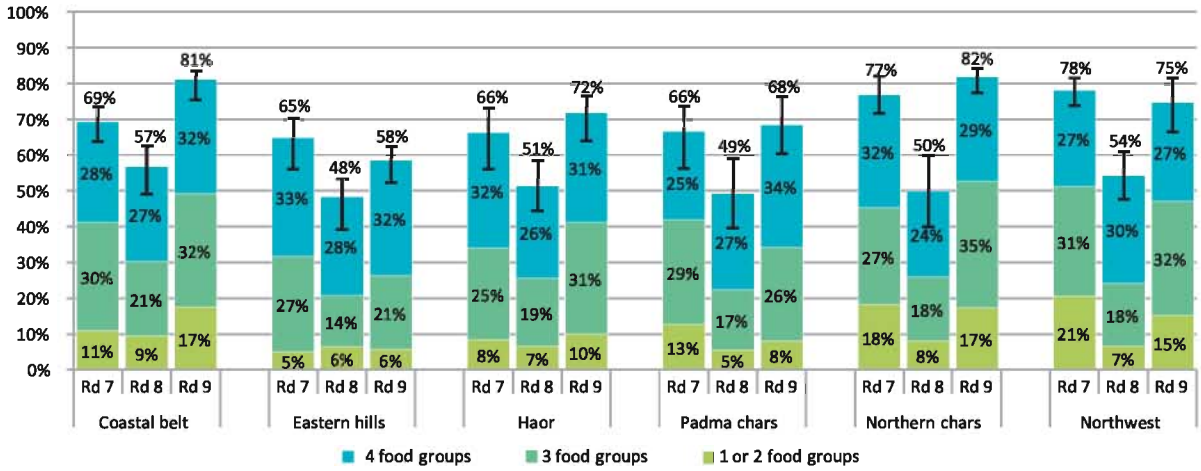
As was the case in 2011, the cut-off value is greater than the average number of food groups women consumed, leading to the majority of women in Bangladesh eating inadequate diets. The proportion of women with inadequate diets appears to have stayed the same or decreased very slightly between 2011 and 2012. Though this change is far from statistically significant, the intra-annual trend since 2010 has been one of slow decline of around one percentage point a year.[2] Women's dietary diversity in Chittagong and Dhaka was better than in other divisions, but even in these divisions, around half of women consumed insufficiently diverse diets. The lowest rates of dietary inadequacy were reported in urban areas. Across surveillance zones, little variation was apparent and estimates were in line with the rural average. In all surveillance zones, except for the Northern chars and Northwest, there was a decline in the proportion of women eating inadequate diets between 2011 and 2012.

1 Because the overall micronutrient adequacy of women's diets was so poor in the FANTA-2 data set, the report was unable to identify a dietary diversity score above which dietary sufficiency was likely.

2 In 2010, FSNSP only collected information on the dietary habits of mothers of children under five years of age. As such, comparisons between 2010 and subsequent years can only be made for this demographic.

As was shown above (figure 5.3), there was much greater variation in the proportion of women eating inadequate diets across seasons in 2012 compared to 2011. In the final season of 2012, almost three-quarters of women consumed inadequate diets.[3] Similarly, across surveillance zones, seasonal variation was much greater in 2012 than in 2011. Seasonal variation was also much greater in zones where dietary inadequacy was higher (Coastal belt, Northern chars, and Northwest). Variation between zones was much greater between the last season of the year compared to the first season. During the monsoon, there was almost no variation between zones.

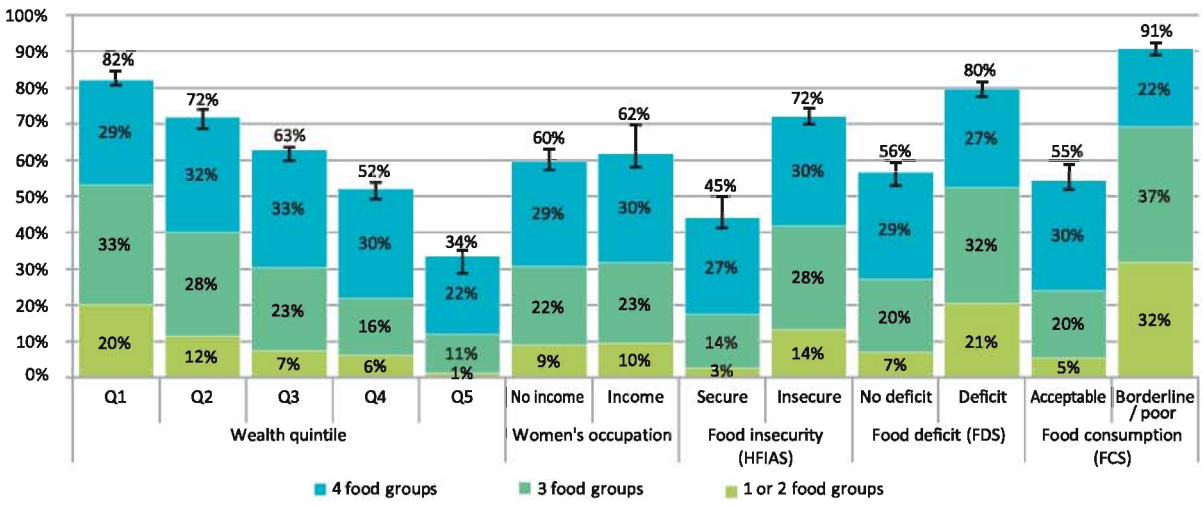
Figure 5.6 : Variation in the proportion of women consuming inadequate diets by season and zone



Consumption of inadequate diets was less common among women from households with greater wealth and better food security. However, even among the wealthiest households, over one-third of women consumed inadequate diets, underlying the need for intensified nutrition education activities nationwide. A strikingly large proportion of women from food insecure and hungry households only consumed one or two food groups. For households with poor and borderline food consumption habits, almost one-third of women fell into this group. Notably, comparing 2011 and 2012, the proportion of women who ate adequate diets declined slightly across all food security categories except households with acceptable food consumption. Notably, though food security improved between 2011 and 2012, diversity of diets largely did not. Women earning income ate slightly less diverse diets (62% inadequate) than women not earning income (60% inadequate). This is indicative of the nature of women's income earning in Bangladesh, where women are largely precluded from income earning unless there is economic need.

3 While there appears to be a relationship between dietary inadequacy and season, it is unclear if this difference is due to real seasonal differences in the micronutrient content of diets - that women were really eating better in the monsoon season - or if this difference is due to shortfalls in the measure - whereby the relationship between dietary diversity and dietary adequacy changed as seasonal diet patterns changed. However, as this measure of dietary inadequacy was validated over two seasons and differences in the relationship between the measure and dietary adequacy between seasons was not found, it is more likely that the inadequacy of diets varies by season. Diets may have improved during the monsoon due to changes in regular consumption patterns associated with the Ramadan period - such as the increased consumption of rich foods - and/or the increased varieties of highly demanded fruits, such as mangos, that are available during the monsoon. Additionally, households may diversify diets in the monsoon period to ensure that rice stores last until the next harvest, thereby increasing the micronutrient content of their diets.

Figure 5.7 : 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 is different in rationale and methodology for the two populations. In the adolescent period, 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.[4] 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 the differences in these methods and their implications are described below.

Height of women and girls

Nutritional status indicators based on height are useful in capturing past 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 (7). In addition, since small stature can result from inadequate nutrition during childhood, women of short stature also have higher odds of delivering lowbirth weight babies due to the intergenerational cycle of malnutrition (7; 8).

For girls, assessment of height is based on growth curves from the World Health Organization's (WHO) 2007 growth reference for school aged children (9; 10). 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

4 While there appears to be a relationship between dietary inadequacy and season, it is unclear if this difference is due to real seasonal differences in the micronutrient content of diets - that women were really eating better in the monsoon season - or if this difference is due to shortfalls in the measure - whereby the relationship between dietary diversity and dietary adequacy changed as seasonal diet patterns changed. However, as this measure of dietary inadequacy was validated over two seasons and differences in the relationship between the measure and dietary adequacy between seasons was not found, it is more likely that the inadequacy of diets varies by season. Diets may have improved during the monsoon due to changes in regular consumption patterns associated with the Ramadan period - such as the increased consumption of rich foods - and/or the increased varieties of highly demanded fruits, such as mangos, that are available during the monsoon. Additionally, households may diversify diets in the monsoon period to ensure that rice stores last until the next harvest, thereby increasing the micronutrient content of their diets.

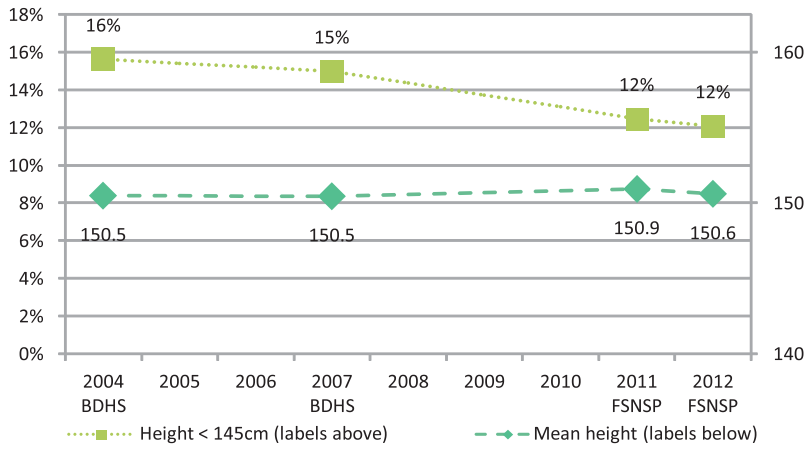
cm that indicates increased risk of requiring a caesarean section during delivery and of giving birth to low birth weight babies due to inter-uterine growth restriction. FSNSP uses a cut-off of 145 cm since that is the benchmark used by the DHS system (11),[5] resulting in the measure for adult women's malnutrition only having one category while the adolescent measure has two. The cut-offs used throughout this section are detailed in Table 5.2.

Table 5.2 : 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 S.D.
		Moderately undernourished	Height-for-age z-score less than -2 S.D. but greater than or equal to -3 S.D.
		Globally undernourished	Height-for-age z-score less than -2 S.D.
Adult women (19 to 49 years of age)	Identifying the proportion of reproductive age women at increased risk during a normal delivery	Moderate risk	Height less than 145cm

Over the past eight years there has been a very limited reduction in the proportion of ever-married women whose height is below 145 cm.[6] The average height of ever-married women has been virtually unchanged during this period (figure 5.8), while the proportion of women shorter than 145 cm has declined slightly since 2007 (12; 2; 13). For adolescent girls, estimates from the BDHS are not available, but FSNSP shows a two percentage point decline in the proportion of adolescent girls who were short for their ages between 2011 and 2012 (figure 5.9).

Figure 5.8 : Trends in the height of ever-married women (2004-2012, 15 to 49 years of age)[7]



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-tenth of adult women are at risk of difficulties during delivery or having low birth weight babies due to small stature (figure 5.9 and figure 5.10).

5 Due to the use of these two internationally standardised methodologies which measure different phenomenon, 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, because she has almost certainly suffered from malnutrition related growth retardation during her childhood (z-score<-2SD from the mean), among 19 year olds, her height would fall into the normal range because this woman's growth retardation was not so severe as to cause an increased risk during delivery (see Figure 5.11).

6 An ever-married woman is a woman who has been married at least once in her life regardless of her current situation. This comparison group has been used because it is the population group targeted by the DHS system.

7 To reduce duplication of data points in a given year, the BDHS survey of 2011 is not shown on this graph. However, the proportion of ever-married women shorter than 145 cm is highly congruent with FSNSP (13.3%), and shows a decline from the 2007 estimate (21). The mean height of women was not included in the 2011 BDHS report.

Figure 5.9 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, 6% of adolescent girls were severely short, while 0% would be expected in a well-nourished population. Almost a quarter 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, while 16% of the population should fall into these groups in a well-nourished population. In contrast, for adult women, there is no "ideal" height structure; however, the proportion of women under 150 cm should approach 0%. For adult women in Bangladesh, 2% of the population was shorter than 140 cm and around two-fifths of the population fell between 140 and 150 cm in height (figure 5.10). Almost three in five women in the country were tall enough to experience no increased risk at delivery, though women's average height was only a little over 150 cm.

Figure 5.9 : Nutritional status of adolescent girls by height for age measures (2011-2012, 10 to 18 years of age)

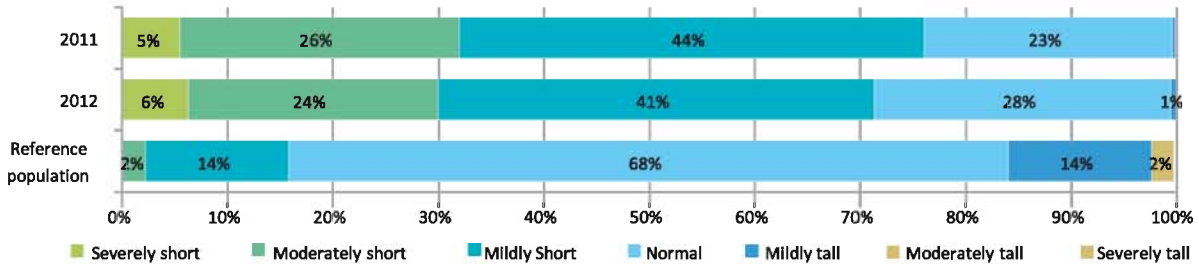
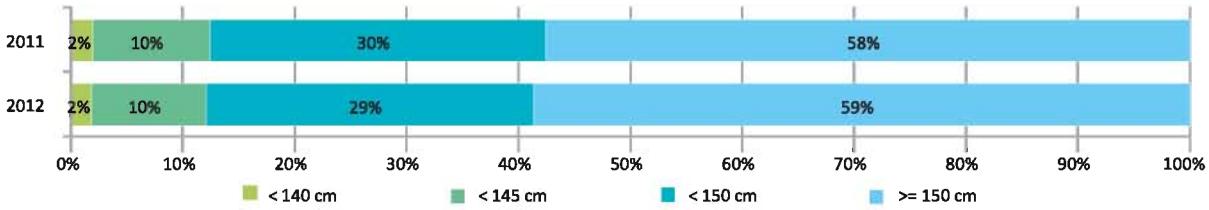
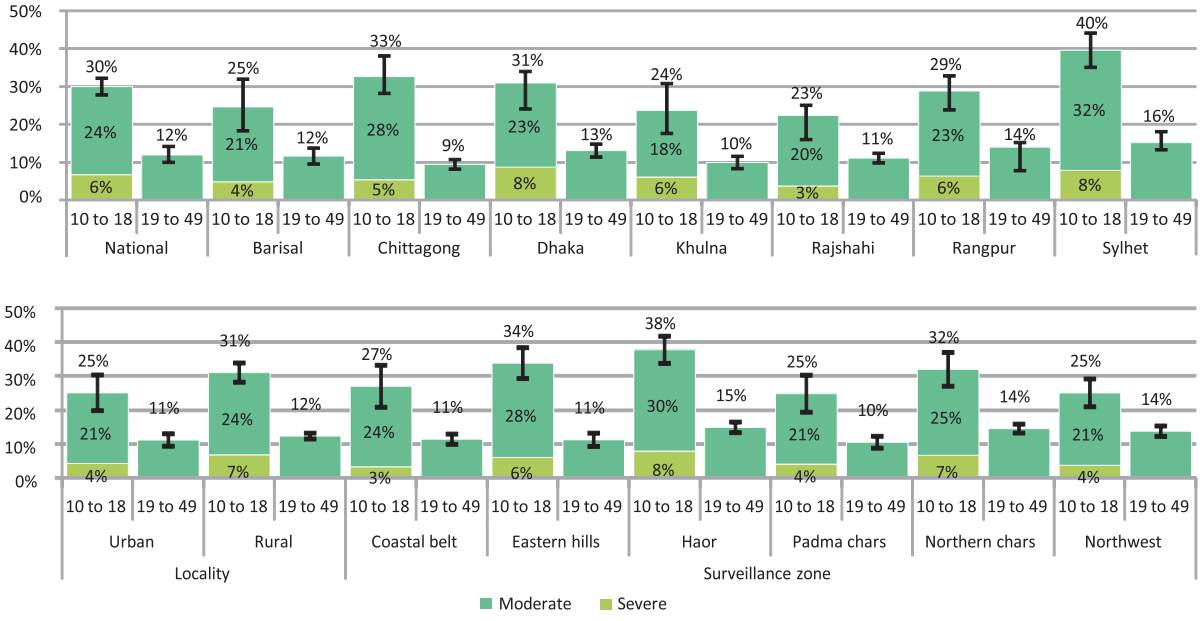


Figure 5.10 : Nutritional status of women by height measures (2011-2012, 19 to 49 years of age)



Across divisions and zones there is less variation in the proportion of women at risk during delivery due to small stature than in the proportion of adolescents who are too short for their ages. As was the case in 2011, Sylhet stands out with higher rates of adolescent stunting than the rest of the country. Rajshahi, Khulna, and Barisal contain a much lower proportion of short adolescents. The proportion of adolescents short for their ages declined in all divisions except Chittagong and Sylhet. In 2012, unlike 2011, the proportion of girls short for their age is lower in urban areas compared to rural. Between surveillance zones, only the Haor basin stands out for having very high levels of both stunted adolescent girls and adult women at risk.

Figure 5.11 : Indicators of inadequate height by area of residence



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 than girls 10 to 14 (figure 5.12). This could be due to an early cessation of growth, due, in part, to poor nutrition and early childbearing (13). Furthermore, adolescent mothers with children under five years of age are shorter than those without children, no doubt at least partially due to the interrelationship between early marriage and poverty and the effect of early pregnancy on linear growth. Figure 5.12 also illustrates the disconnect between the adolescent and adult measures. A little less than three times more 15 to 18 year olds are short for their age based on the WHO growth reference than are at risk during delivery due to small stature. Between 2011 and 2012 there was little notable changes in estimates over these categories.

Figure 5.12 : Inadequate height by age and maternal status

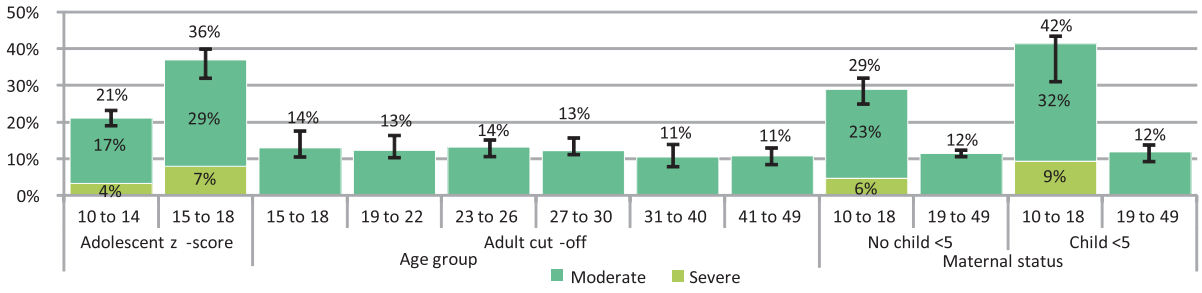
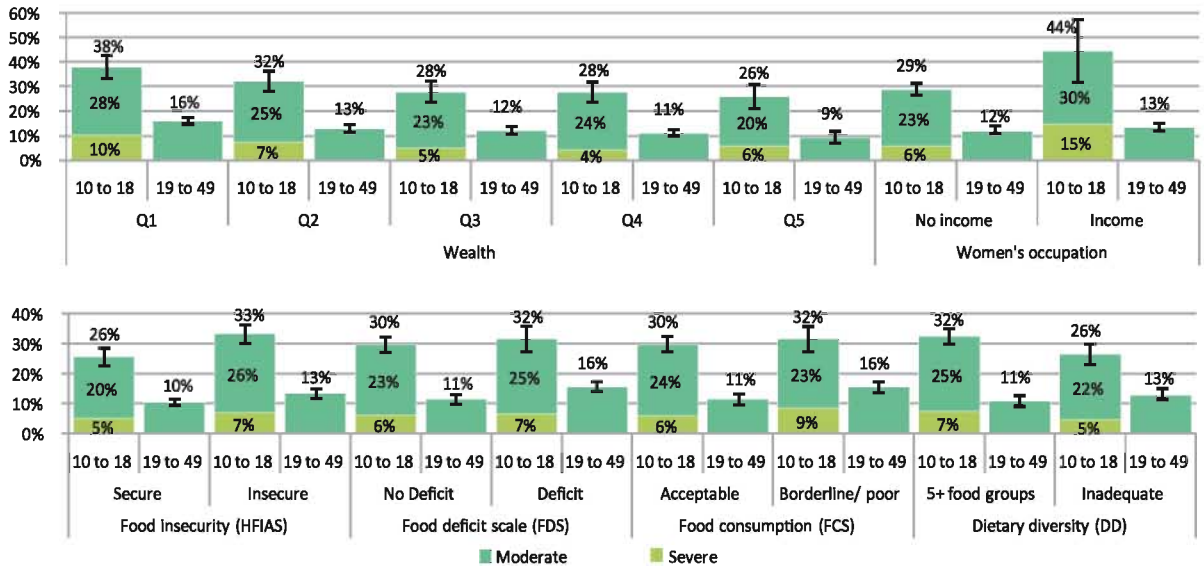


Figure 5.13 : Indicators of inadequate height by household wealth, women's occupation, and food insecurity



There was significant variation in the proportion of adolescents and adults with low height attainments across wealth quintile. A significantly greater proportion of adolescents and adults belonging to the poorest quintile were short compared to that of wealthier quintiles. Women who earned income were slightly but significantly shorter than women who did not. The difference was also significant for adolescent girls, probably due to underlying poverty and its relationship with child labour and height. The link between short-term food security measures and height, a long-term measure of malnutrition, is most likely indicative of a low amount of social mobility in Bangladesh whereby women from food insecure households tend to marry into similarly food insecure households. Interestingly, the association between these short-term food insecurity measures and height attainment did not hold for adolescent girls. In contrast, dietary diversity was related to the height of adolescent girls but not of 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, $weight_{kg}/height_m^2$) (11). 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 (11)[8].

8 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 (11). FSNSP 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.

Table 5.3 : 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	Height-for-age z-score less than -3 S.D.
		Moderately undernourished	Height-for-age z-score less than -2 S.D. but greater than or equal to -3 S.D.
		Globally undernourished	Height-for-age z-score less than -2 S.D.
		Severely overweight	Height-for-age z-score greater than +3 S.D.
		Moderately overweight	Height-for-age z-score greater than +2 S.D. but less than or equal to +3 S.D.
		Globally overweight	Height-for-age z-score greater than +2 S.D.
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

In FSNSP, two distinct approaches are used to classify the nutritional status of women and girls using BMI, as was done with height indicators. 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 (10; 11; 14). 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 (15)[9].

For girls, growth curves provided by the World Health Organization for school aged children are employed as a reference population (10; 9). 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 (15). 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. Because the adult measure includes mildly malnourished

9 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.

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 (14; 15). 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 wellnourished population, while women are classified based on the BMI score at which an increased risk of non-communicable diseases has been observed (14). As was the case with the BMI malnutrition measures, these two approaches to BMI measurement are aligned but not entirely comparable. Firstly, 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.[10] Because of these differences, and similar to the estimates of under nutrition, the adult measure of overweight and obesity contains a greater share of the population (See figure 5.21).

Figure 5.14 : Nutritional status of adolescent girls by BMI measures (2011-2012, 10 to 18 years of age)

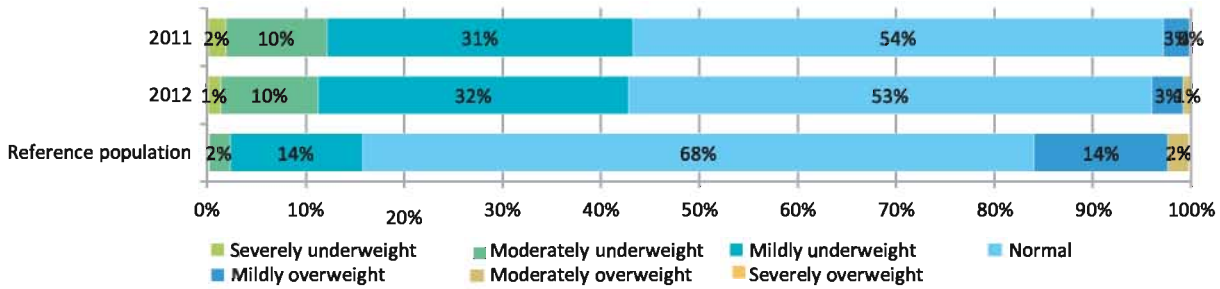
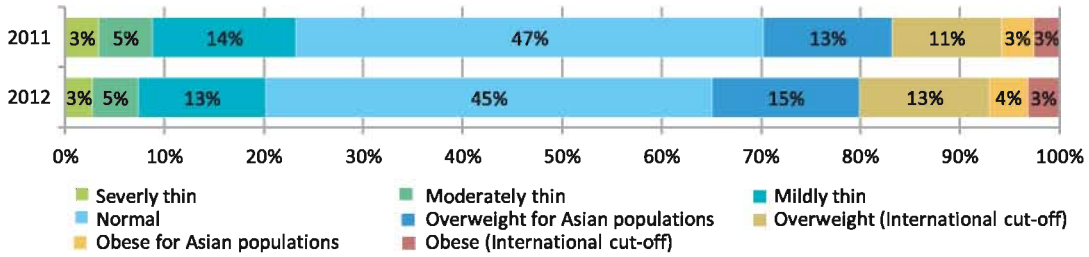


Figure 5.15 : Nutritional status of women by BMI measures (2011-2012, 19 to 49 years of age)

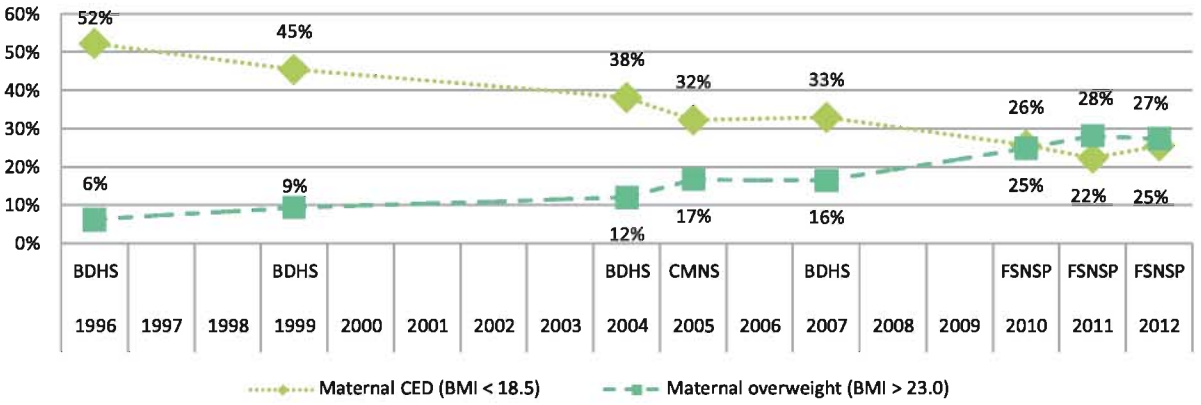


Illustrating these two systems of classification, Figure 5.14 presents national level data for adolescent girl's nutritional status. Using z-scores, figures for Bangladeshi girls aged 10 to 18 years of age (upper bar) are juxtaposed against the WHO reference group (lower bar). This reference suggests 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, girls in Bangladesh are overwhelmingly undernourished with over 42% of the population below -1SD from the mean, and only a small percentage measuring overweight (mild - 3%, moderate - 1%, severe - <0.1%). For adult women, aged 19-49, international standards provide eight categories of nutritional status, but no guidance on what an "ideal" distribution should be (14; 15). While 21% of the population are

10 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.

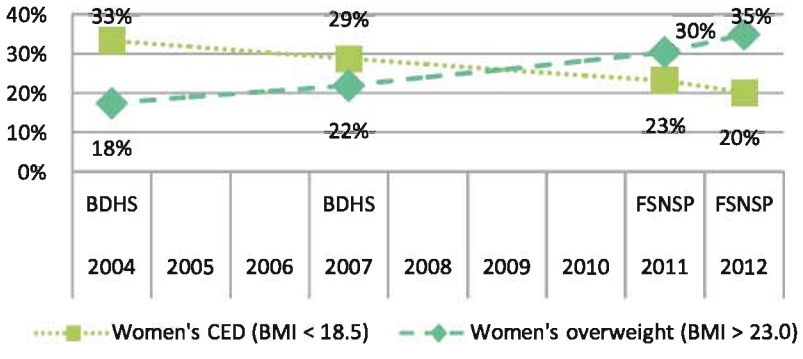
undernourished, an even larger proportion are overweight based on Asian cut-offs (35%). More troublingly, the proportion of women overweight has increased by five percentage points between 2011 and 2012. This level of under nutrition clearly identifies Bangladesh as having a medium severity public health problem for women's underweight. Although alarming levels of overweight are also apparent, no international classification system currently exists that helps assess the public health risk of this growing problem (16).

Figure 5.16 : Trends in maternal nutritional status (women 15 to 49 with a child less than 5, 1996 to 2012)



These distributions have no doubt changed greatly in the last few decades, but past comparative information for the entire population of adult women or adolescent girls does not exist. However, trends in the nutritional status of mothers of children less than five years of age and ever-married women aged 15-49 using the adult cut-offs described above are depicted in Figure 5.16 and Figure 5.17. In the 16 years between 1996 and 2012, the prevalence of maternal CED has halved and the prevalence of maternal overweight using the Asian cut-off has quadrupled (Figure 5.16) (17; 18; 12; 2; 19; 20). In the shorter term, among ever-married women, the trend has been the same (Figure 5.17). In the years between 2004 and 2012, the proportion of ever-married women with CED has fallen by 50% while the proportion women who are overweight, using the Asian cut-off, doubled (12; 2; 21; 20). Between 2011 and 2012, the proportion of women overweight has increased much

Figure 5.17 : Trends in ever-married women's nutritional status (2004 to 2012)[11]



11 Not shown on this graph are the findings of the BDHS survey of 2011. The proportion of women underweight (BMI<18.5) was 24% and the proportion overweight by international standards was 17% (21). Both of these figures closely align to the FSNSP findings, especially when slight variation due to seasonality is accounted for.

faster than the proportion of women underweight has fallen. As rates of child under nutrition have remained high, (see page 163), this worrisome trend towards a double burden of malnutrition requires urgent attention (18; 19).

Figure 5.18 : Girls' and women's nutritional status by locality [12]

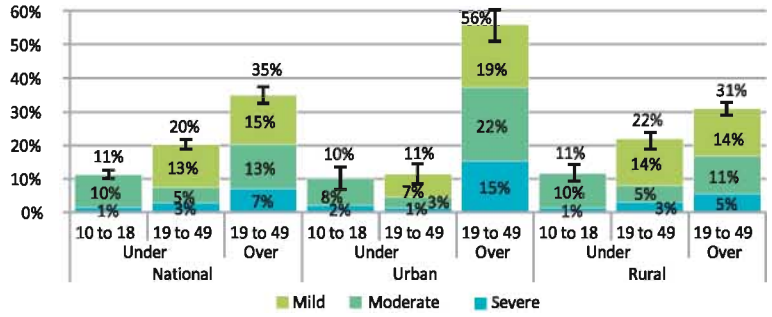


Figure 5.18 presents national, urban and rural rates of underweight for women and adolescent girls, coupled with the rates of overweight among adult women. As might be expected, overweight among adult women is much more prevalent in urban compared to rural areas. Well over half of adult women in urban areas were classified as overweight, indicating a nine percentage point increase between 2011 and 2012. However, even in rural areas, considerably more adult women are overweight than underweight. Between 2011 and 2012, women's underweight has decreased by three percentage points while women's overweight has increased by four percentage points. In contrast, rates of underweight among girls were similar between urban and rural areas, though more adolescent girls were severely undernourished in rural areas. Adolescent girls are undernourished in a greater proportion than adult women nationally and in both rural and urban areas.

As shown in Figure 5.19, 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 and the Northern chars, all other areas of the country, except Sylhet and the Haor, have a greater proportion of women overweight compared to underweight. Sylhet stands out as having a much greater proportion of women underweight compared to overweight, though the rates of adolescents undernourished is in line with the national average. Between 2011 and 2012, rates of adolescent underweight have changed little, but adult measures have changed substantially. The proportion of adult women overweight has increased most in Rajshahi (from 24% to 33%) and Dhaka (from 33% to 42%). In contrast, estimates for adult women over and underweight in Chittagong and Rangpur have changed little. Among surveillance zones, adolescent underweight appears to have increased somewhat in the Northwest (from 7% to 11%), but not changed significantly in any other zone. The proportion of underweight women in the Haor fell substantially (from 39% to 30%), while the proportion of women overweight changed much less (from 16% to 22%).

12 For the remainder of the graphs in this chapter the following cut-offs will be used:
10 to 18 years underweight: Severe - BMI z-score less than -3 SD; Moderate - BMI z-score greater than or equal to -3 SD but less than -2 SD
19 to 49 years underweight: Severe - BMI less than 16; Moderate - BMI greater than or equal to 16 but less than 17; Mild - BMI greater than or equal to 17 but less than 18.5
19 to 49 years overweight: Mild - BMI greater than 23 but less than or equal to 25; Moderate - BMI greater than 25 but less than or equal to 28; Severe - BMI greater than 28

Figure 5.19 : Adolescent girls' and women's nutritional status by division and surveillance zone[13]

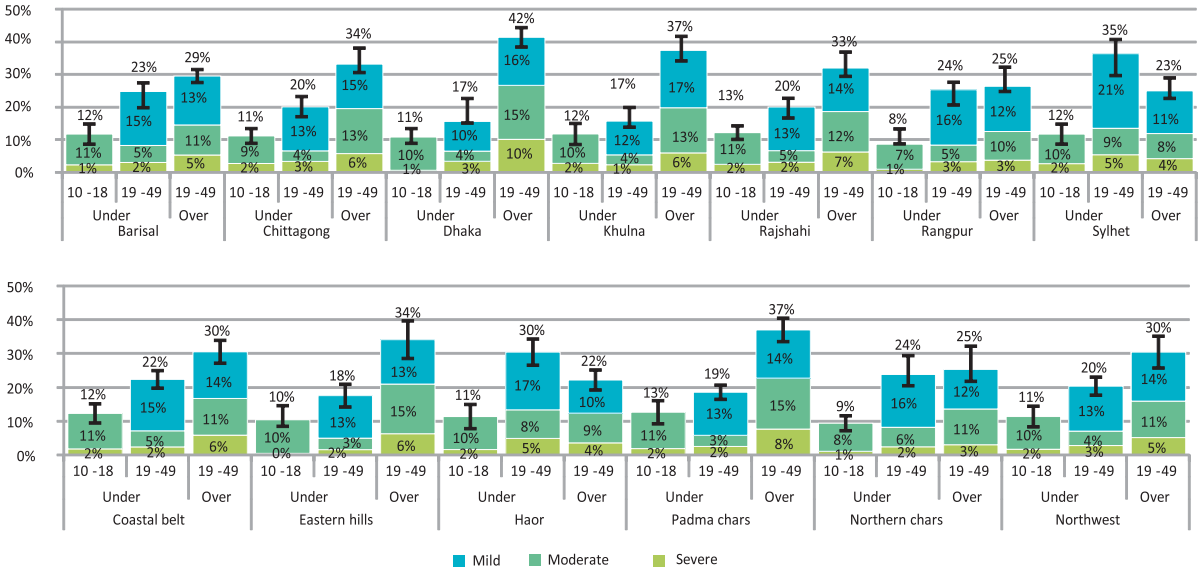
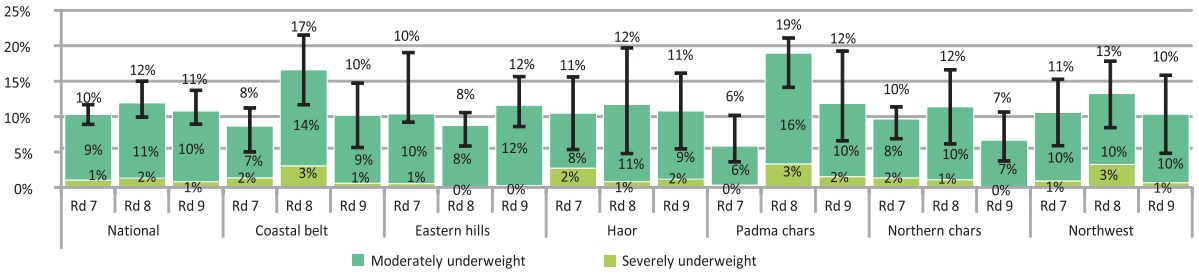


Figure 5.20 : Seasonal variation in adolescent girls' malnut rition by surveillance zone[13]



Among the surveillance zones, there is little variation in levels of adolescent under nutrition, but much higher variation in adult nutritional status. The Haor has a much greater level of adult malnutrition than other zones, while adult overweight is less prevalent in the Haor and Northern chars. There was very little seasonal variation in the nutritional status of women nationally. Variation was significant in only a few zones, as shown in figure 5.21. While adolescent girls were undernourished in greater proportion during the monsoon, the same pattern found among child measures (see page 171), similar seasonal variation was not found among adult women.[14]

13 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 5.14).

14 Adolescent overweight and obesity is not shown because levels were too low to disaggregate by season.

Figure 5.21 : Seasonal variation in women's nutritional status by surveillance zone[13]

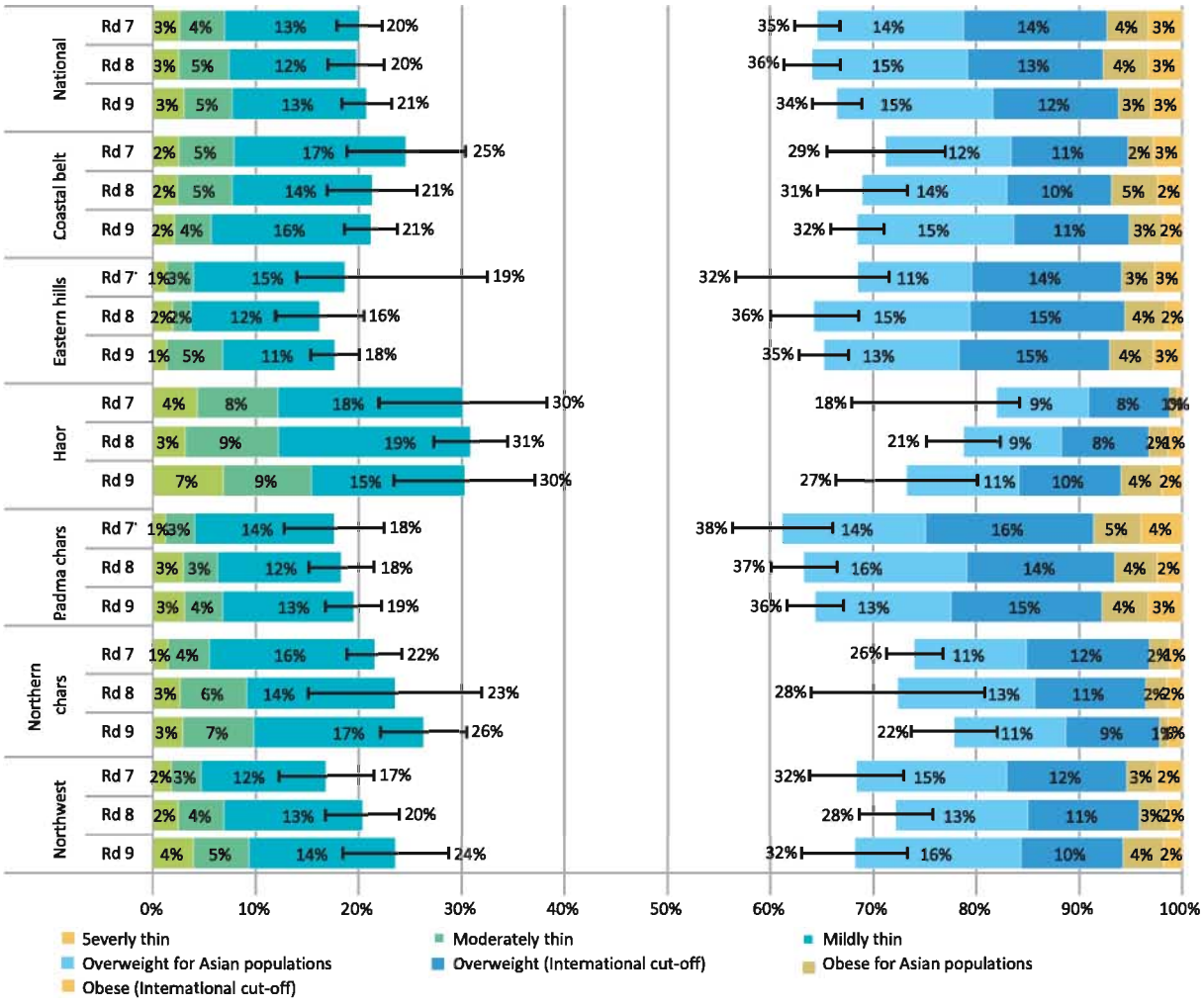


Figure 5.22 clearly illustrates the discontinuity between z-score and cut-off methodologies using the 15-18 year old age group. A much greater proportion of young women are classified as both underweight and overweight using the cut-off methodology compared to the z-score approach. It indicates an almost stepwise increase in the proportion of women overweight as women age from 15 to 40 years of age, and a steeper decrease in the proportion of women underweight in younger age groups until age 23 when the prevalence of CED remains steady at around 20%. Compared to 2011, 2012 estimates for adult overweight were greater for the oldest age groups, but similar among younger age groups. For women 41 to 49 years of age, the prevalence of overweight increased from 32% in 2011 to 41% in 2012.

Figure 5.22 : Nutritional status of women and adolescent girls by age[13]

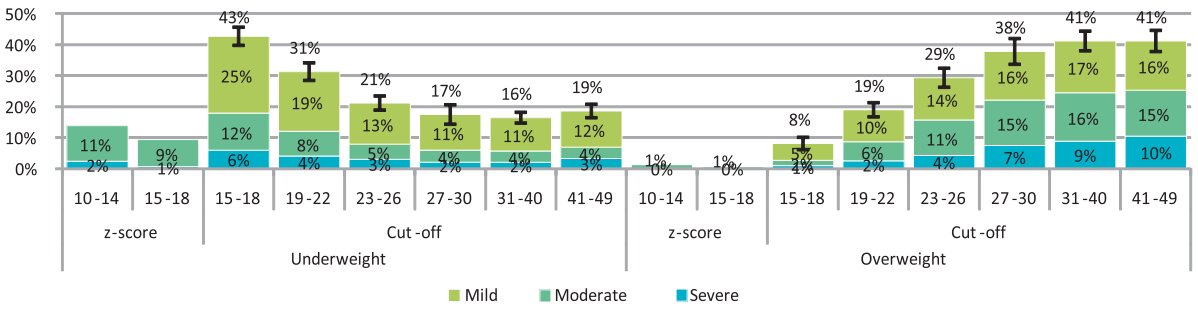


Figure 5.23 : Adult women's nutritional status by own education[13]

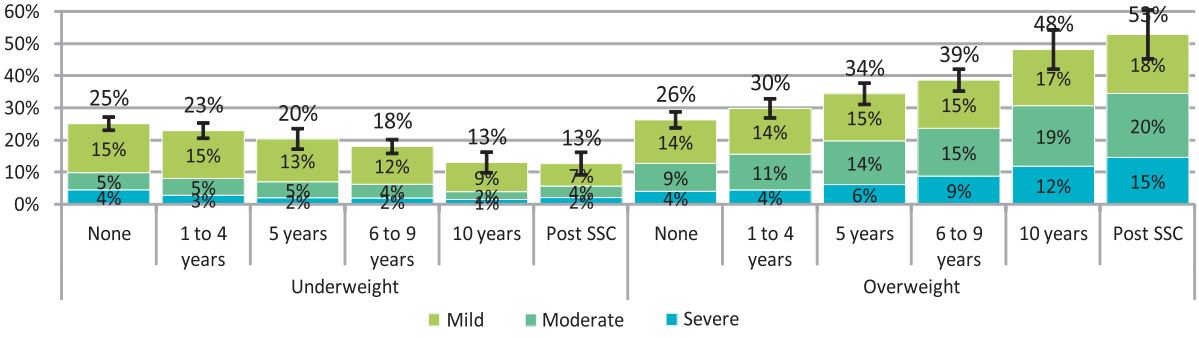


Figure 5.23 depicts the proportion of adult women underweight and overweight by the women's own educational level.[15] Rates of under nutrition are markedly less among the most educated women and rates of overweight are much greater compared to those with minimal education. This association is likely due to the correlation between wealth and greater educational attainment, and wealth and better nutrition. Significantly, over half of the most educated women are overweight. Compared to the 2011 results, the decrease in the proportion of women underweight over increasing educational attainment is much flatter while the increase in the proportion of women overweight along with increasing educational attainment is much steeper.

15 The proportion of adolescent girls undernourished by own education level is not depicted as it can be assumed that a significant portion of young women are still going to school.

Figure 5.24 : Women's and adolescent girls' nutritional status by wealth, food security, and dietary diversity[13]

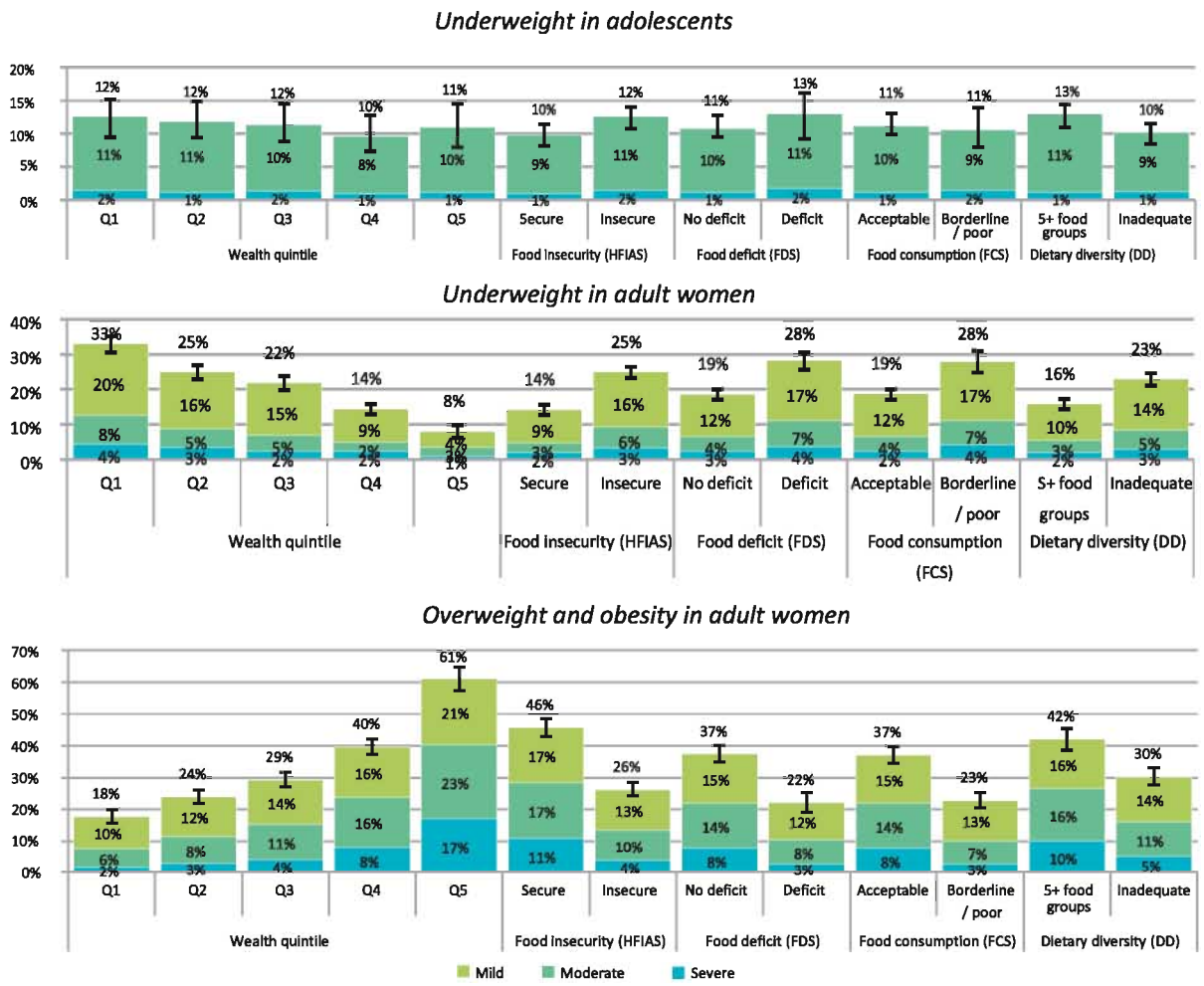
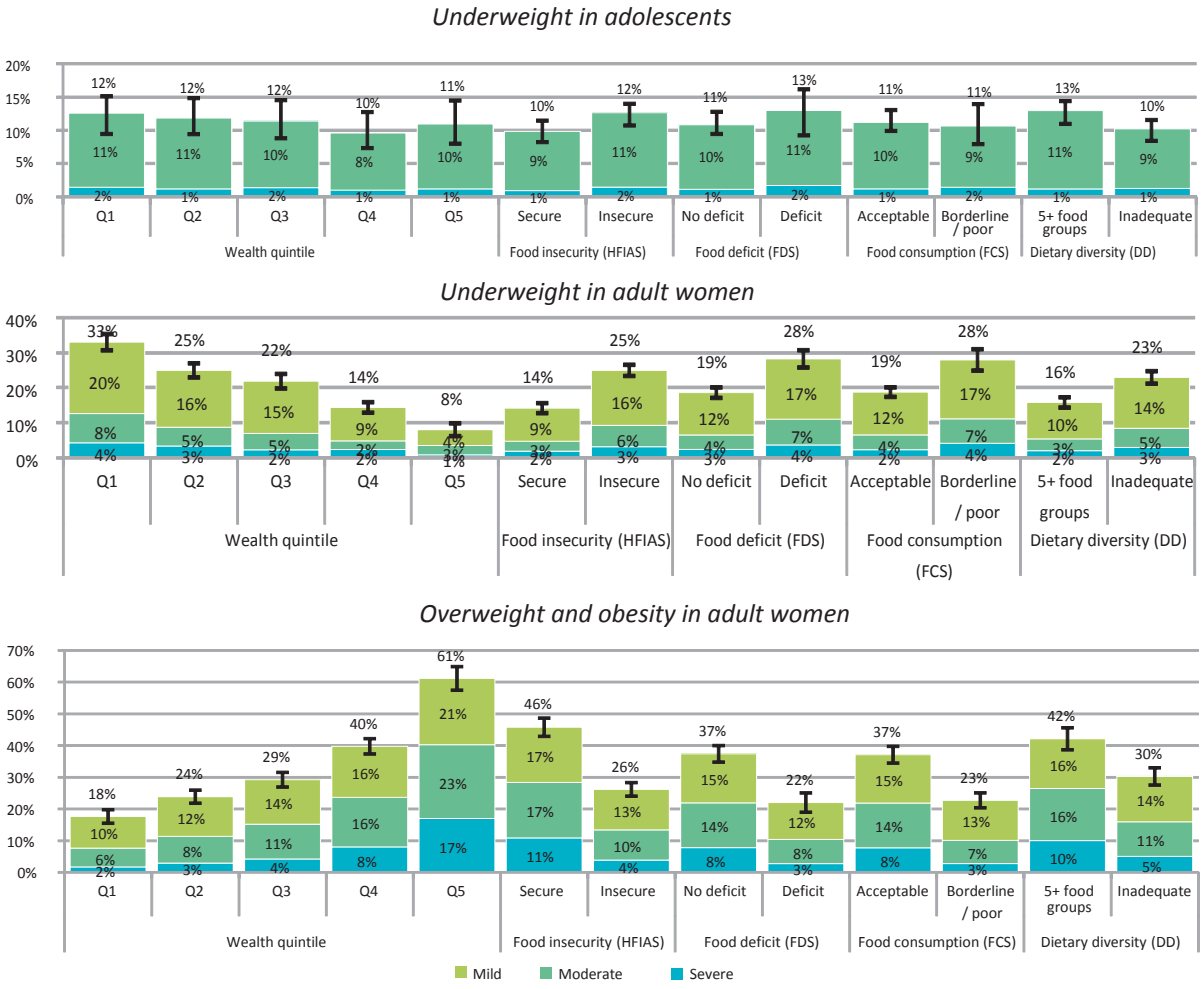


Figure 5.24 shows the association of malnutrition of adolescent girls and adult women with household wealth quintile, food security status, and individual dietary inadequacy. Rates of malnutrition among adolescent girls vary little by wealth quintile or household food security status. Although lower proportions of girls from the wealthiest and most food secure households are underweight, the difference is not significant. 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. This change is gradual until the wealthiest quintile, when the proportion of women overweight increases by half compared to the next wealthiest quintile. A strong relationship between the nutritional status of adult women and measures of food security and dietary diversity is also apparent. Underweight is strongly associated with food insecurity, hunger, poor food access and lack of diversity in diet, while overweight is more often found among women from food secure households who eat more diverse diets. For measures of under and overweight, the indicator that is correlated the most strongly with nutritional status is food security as measured through HFIAS.

Figure 5.24 : Women's and adolescent girls' nutritional status by wealth, food security, and dietary diversity[13]



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Maternal care and nutrition

FSNSP interviewed and measured over 1,622 pregnant women and 931 women with a child less than six months old.

Almost a quarter of pregnancies were among adolescent girls 15 to 18 years of age. Over one-tenth of women in their second pregnancy were 18 years old or younger

Only a little over one-tenth of pregnant women received adequate antenatal services (were seen by a medically trained provider at least four times during pregnancy and at least once during the first trimester).

Receiving antenatal care was associated with a reduction in the proportion of infants with low birth weight.

The rate of women not taking iron-folic acid (IFA) dropped from 63% in 2000 to 38% in 2012. Moreover, the proportion of pregnant women regularly taking IFA increased by three percentage points from 2011 to 2012.

The proportion of pregnant women who are so thin as to pose a risk to their foetus and dietary quality among pregnant women has not changed between 2011 and 2012. Over one in four foetuses are at risk.

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 conferred a significant beneficial effect on pregnancy outcomes, with women who did not receive clinical antenatal care (ANC) care having 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, leading to higher prevalence rates of child malnutrition. 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).[1] Thus it is difficult to overstate the importance of effective care during pregnancy for child and maternal health. Care during pregnancy has multiple components, some requiring health professionals and some dependent on family. FSNSP measures aspects of both. In 2012, FSNSP interviewed and measured 1,622 pregnant women and interviewed 931 women with a child less than six months of age about the care they received during and immediately after their pregnancy. This chapter will present findings in a historical context whenever possible.

Table 6.1 : 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	9	1%	0	0%
15 to 19	457	28%	196	22%
20 to 24	548	32%	328	32%
25 to 29	401	26%	240	26%
30 to 34	144	9%	122	15%
35 to 39	52	4%	27	4%
40 to 44	9	1%	11	1%
45 to 49	2	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. From 6.3 births per women in 1971-1975, the total fertility rate now stands at 2.3 - just slightly above the replacement rate (11; 12).[2] The median birth interval has lengthened from 34.7 months in 1990-1993 to 47.4 months in 2006-2011 (12; 11). Although the proportion of women with less than a nine month gap between pregnancies has remained largely constant between 1990-1993 and 2002-2007, recently the proportion has reduced to 5% in 2006-2011 (8% in 1990-1993 to 7% in 2002-2007) (11; 12; 13).

However, 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). 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).

1 It is unclear if this increase is due to the more precise measurement methods used in this study or its focus on a particularly poor area of Bangladesh (32).
2 Replacement rate refers to the rate of reproduction at which the population of the country will not grow.

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 - slightly over one-third - were in their first pregnancy and a little less than one-third were in their second pregnancy. Similar to 2011 results, in 2012, 17% of women were in their fourth or fifth 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 6.1 : Parity of pregnant women

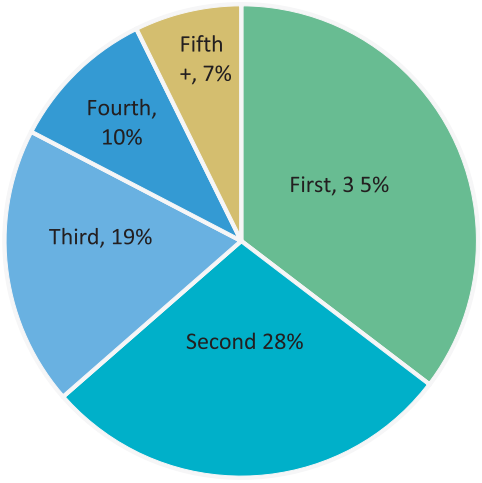


Figure 6.2 : Age group of pregnant women by number of previous pregnancies

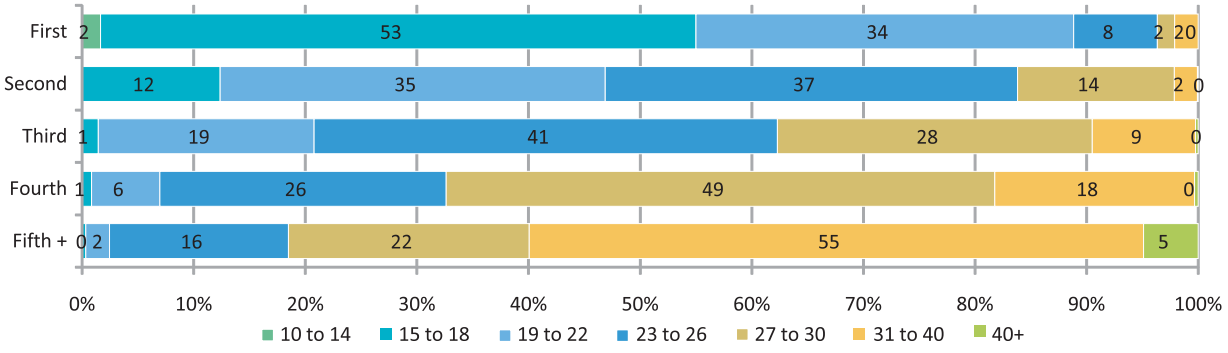


Figure 6.3 : Distribution of number of previous pregnancies by age[3]

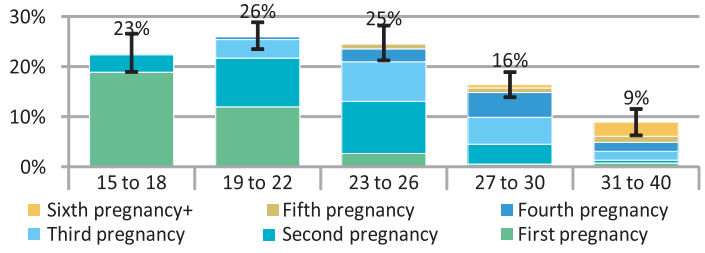


Figure 6.3 displays the age distribution of pregnant women. Almost half of pregnant women were 22 years of age or younger and the largest proportion of pregnant women were 19 to 22 years of age. Over one-fifth of pregnant women were 18 years or younger.[4] Only around 4% of currently pregnant women indicated a gap of less than 18 months between the birth of their last child and the estimated birth date of the current pregnancy.

3 This graph excludes nine fourteen-year-old pregnant girls and eleven pregnant women who were 41-46 years of age, due to the small number of pregnancies at these ages.

4 This pattern is congruent with the most recent age-specific fertility rates from BDHS 2011 (12).

Clinical antenatal care[5]

Clinical antenatal care encompasses many different components, which together help ensure the health and safety of mother and baby during pregnancy and through delivery. FSNSP collects information on the coverage and types of care received by women during pregnancy and on the current coverage of iron and folic-acid supplements.[6] 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 (13). 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 (13). The FSNSP system ascertains this information by interviewing mothers of children less than six months of age about care they received during their last pregnancy.

Figure 6.4 : Trends in ANC care for women who delivered in the six months before the interview (1993-2012)[7]

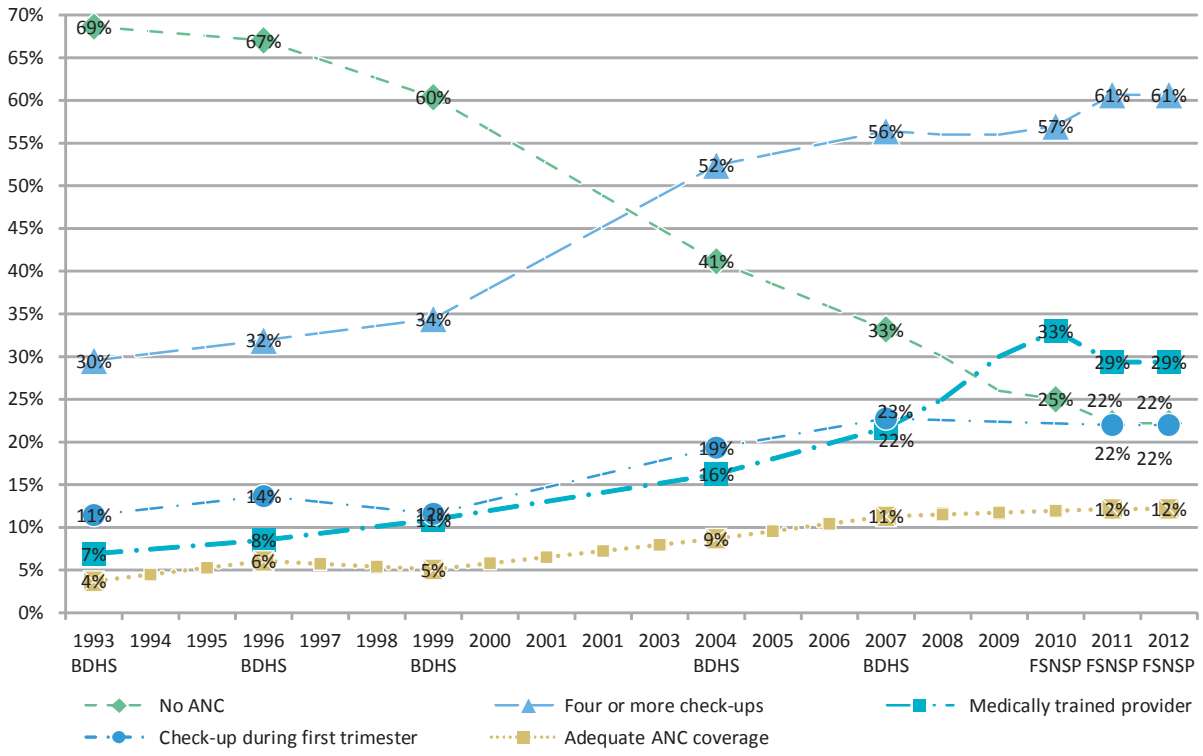


Figure 6.4 compares estimates of ANC coverage from past surveys with FSNSP estimates (11; 15; 16; 17; 13; 18; 19). Since 1993, the proportion of women receiving no ANC dropped by over two-thirds, from almost 70% in 1993 to less than a quarter in 2011 and 2012. On the other hand, the proportion of women visiting a medically trained ANC service provider almost doubled from 1993 until 2007, but there has been little progress since then.[8] Two indicators, the proportion of women

5 In 2011, these ANC estimates were drawn from only the 5th and 6th rounds of surveillance.

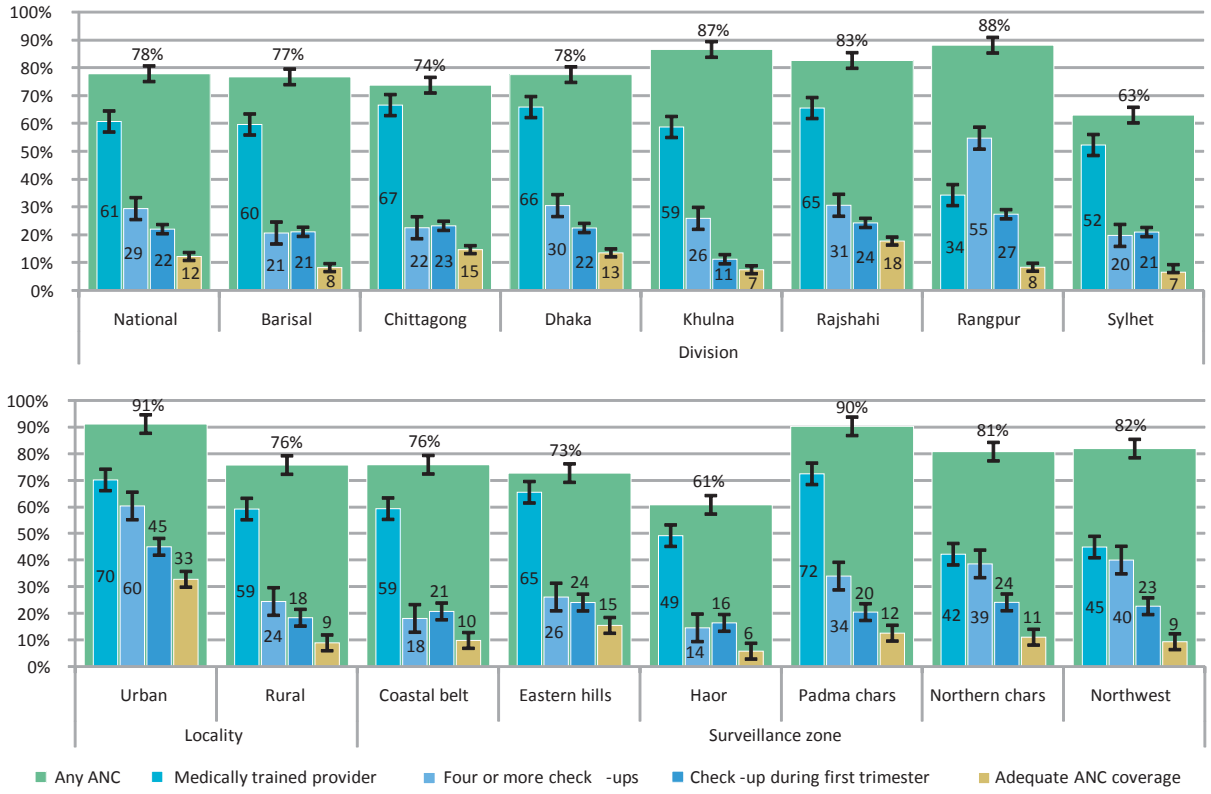
6 Information about care components - such as extent of physical examination, counselling, TT immunisation, birth planning, early tests used in the identification of danger signs of pregnancy, and management of these dangers - can be found in complementary surveys such as the BDHS.

7 These estimates were re-calculated using the raw datasets to only include the women who delivered in the six months prior to the interview.

8 In 2011, FSNSP estimates for these indicators were in line with those given in the 2011 BDHS. Using the same recall period as that used in FSNSP: the proportion of women who had received any ANC was 70% in BDHS while it was 77% in FSNSP; the proportion of women who had received care from a medically trained provider was 53% in BDHS while it was 58% in FSNSP; and the proportion of women who had four or more ANC checkups was 27% in BDHS while it was 26% in FSNSP (12; 41). The timing of the first antenatal check-up was not recorded in the 2011 BDHS.

completing four or more ANC visits and the proportion of women who had an ANC check-up in their first trimester, increased slightly and in tandem over the period; around one-quarter of women are currently practicing each behaviour, though more women receive four ANC visits than those who receive ANC care during the first trimester. Ultimately, only around 12% of pregnant women in Bangladesh 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 (13).

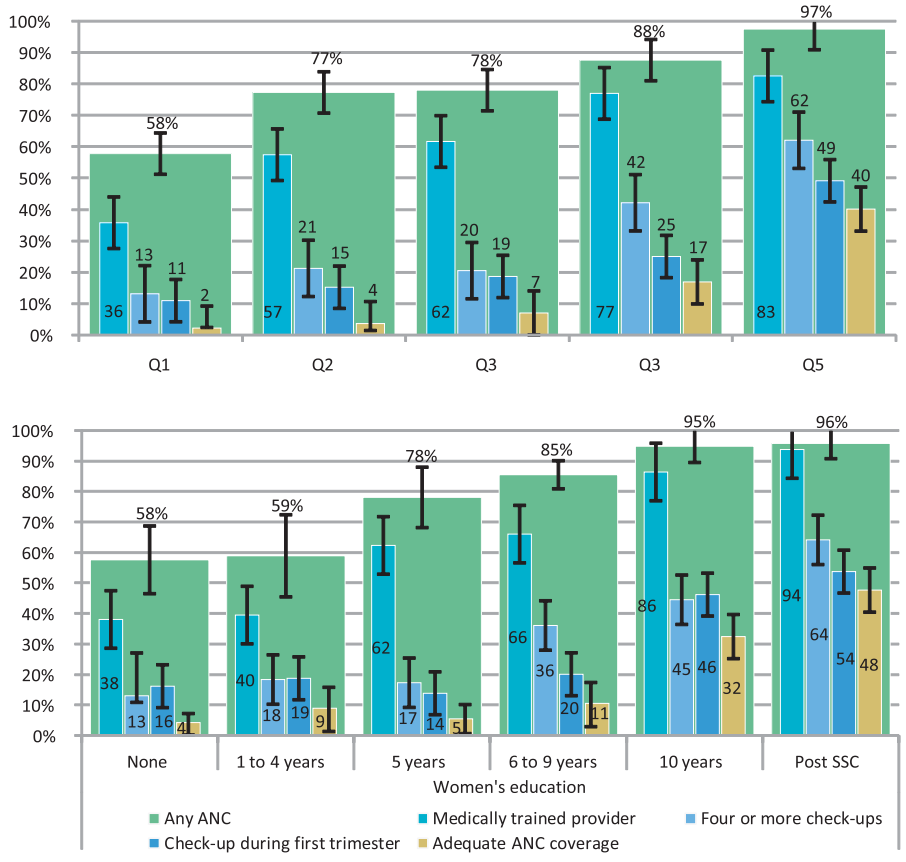
Figure 6.5: Proportion of mothers who received ANC by division and locality



At the national level, over three-quarters of women complete at least one ANC check-up during their pregnancy and over three-quarters of these women receive care from a medically trained provider. However, of all women who obtained any ANC, only around one-third of them had their first ANC visit in the first trimester and received at least four check-ups. Furthermore, only one-sixth 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 6.5 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 of the following: four or more ANC check-ups; care from a medically trained provider; an ANC check-up during the first trimester; and receipt of all three conditions.

Pregnant women in Sylhet received ANC care in a much lower proportion than in other divisions. However, in this division almost all women who received ANC did so from a medically trained provider, possibly indicating a greater use of the formal health system. In Rangpur division, only a little over one-third of women receiving ANC did so from a medically trained provider, suggesting substantial barriers to formal health services. Nevertheless, in Rangpur, over four-fifths of women received at least one ANC check-up, about three-fifths of whom completed four visits. This is considerably greater than the rates of women completing four ANC visits in all other divisions, suggesting that these areas may experience greater challenges in terms of women's mobility and ability to access health care. Rajshahi had the highest proportion (18%) of women who obtained adequate ANC care.

Figure 6.6 : ANC indicators by household wealth, women's own education



A higher proportion of women in urban areas, compared to those in rural areas, received ANC services. Across surveillance zones, women receiving any sort of ANC care were highest in Padma chars and lowest in the Haor. The Haor also had the lowest proportion of women having adequate ANC coverage compared with the highest proportion in the Eastern hills (15%). Access to medically trained ANC providers appear weakest in the Northern chars and Northwest, however these two zones have higher proportions of women receiving four or more ANC check-ups.

As shown in Figure 6.6, elements of care increased in an almost step-wise fashion by mother's education level and wealth quintile. Overall, ANC coverage was greatest among the most educated women and those belonging to the wealthiest quintile. However, overall rates of adequate ANC coverage (all conditions fulfilled) are alarmingly low regardless of wealth. In the poorest quintile, only 2% of pregnant women received adequate care, while even in the richest wealth quintile, less than one-half received adequate care. As predicted, households experiencing greater food security and higher food consumption scores tend to have better ANC (not shown). As might be expected,

women engaged in income earning activities also received ANC in a greater proportion than women who did not work, possibly due to the greater mobility of this group (78% vs. 74% for any ANC and 61% vs. 58% for ANC with a medically trained provider, not shown).

Iron and folic acid 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 (19). Compliance with an IFA regimen requires two elements: timely receipt of or access to IFA tablets and regular consumption of the tablets provided. FSNSP 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 6.7 : Trends in the proportion of mothers not taking IFA during their last pregnancy (2000-2012)[9]

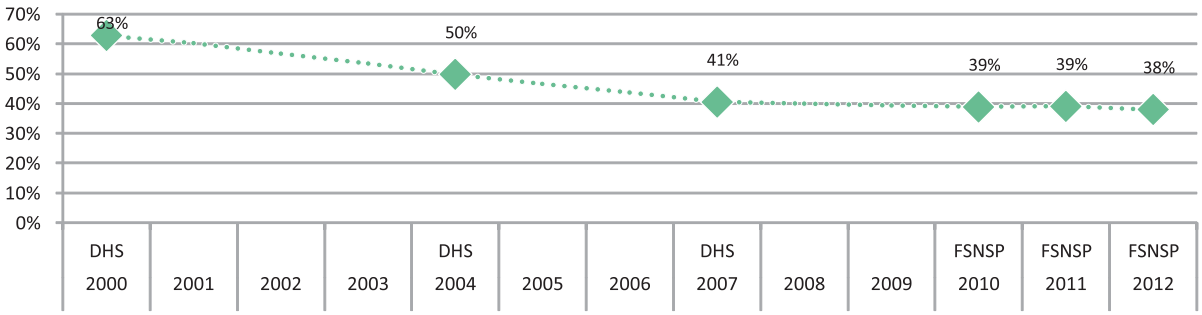
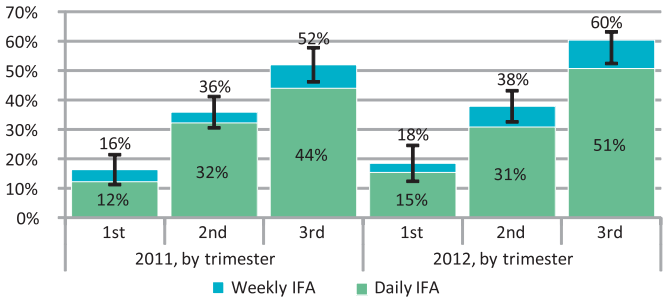


Figure 6.7 displays the proportion of women over time who have given birth to a child in the six months before they were interviewed who did not take IFA tablets during their last pregnancy (13; 19; 18; 17; 16). In 2012, 38% of mothers report not having taken iron tablets despite the fact that nearly half of pregnant women in Bangladesh are anaemic (6). These trends show that IFA use has increased by nearly fifty percent over the last decade, though current rates of iron supplementation during pregnancy remain unacceptably low. Moreover, there has been no decrease in the proportion of women who do not take IFA during pregnancy since 2010.

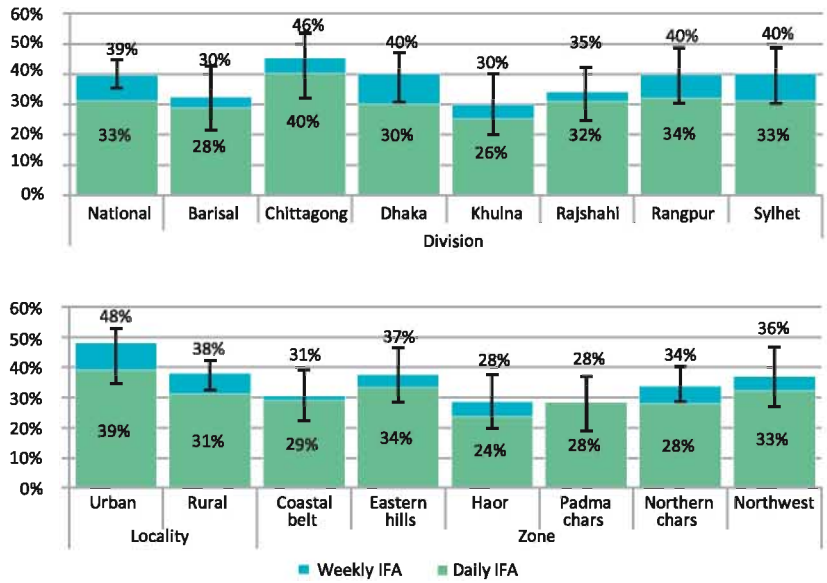
Figure 6.8 : Pregnant women taking IFA by trimester



9 Not included in this graph are the 2005 CMNS and the 2008/2009 HFSNSA surveys as the raw data was not available to reevaluate these estimates for a six month recall period. In addition, receipt of IFA was not recorded in 2011 BDHS (39; 40).

However, these figures understate the level of IFA consumption, as women with completed pregnancies tend to report their practices during the last trimester. Few of these women took IFA consistently throughout their pregnancies. 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.[10] Figure 6.8 indicates that in 2012 while less than one-fifth of women reported they had taken IFA tablets weekly in the first trimester, this rose to three fifths of women in their final trimester. Promisingly, though the proportion of women who did not take IFA at all did not decline, the proportion of women who took IFA regularly increased dramatically between 2011 and 2012 - particularly during the final trimester. As was the case in 2011, in 2012 the majority of women who took IFA weekly took it daily.

Figure 6.9 : 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 (20; 21; 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.

As was shown in figure 6.9, the regular consumption of IFA increased between 2011 and 2012 by three percentage points. Notably, there was a large improvement in rates of regular IFA consumption in Barisal and Sylhet, the areas which had the lowest rates in 2011. In contrast, Khulna was the only division which had a lower estimate in 2011 than in 2012. As was the case in 2011, in 2012 iron supplementation is much higher among women from urban areas compared to those from rural areas, though the level of difference was much lower in 2012 than it was in 2011 as the proportion of pregnant women regularly taking IFA declined in urban areas and increased in rural areas between 2011 and 2012. Among surveillance zones, there was less change in estimates between 2011 and 2012.

10 The results presented above for completed pregnancies are closest to the estimates in the 3rd trimester as women who have recently completed a pregnancy appear to report on their most recent level of consumption (their consumption during the final trimester). Because of this recall bias, this section will focus on women who were pregnant at the time of interview.

Figure 6.10 : Proportion of pregnant women who took IFA by household wealth and own education

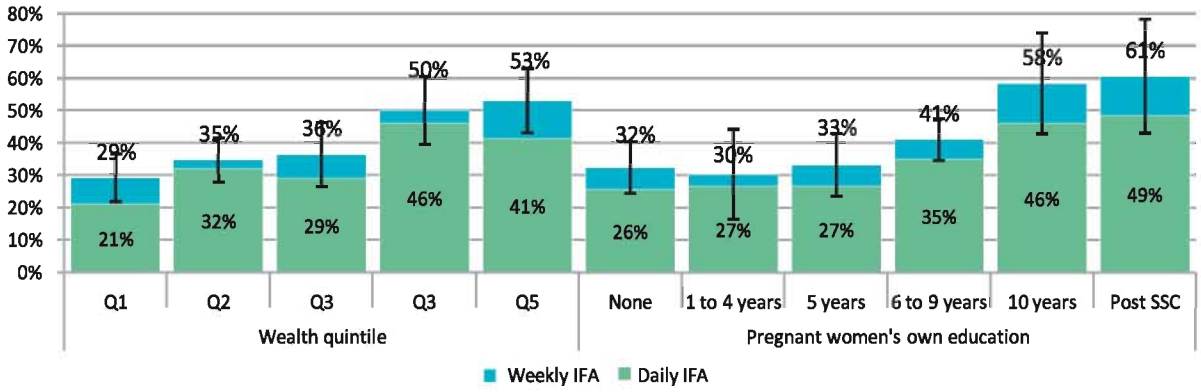
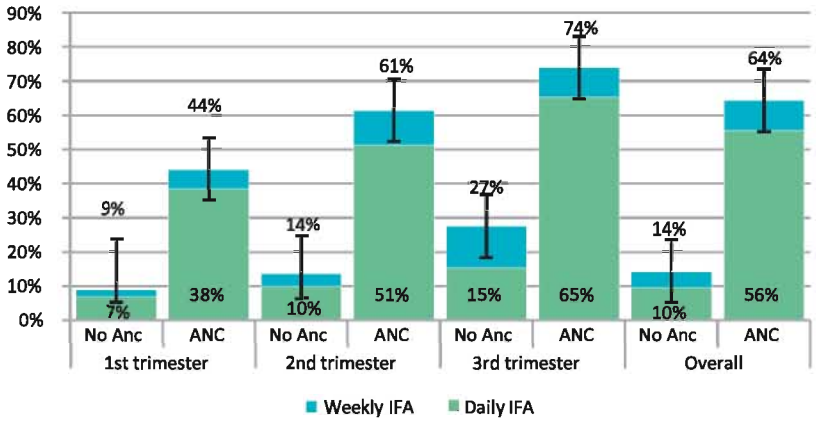


Figure 6.11 : Pregnant women who took IFA by ANC care and trimester

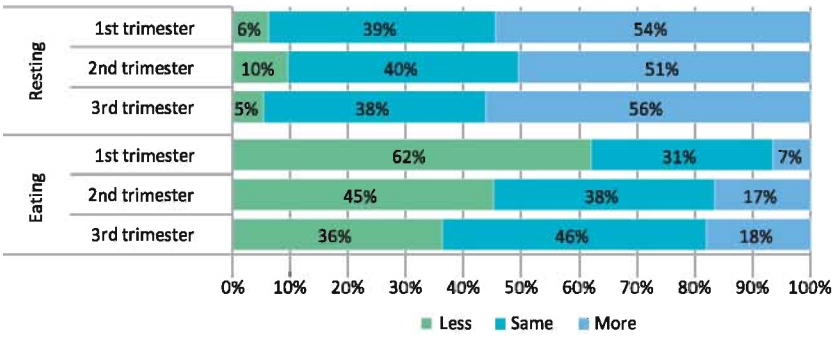


While there was limited association between women's age and adherence to an IFA regimen (not shown), expected patterns related to wealth and education were observed. As education increased, so did the proportion of women who reported taking IFA weekly. Wealth appeared to have a greater influence on IFA consumption in 2012 than it did in 2011, though only around half of the women in the two richest quintiles reported to take weekly IFA. Overall, five times more women took IFA weekly who had completed at least one ANC visit compared to those who had had no ANC visits (figure 6.11). Similar to 2011, in 2012, this difference was even larger during the early trimesters of pregnancy.

Family and self-care

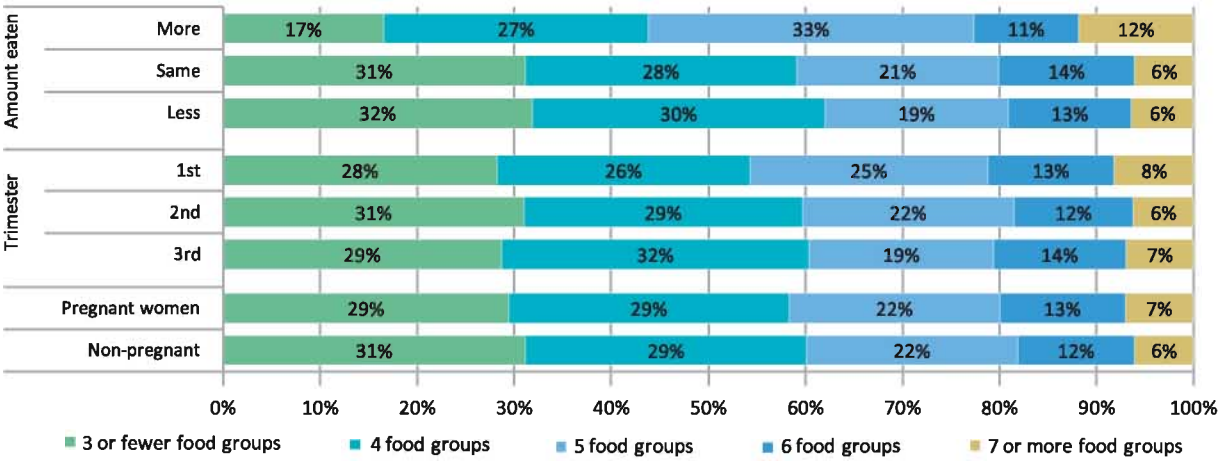
Along with clinical ANC, women must receive special consideration in the home during pregnancy to ensure the optimum health of mother and child. A pregnant woman's household should support her to reduce heavy work and increase the quantity and quality of her diet. Household and self-care for pregnant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

Figure 6.12 : Amount of rest and food during pregnancy as compared to before



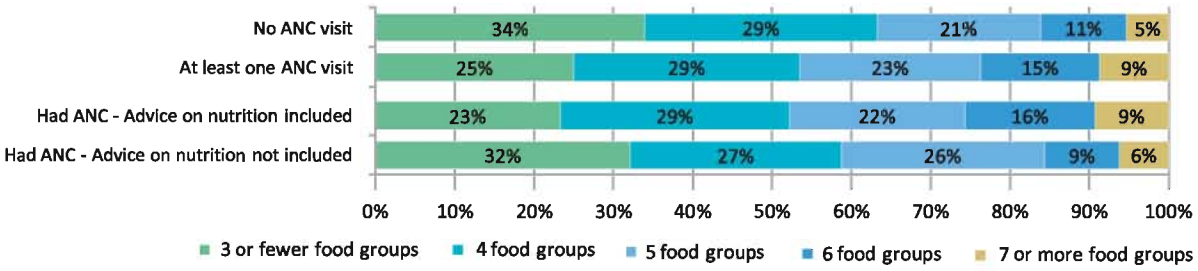
Interestingly, most women report being able to rest more during pregnancy, but only a minority report a greater amount of food consumed. Strikingly, the majority of women actually report eating less during the first trimester of their pregnancy in comparison to before, perhaps due to morning sickness. 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. This may be due to food taboos or a desire to have a smaller baby for ease of delivery (22). Troublingly, though the proportion of women who rested less than usual decreased between 2011 and 2012 during all trimesters, the proportion that ate less food than usual increased dramatically by four percentage points during the latter two trimesters.

Figure 6.13 : Dietary diversity scores by reported eating habits, trimester and pregnancy status



This pattern of food consumption is consistent with information obtained on women's dietary diversity; women's self-report of the amount of food they are eating during their pregnancy as opposed to the amount they ate before pregnancy corresponds to differences in dietary diversity scores. However, there is little difference in the diversity of diets between women who report eating the "same" versus those who report eating less. In 2012, the diets of pregnant women were slightly less diverse during their second trimester compared to other trimesters. Overall, dietary diversity during pregnancy did not appear to improve between 2011 and 2012. As was the case in 2011, in 2012, there are minimal differences in the diversity of diets consumed by pregnant and non-pregnant women. In light of the increased nutritional needs of women during pregnancy, these findings raise serious concerns regarding the proper nutrition of women and unborn children.

Figure 6.14: Dietary diversity scores by ANC visit



Around 50% of the pregnant women interviewed had received at least one ANC visit before the interview. Notably, these women reported eating more diverse diets than women who had not yet attended an ANC visit, in spite of the fact that dietary diversity did not increase over the pregnancy period. Moreover, 81% of women who had 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 most 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 gain weight during pregnancy regardless of their nutritional well-being, 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 FSNSP is a cross sectional surveillance system, FSNSP 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. Additionally, clinical vitamin A deficiency is assessed by asking a set of questions to women who were pregnant at the time of interview or during the six months prior to interview.

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 increased risk of intrauterine growth restriction at this point (23; 24). In addition to this cut-off, beginning in 2012, FSNSP has begun to include the severe cut-off recommended by the SPHERE standards of 207 mm (24), instead of the two additional cut-offs intended for the general population as was given in 2011 (19). Although obesity is also associated with negative pregnancy outcomes (25; 26), there is no standard to classify women's overweight or obesity based on MUAC.

Figure 6.15: Trends in under nutrition in pregnant women

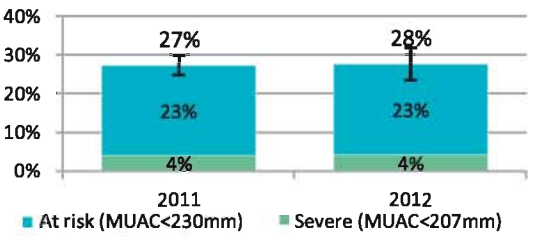


Figure 6.15 reveals that the proportion of pregnant women who are severely malnourished and those who are at risk remained almost the same in 2012 as compared to 2011. Similar to non-pregnant women, as discussed in the last chapter, an estimated 5% of pregnant women were

above 150 cm tall; only 12% were of short stature (height less than 145 cm) and 2% were shorter than 140 cm. Less than 1% 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 and the 3% reported in the 2004 BDHS (27; 28; 16; 29).

Figure 6.16 : Women undernourished by trimester and pregnancy status

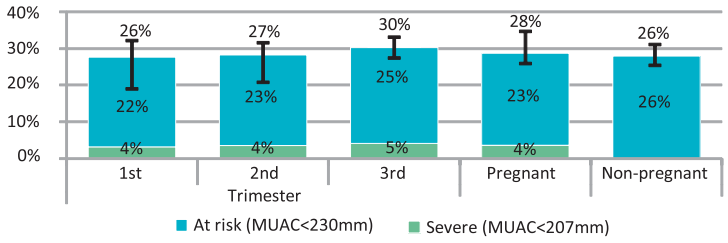
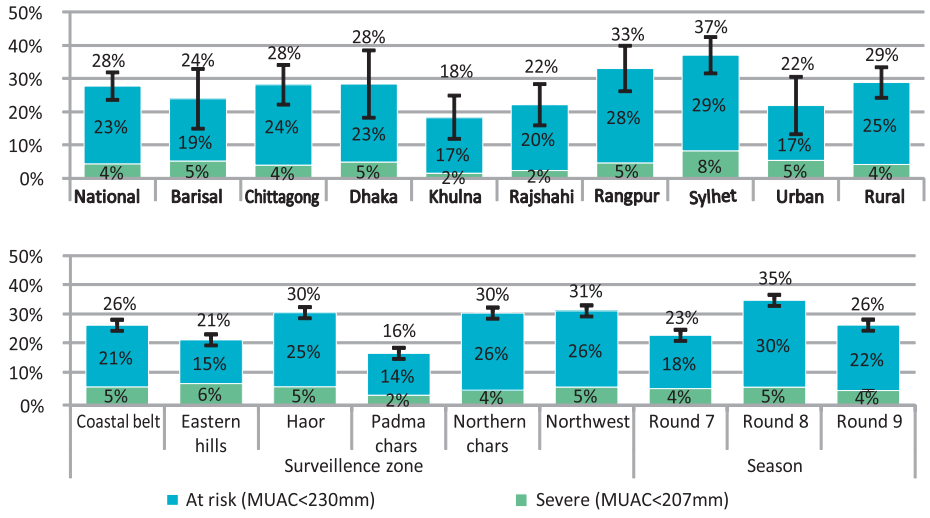


Figure 6.16 outlines the proportion of pregnant women undernourished according to SPHERE standards using MUAC as the assessment tool. In contrast to 2012, women in their third trimester were slightly and not significantly thinner than women in their first trimester. For the sake of comparison, non-pregnant 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 23.0 cm 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 6.21).

Figure 6.17 : Pregnant women's nutritional status by area of residence and season



Similar to patterns of under nutrition among non-pregnant women (See Figure 5.19), there were notable variations in the nutritional status of pregnant women across geographic areas. Sylhet had very high rates of under nutrition among pregnant women followed by Rangpur, while Khulna had the lowest. As expected, pregnant women in rural areas are far more likely to be at nutritional risk compared to urban areas; however, both areas had almost the same proportion of women who were severely thin. Mirroring these results, the Northwest, Haor, and Northern chars had the highest rates of under nutrition during pregnancy. Pregnant women in the Padma chars and 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 greater proportion of pregnant women at risk due to thinness during the monsoon in Round 8 in comparison to Round 7 and Round 9.

Figure 6.18 : Pregnant women's nutritional status by household wealth and food security status

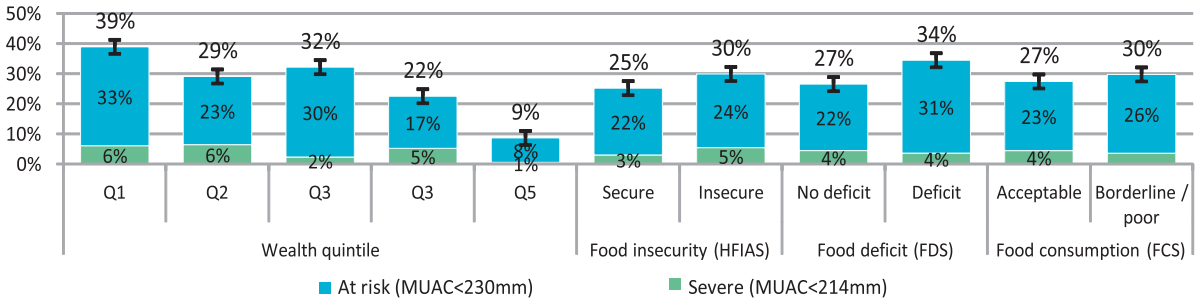
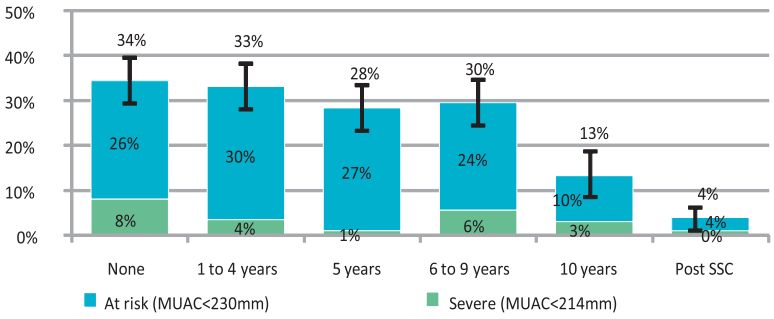
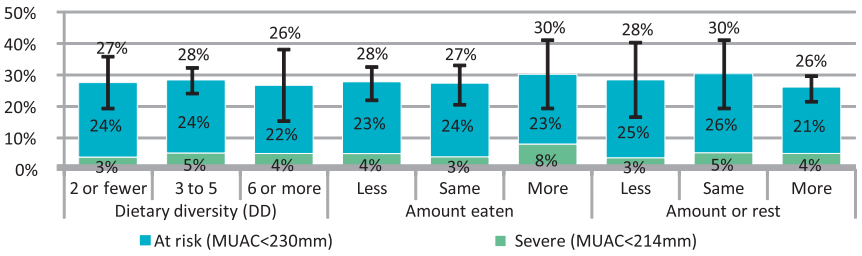


Figure 6.19: Pregnant women's nutritional status by women's own education



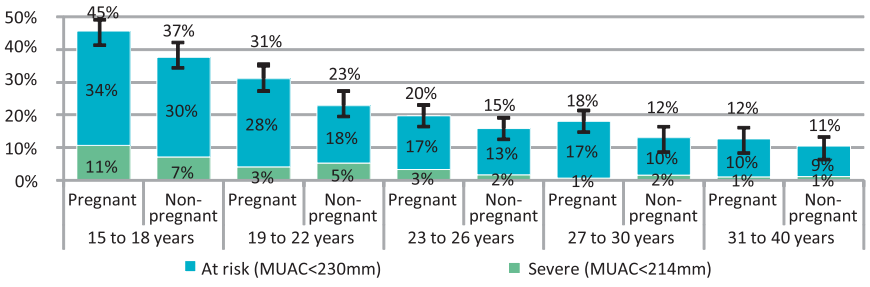
As expected, more educated pregnant women and those from wealthier and more food secure households were malnourished in a lower proportion than those less educated or from poorer and more food insecure households. As we can see, in the wealthiest quintile, around one tenth of pregnant women were at risk, whereas in the poorest quintile, the rate was around two-fifths. However, if compared on the basis of food consumption scale, there is little difference in the prevalence of pregnant women at risk in poor or acceptable categories. On the other hand, only 4% of pregnant women were at risk compared to 34% of pregnant women with no education at all. The prevalence decreases as educational attainment increases, showing a very positive trend in educational attainment and nutritional status of women.

Figure 6.20 : Pregnant women's nutritional status by diet and rest



Surprisingly, pregnant women who ate a more diverse diet yesterday were malnourished in almost same proportion as those who ate a monotonous diet. in 2012, women who reported eating more while pregnant than they did before pregnancy were not better nourished than those who reported eating the same or less. Similarly, the amount of rest a pregnant woman was able to take was also not correlated to nutritional outcomes in 2012.

Figure 6.21 : 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, almost half 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 except over 30. 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 prepared.

Low birth weight

As discussed earlier in the chapter, maternal nutrition is an important precondition 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 is not measured for a random subset of all children in the country, and the precision with which these children were weighed is unknown (38). Of the children weighed at birth in the two years before the interview whose weight could be recalled, 19% 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 there is information.

Figure 6.22 : Relationship between ANC care and low birth weight in children

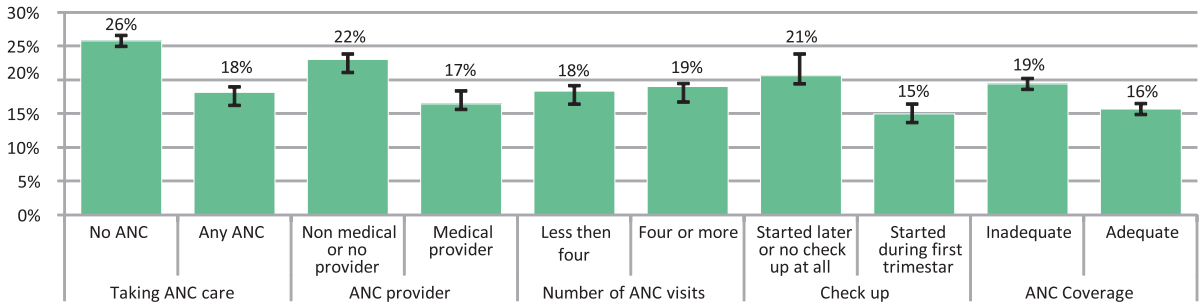
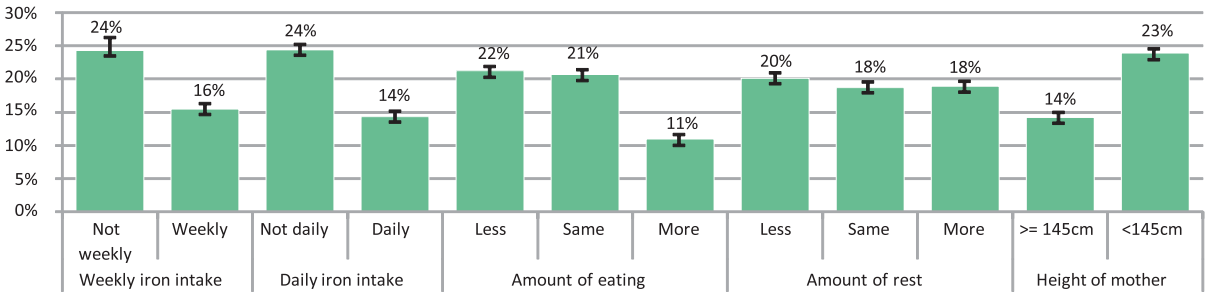


Figure 6.22 shows the prevalence rate of children born with low birth weight by the indicators included in this and the previous chapter. Studies have shown that the birthweight of babies increased with improved clinical ANC visits of mothers (30), and FSNSP results strongly support this finding for Bangladesh. In 2012, of the children whose mothers reported not receiving any ANC, 26% were reported to have been born at low birth weight, whereas only 18% 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.

IFA during pregnancy has also been shown to be negatively associated with LBW after adjusting for socio-economic status (31). In line with this, FSNSP found that frequent consumption of IFA was associated with a reduction in low birth weight prevalence. 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 or less during their pregnancy than before and shorter mothers.

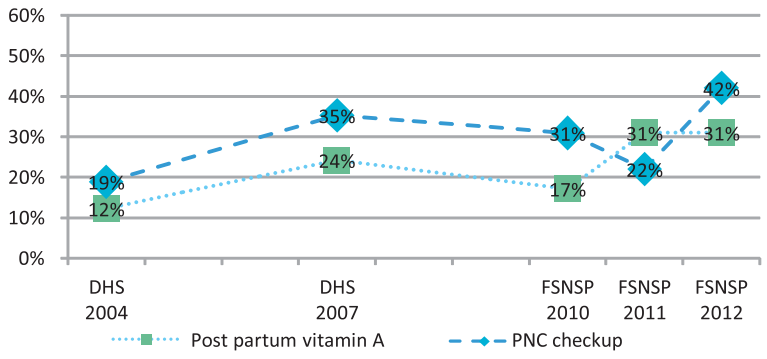
Figure 6.23 : Relationship between maternal care and low birth weight in children



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.

Figure 6.24: Post-natal care over time (2004 - 2011)[11]



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 (32; 33). 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 (34), which provides women who have recently given birth with high potency vitamin A capsules within six weeks of delivery.[12] Vitamin A given to the mother is passed to the child through breast milk and helps the child's immune system to develop (35).

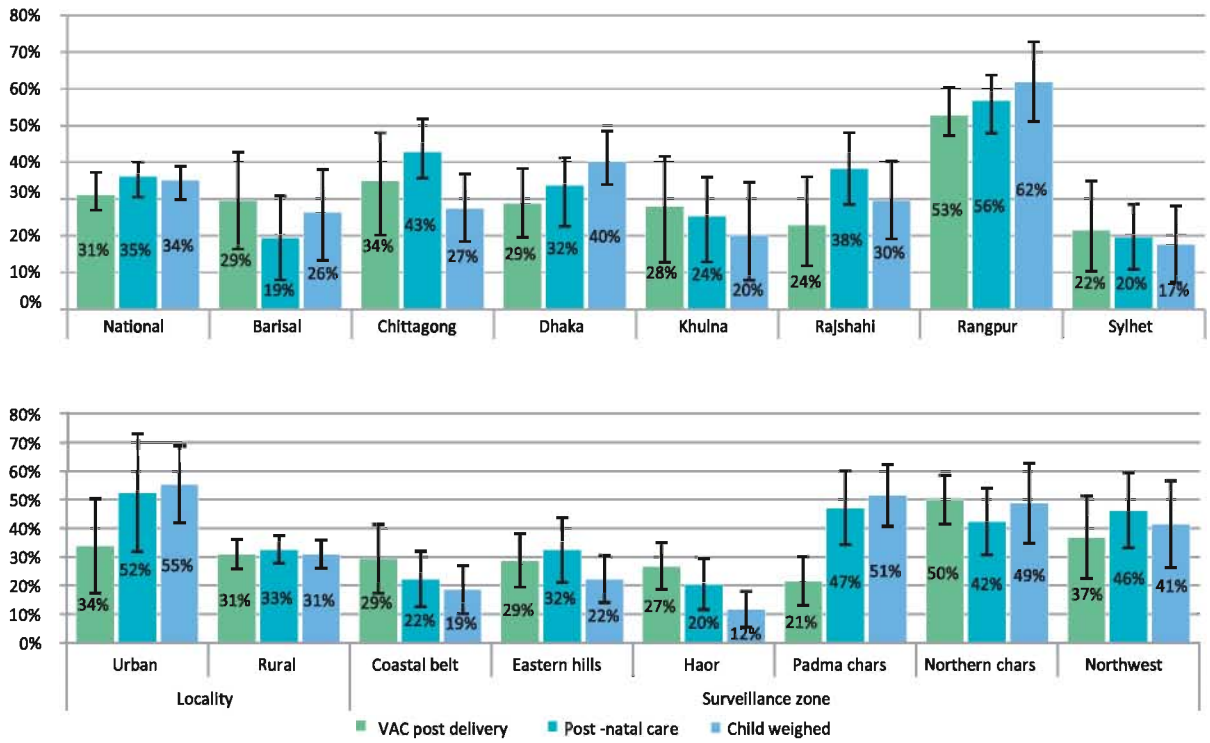
Between 2004 and 2007, there was some improvement in the rates of post-partum vitamin A and PNC care (16; 17; 18). Overall, a little less than one-third of women nationally reported receiving a VAC within six weeks of delivery, while only around two-fifths of women received a post natal

11 While the DHS system extends the PNC period to 42 days past delivery (32), FSNSP defines PNC as care during the 30 days past delivery. This difference is not expected to change results dramatically as the vast majority of PNC is received within two days of delivery.

12 Recently the World Health Organization has provided detailed recommendations for vitamin A supplementation programmes, which do not recommend supplementing women postpartum (38). 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 (37).

check-up within 30 days after birth, and a little over a quarter of children were weighed at birth. Across divisions, Rangpur stands out for having the highest rates of all these indicators, and Sylhet the lowest. There is not a large difference between urban and rural areas for VAC post-delivery, however a greater proportion of urban mothers 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 half had received VAC, over three-fourths had received nutrition messages and around 70% had received support for breastfeeding. It is unclear if these gaps were due to supply gaps with VAC, a lack of provider time, or a lack of provider training.

Figure 6.25 : Post-natal care by area of residence



Child feeding and care

Half of newborn babies in Bangladesh receive pre-lacteal feeding in the first hour of their life, while less than half of these children are breastfed in the first hour of life.

The proportion of exclusively breastfed children in Bangladesh remains around 50%. The rate of exclusive breastfeeding declines after about two months of age.

The rates of continued breastfeeding in Bangladesh have returned to above 90% after a temporary dip in 2011.

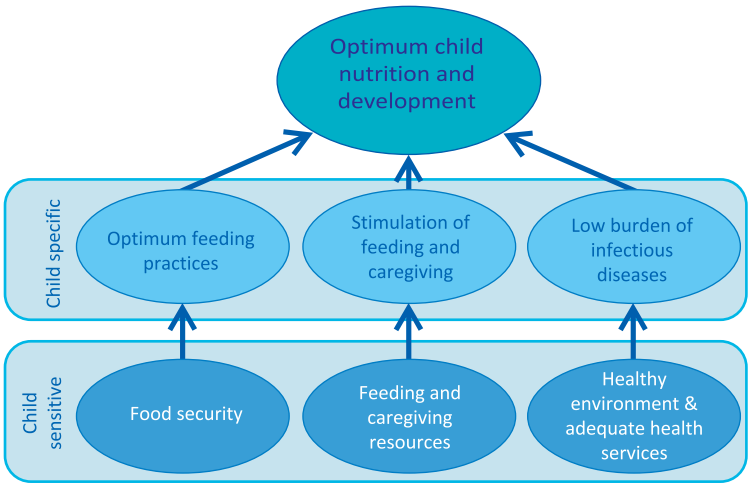
There have been slow but steady increases in the proportion of infants and young children fed with a bottle and fed infant formula since 2010.

In 2012, almost 90% of children six to eight months old were introduced to complementary food, but less than one-fifth of children were eating in line with the minimum diversity standard.

According to FSNSP estimates, nearly 99% of children over two years of age are eating at least three meals or snacks per day, and many are eating much more frequently than this.

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 has long-term cognitive (increasing IQ) and health benefits (including prevention of chronic disease), all of which reduce the economic burden of disease and malnutrition and contribute to the achievement of the MDGs (3; 1). As Figure 7.1, a simplified rendition of the Lancet 2013 framework, illustrates, optimal child 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. 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. FSNSP explores most of these components.[1]

Figure 7.1 : Lancet 2013 framework of child development



This chapter explores the child specific causes of child malnutrition as related to current feeding practices. These feeding practices are examined in their historical context, by connecting FSNSP findings to historical survey data. Using the World Health Organization (WHO) suite of indicators, this chapter 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 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.

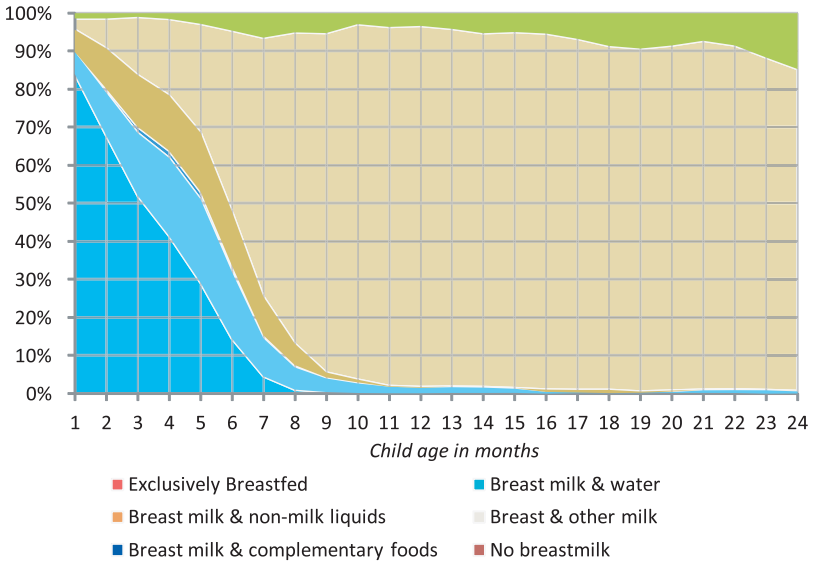
Table 7.1 : Children surveyed by age

Age group in months	*Number surveyed*	*Weighted proportion*
0 to 5	1,070	9%
6 to 11	1,331	11%
12 to 17	1,238	12%
18 to 23	1,213	11%
24 to 29	1,251	10%
30 to 35	1,139	10%
36 to 41	1,078	9%
42 to 47	1,041	9%
48 to 53	1,040	9%
54 to 59	985	9%

1 while indicators of early childhood development are not currently included in FSNSP, they will be available in 2014

To obtain estimates of care and feeding practices for infants and young children, FSNSP interviews the caregiver of the youngest child in each selected household.[2] As such, all estimates in this section should be interpreted as prevalence of the indicators for the youngest born child in the household.[3] This approach to data reduces the number of older children included in the surveillance system (Table 7.1).[4]

Figure 7.2 : Child feeding practices in the first two years of life[5]



IYCF practices in Bangladesh remained largely consistent between 2011 and 2012. Overall there were only three notable changes, two negative and one positive. Unfortunately, the overall prevalence of exclusive breastfeeding decreased from 2011 to 2012, particularly in the fifth month of life. In addition, there was an increase in water intake rates for children under six months of age, especially for children three and four months old. In contrast, the majority of children were breastfed throughout their first two years of life, and the proportion of children who continued to receive breast milk at two years of age rose considerably between 2011 and 2012. 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. Needing no preparation, breast milk is hygienic even in low-resource settings. The antibodies, living cells, and immuno-protective factors in milk help to ward off infections by reducing the risk of digestive and respiratory illnesses (7; 8; 9). 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 (10). Additionally, during illness, a child's appetite for foods is often diminished but their demand for breast milk remains unchanged (7; 11), thus breastfeeding helps to prevent dehydration and provides vitamins, minerals, and energy to aid recovery (12). In longitudinal studies, longer total duration of breastfeeding is associated with greater linear growth and thereby lower rates of childhood stunting (13; 14). In adulthood these children will be taller with greater

2 In the case of two children of equal ages, one of the children is randomly selected.

3 This approach is identical to that of the Demographic and Health Survey system for most infant and young child feeding indicators (50; 52).

4 While 6% of children zero to five months of age were measured but not included in the IYCF and care modules, over 30% of children in their fifth year of life were measured but excluded from these modules. This does not impact estimates greatly as most indicators focus on children under two years of age. However, if the prevalence of any indicator increases over age, estimates will be overstated, and if the prevalence of any indicator decreases over age, estimates will be understated. This bias is similar to that found in the DHS system (50).

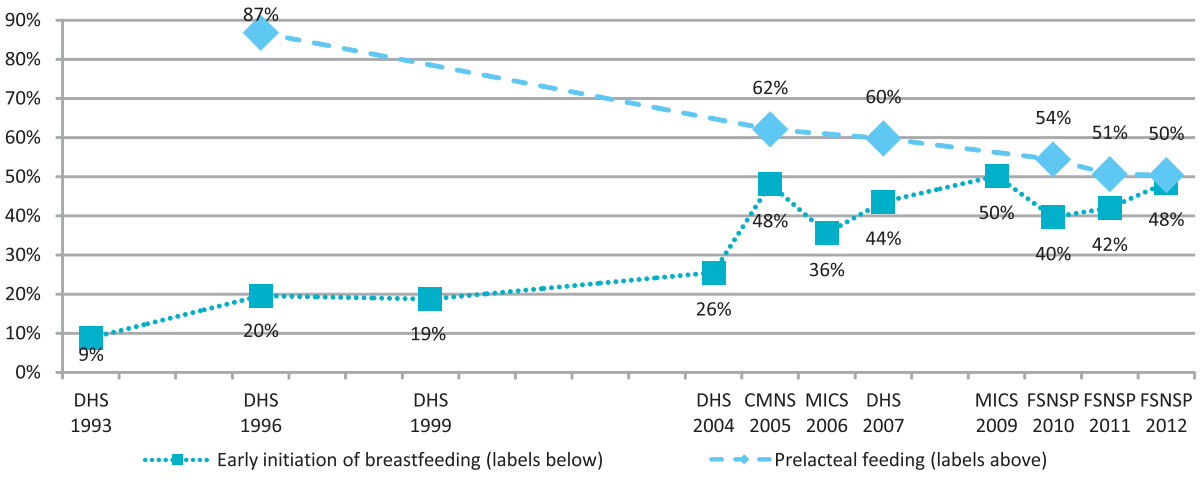
5 This figure is constructed using a three month moving average. As such, it is designed to show a pattern over age in months and not provide precise point estimates. The estimates given in the figure above will differ from point estimates given elsewhere in this report.

working capacity and productivity (15; 16; 1). A recent meta-analysis has shown that breastfeeding is associated with lower cholesterol, blood pressure, obesity, and type-two diabetes, and improved educational attainment (15). Some evidence also indicates a relationship between breastfeeding and a reduction in the risk of chronic conditions like allergies and serious digestive disorders (17). Optimum breastfeeding practices also improve cognitive, motor, socio-emotional development, school performance, and learning capacity (15; 16; 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 antibodies and contains a larger percentage of protein, minerals and fat soluble vitamins than mature milk. Colostrum maintains the integrity of the epithelial surfaces, helping to prepare the lining of the gut to receive the nutrients in breast milk, thus providing the basis for the proper development of a child's immune system (12). Despite this, traditional beliefs such as that breast milk is not ready until several days after birth or that children should not be breastfed before receiving ceremonial foods, delay breastfeeding. In line with this, FSNSP records the proportion of living infants who are fed pre-lacteal foods in the first three days of life (18). Pre-lacteal feeding refers to the practice of feeding an infant anything other than breast milk during the first three days after birth. Pre-lacteal feeding is discouraged by UNICEF and WHO because it can adversely affect breastfeeding and introduce pathogens into a child's digestive system.

Figure 7.3 : Changes in child feeding practices during the first days of life[6,7]



6 While WHO guidelines direct these questions to all live births in the last five years irrespective of whether the child is still living, FSNSP asks these questions only to mothers about their youngest living children who is younger than two years in line with programmatic guidelines (58). In contrast, the DHS system directs these questions to mothers about their youngest children aged less than two years irrespective of whether the child is still living. These differences should not bias estimates greatly; in BDHS 2007 only 3% of children born two years prior to the survey were no longer living at the time of interview (23).

7 Due to multiple estimates of these indicators in 2011 from several survey systems, the results for these indicators from the 2011 BDHS survey are not given in Figure 7.3 and differ somewhat from FSNSP (23). Rates of early initiation to breastfeeding were somewhat greater than the 2011 results though less than the 2012 estimate at 47%, while rates of pre-lacteal feeding were much lower than FSNSP at 39%. This difference could be due to the more detailed definition used in the FSNSP survey (During the first three days of life, did you place anything in the child's mouth apart from breast milk?).

Figure 7.4 : Association between pre-lacteal feeding and early initiation

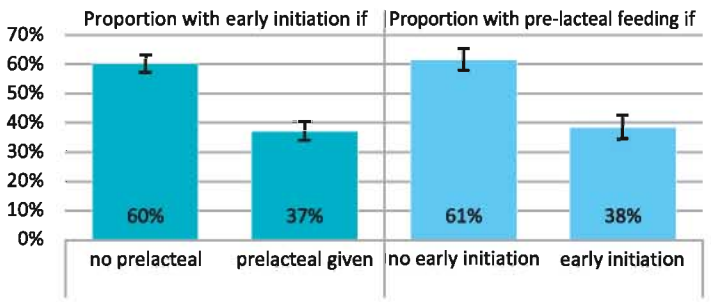
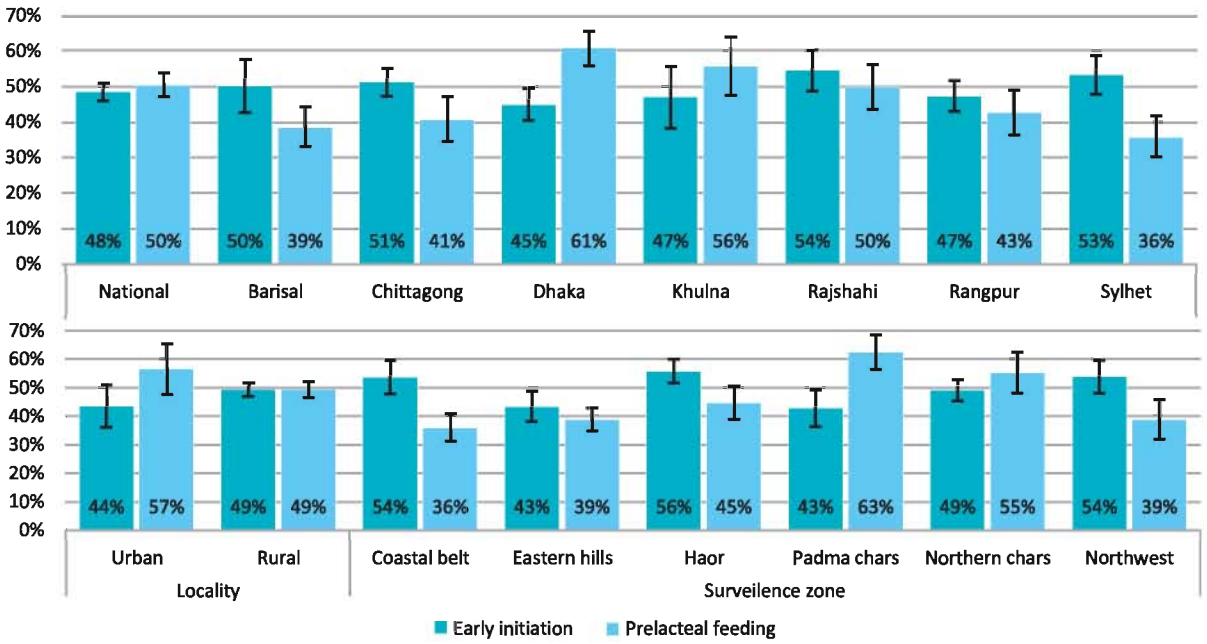


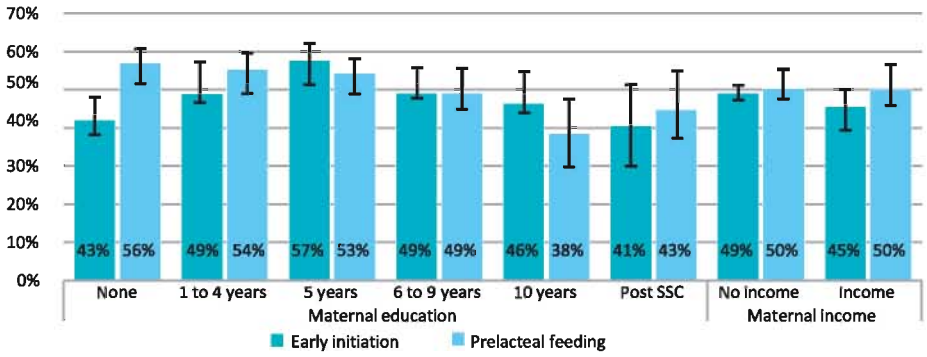
Figure 7.3 tracks the prevalence of these two behaviours over the past 19 years (19; 20; 21; 22; 23; 24; 25; 26; 27). As found in the 2011 report, early initiation of breastfeeding steadily increased between 1993 and 2007, but since 2007 there appears to have been little real or sustained change. However, in the last three years, FSNSP has documented a steady increase in the percentage of children breastfed in the first hour of life - 2012 rates were almost 20% greater than those in 2010. Sharp reductions in pre-lacteal feeding occurred between 1996 and 2005 (from 87 to 62%), coinciding with significant improvements in early breastfeeding in the same period, but since that time, improvements have been less dramatic. FSNSP only recorded a 1% decline in pre-lacteal feeding from 2011 to 2012. Pre-lacteal feeding and early initiation of breastfeeding are closely linked, as can be seen in figure 7.4. Children who are given pre-lacteal feeds are breastfed within the first hour of life at a significantly lower rate than children who were not fed prelactally (37% in contrast to 60%). Conversely, children who are breastfed within the first hour of life are fed pre-lacteal feeds in a lower proportion (38% in contrast to 61%).

Figure 7.5 : Child feeding practices during the first days of life by area of residence



Dhaka has the lowest rates of early initiation as well as the highest rates of pre-lacteal feeding. This pattern is similar to that documented in the 2011 BDHS report. In contrast to differences identified in 2011, in 2012 rates of initiation were similar between rural and urban areas. Looking across surveillance zones, there were very high rates of pre-lacteal feeding in both char zones compared to very low rates in the Coastal belt. Like 2011, early initiation to breastfeeding was less common in the Eastern hills and Padma chars.

Figure 7.6 : Feeding during the first days of life by maternal characteristics



There was little variation in the rates of early initiation or pre-lacteal feeding across wealth quintiles or categories of food security, even less than the variation in 2011 (figure not shown). Child gender also had no significant effect in rates of early initiation (males: 49% and females: 48%) as well as in rates of pre-lacteal feeding (males: 49% and females: 52%). More educated mothers provided pre-lacteal 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 7.6). Early initiation of breastfeeding was practiced most frequently by women who had attended five years of education. Earning mothers initiated breasting later compared to mothers without income.

Exclusive breastfeeding

Exclusive breastfeeding for the first six months provides all the nutrients required for the healthy growth of infants and protects them from consumption of food contaminants before their immune system has matured. Because of this, exclusive breastfeeding, feeding the infant nothing but breast milk and required 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 breasted) and two-thirds lower odds than children who are breastfed and receive complementary foods or breast milk substitutes (10).

FSNSP 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. However, when a child is predominately breastfed there is reduced or non-existent protection from contamination. As noted in Figure 7.7, in contrast to trends in pre-lacteal feeding and early initiation of breastfeeding, exclusive breastfeeding patterns have changed little in the past 18 years (19; 20; 21; 22; 23; 24; 28; 27). There has been notable variation between years, from 43% in 1993 DHS to over 52% in 2010, but little sustained change, as rates in 2012 have dropped to 45%. These rates indicate that Bangladesh has a way to go to reach the goal set by the 65th World Health Assembly of at least 50% of the babies around the world exclusively breastfed by 2025 (29).

Figure 7.7 : Changes in rates of exclusive and predominant breastfeeding since 1993[8]

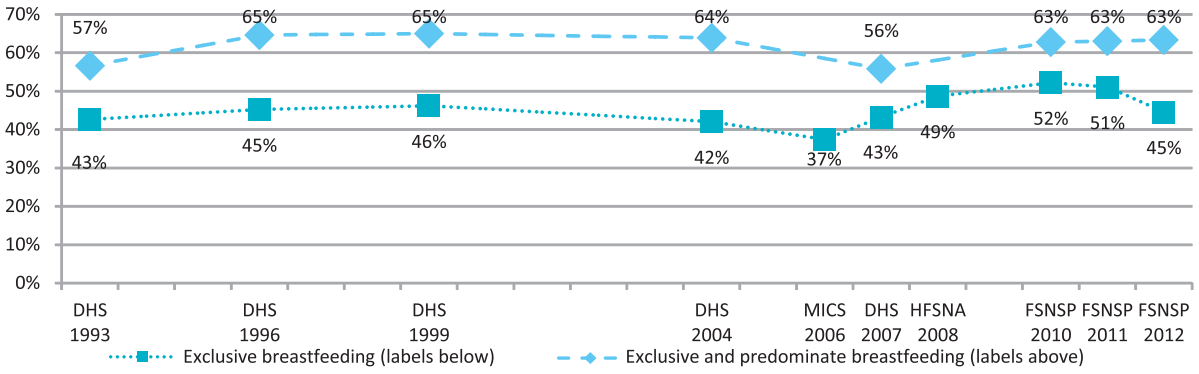
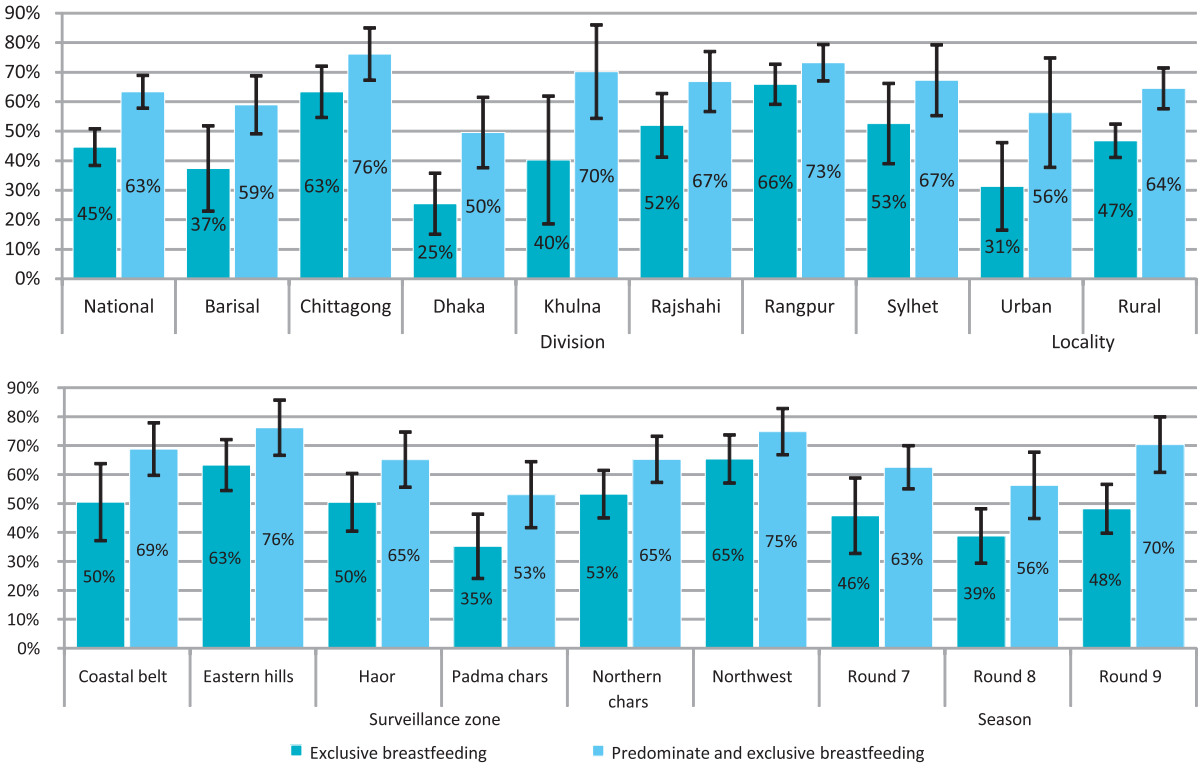


Figure 7.8 : Exclusive and predominant breastfeeding rates by area of residence



Chittagong and Rangpur had the highest rates of exclusive breastfeeding, and Dhaka had the lowest. The proportion of rural children exclusively breastfed was greater than the proportion of urban children, in contrast to the 2011 findings, and this difference was statistically significant in 2012. In Dhaka division the rate of exclusive breastfeeding reduced drastically (25% in 2012 from 46% in 2011). Looking across surveillance zones, there was a very low rate of exclusive

8 Seasonal variation, differences in the age breakdown of children surveyed, and slight differences in the way child feeding questions were asked and analysed is the likely cause of the differences in exclusive breastfeeding rates between the findings of 2011 FSNSP (51%), the BDHS 2011 survey (64%), and the 2011/2012 BIHS survey (59%, rural areas only) (52; 56; 59). For more information please see the 2011 report (56).

breastfeeding in the Padma chars. There are also sizable seasonal variations in these estimates. These are due both to real changes in feeding practices throughout the year and differences in the ages of children during the different rounds of data collection. For example, the lower proportion of children exclusively breastfed during Round 8 is largely due to the relatively older ages of the infants whose caregivers were surveyed in that round (figure 7.8). The difference in age wise rates of exclusive breast feeding is very small (Figure 7.9).

Figure 7.9 : Rates of exclusive breastfeeding by child age in month by round and in comparison to 2011[9]

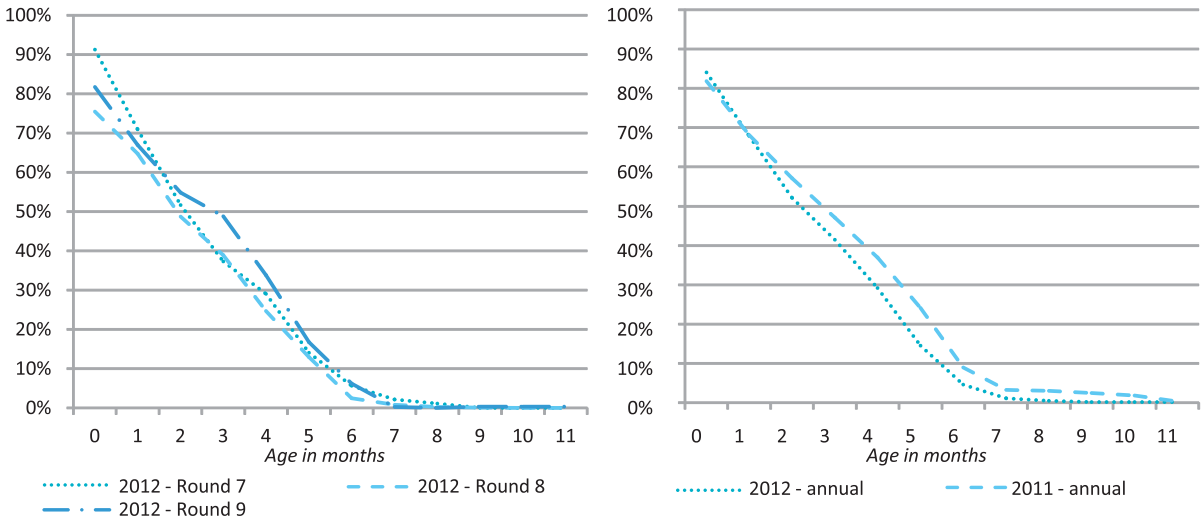
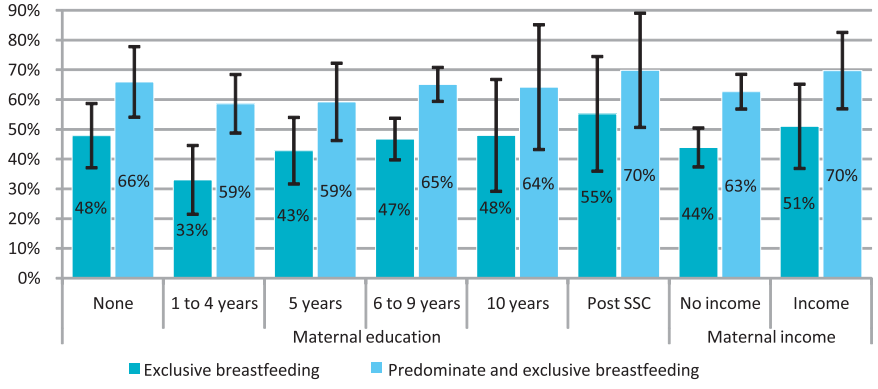


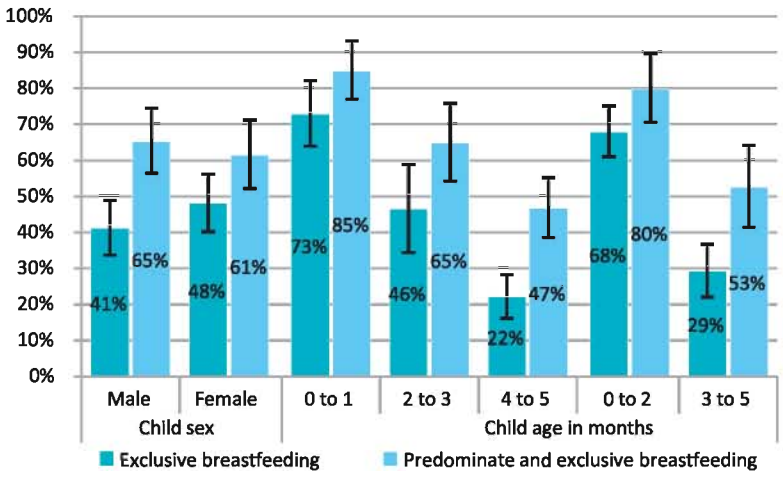
Figure 7.10 : Exclusive and predominant breastfeeding rates by maternal characteristics



Women who had studied beyond their Secondary School Certificate (SSC) exclusively breastfed their children in a significantly higher proportion than their less educated peers. Involvement in income earning did not have a significant association with rates of exclusive breastfeeding in 2012, in contrast to what was found in 2011. In line with the 2011 findings, there is little variation in exclusive breastfeeding rates between food secure and food insecure households or by wealth quintile (figure not shown).

9 This figure is constructed using a three month moving average. As such, it is designed to show a pattern over age in months and not provide precise point estimates. The estimates given in the figure above will differ from point estimates given elsewhere in this report.

Figure 7.11 : Exclusive and predominant breastfeeding rates by child characteristics



There was a slight but statistically insignificant association between a child's sex and rates of exclusive breastfeeding in 2012, with a greater proportion of female infants exclusively breastfed compared to male infants. However, if the results from 2012 are combined with 2011 results, this relationship becomes significant. As might be expected, rates of exclusive breastfeeding decline steadily with the age of a child. While almost three-quarters of children are exclusively breastfed in the first two months of life, the rate decreases to less than one-fourth of children in the fourth and fifth months of life.

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 second year of life (8; 9). Not only does the high fat content of human breast milk provide a key source of calories, essential fatty acids, and micronutrients, it assists in processing plant-based vitamin A precursors (9; 7).

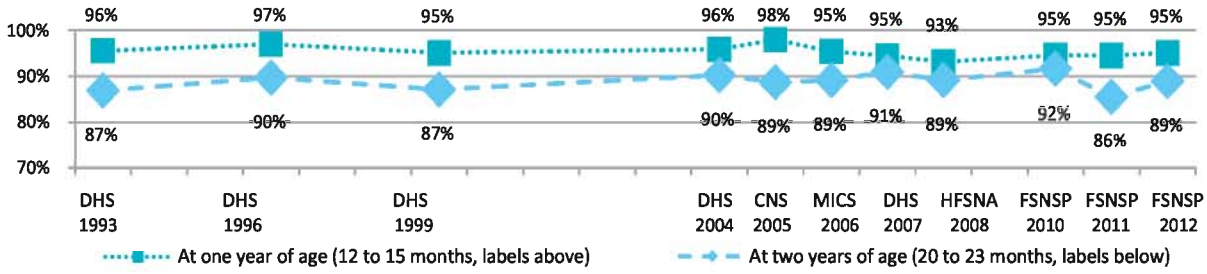
Figure 7.12 : Continuation of breastfeeding by age in months [10]

Bangladesh has consistently had very high rates of continued breastfeeding. Figure 7.12 shows the proportion of children who are breastfed by age in months in 2011 and 2012; between the two years, there has been very little change in rates of breastfeeding. There is no apparent change in the median age of breastfeeding discontinuation (i.e. the point at which 50% of children are no longer breastfed), which held constant at 35 months of age.

10 This figure is constructed using a five month moving average. As such, it is designed to show a pattern over age in months and not provide precise point estimates. The estimates given in the figure above will differ from point estimates given elsewhere in this report.

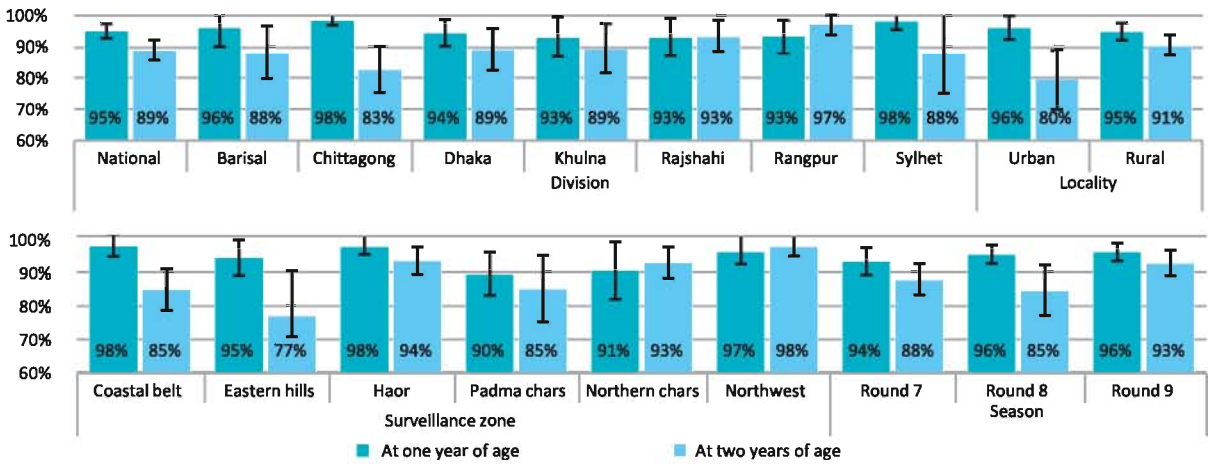
Just over 10% of children in Bangladesh continue to be breastfed until the start of the fifth year of life. To more precisely measure this behaviour, two WHO-recommended indicators are used. The first is continuation of breastfeeding at one year of age, which is defined as the proportion of children 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 7.13 : Rates of breastfeeding continuation over time (1993-2012)[11]



Since 1993, rates of continued breastfeeding for children at one year of age have been consistently greater than 90%, while rates of continued breastfeeding at two years have been greater than 85% (19; 20; 21; 22; 23; 24; 25; 28; 27). These rates have varied little over the years with the exception of a dramatic drop in the proportion of children breastfed at two years of age in 2011, but in 2012 the situation improved back to 2010 levels. Across the nation, there was limited geographical and seasonal variation in these indicators (figure 7.14).

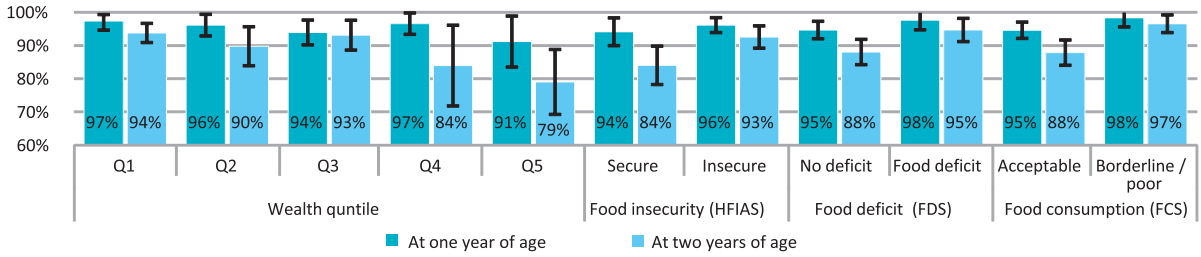
Figure 7.14 : Continued breastfeeding by area of residence



There were no significant differences in maternal income earning status and child sex (not shown), but a few across the categories of maternal education. Women with greater levels of education discontinued breastfeeding before two years of age in a greater proportion than less educated women (not shown). The only background characteristics with a significant association with continuation of breastfeeding were the food security status and relative wealth of households. As shown in figure 7.17, 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 breast feeding with nutritional outcomes (30; 31; 32).

11 Estimates from the BDHS 2011 and BIHS 2011/2012 report are largely congruent with the 2011 FSNSP estimates (52; 56; 59).

Figure 7.15 : Continued breast feeding by households' food security and relative wealth

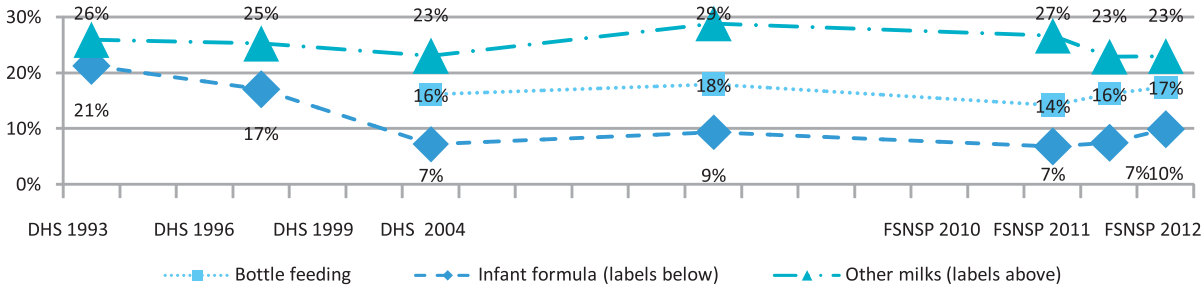


Threats to breastfeeding

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; 18). There is also limited understanding of the risks of bottle feeding and breast milk substitutes. Bottles are difficult to clean in resource poor settings, and thereby a frequent source of bacterial or viral contamination, especially when paired with liquid milk products (7; 5; 33). Moreover, the substitutes themselves are a source of calories and some micronutrients but do not provide increased immunity for the child and displace breastfeeding (7; 5). 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; 34) - the marketing of breast milk substitutes had remained widespread. Recently a new law passed which bans ads on infants' food, along with an increase in the penalty for breaking these rules (35). Although there are laws to support breastfeeding, there is widespread non-compliance to the provisions of the laws relating to maternity benefits in the private sector (36).

To monitor the use of breast milk substitutes, FSNSP 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. In line with the continued high rates of breastfeeding in Bangladesh, there has been no rapid increase in breastfeeding substitutes during the past 18 years (19; 20; 21; 22; 23; 27). The proportion of children bottle fed had not changed appreciably from 1999 to 2012 and the proportion of children receiving infant formula appears to have declined since the early 1990s but has increased since 2011 (figure 7.16). Fewer than one in five children less than two years of age were fed with a bottle, a proportion that has varied little in recent years. Feeding of either category of milk supplement has increased somewhat, from 28% in 2011 to 31% in 2012 (figure 7.17).

Figure 7.16 : Proportion of children bottle fed and fed with breast milk substitutes over time (1993-2012)[12]



12 The result for bottle and formula feeding is identical between FSNSP 2011 and the BDHS 2011 (52). The estimates for the proportion of children consuming other milks are congruent (BDHS 20%, FSNSP 23%).

The proportion of infants and young children fed breast milk substitutes or with bottles varies greatly across the regions of Bangladesh. 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 increased dramatically between 2011 and 2012. The proportion of children fed with a bottle did not vary greatly over seasons, but was lowest during Round 9. In contrast, the proportion fed breast milk substitutes was greatest during the monsoon season. This could be due to the difference in the age distribution of sampled children at these three time points. Most of the seasonal variation was caused by a change in the proportion of children fed animal milk and not due to changes in the proportion of children being fed with infant formula.

Figure 7.17 : Indicators of threats to breastfeeding by area of residence and season

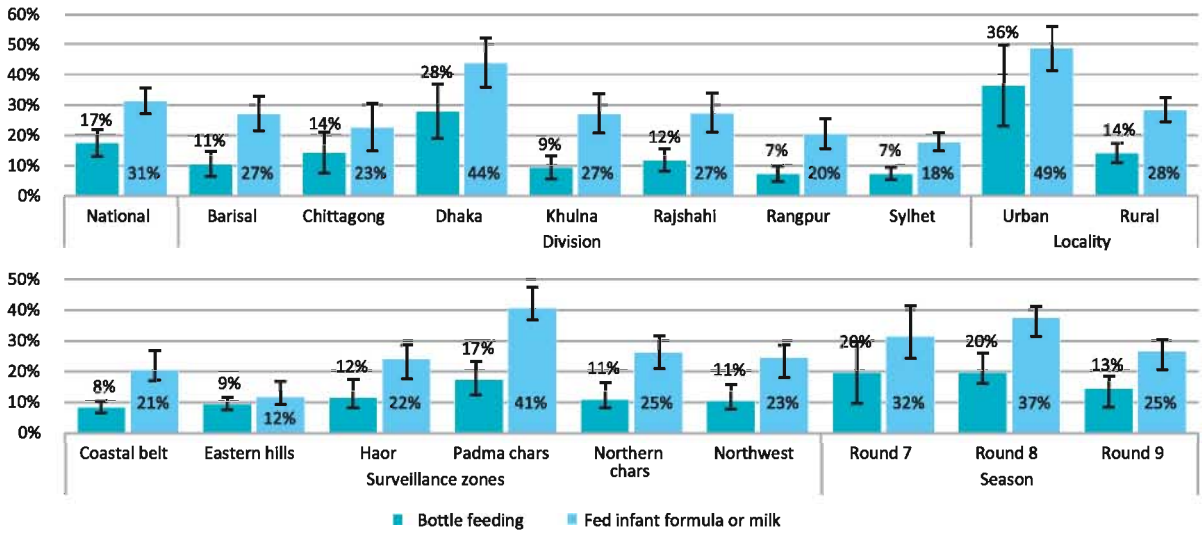
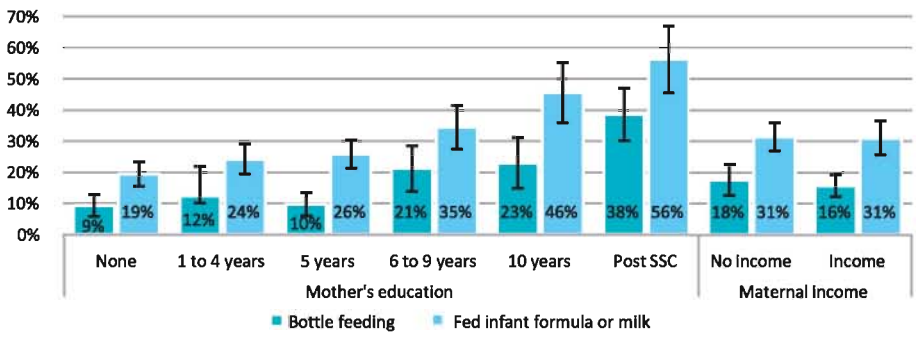


Figure 7.18 : Indicators of threats to breastfeeding by maternal characteristics



Similar to the 2011 findings, more educated mothers fed their children with a bottle and breast milk substitutes in a greater proportion than less educated mothers (figure 7.18). The increase in bottle and breast milk substitute feeding for more educated mothers may also be due to wealth effects, as more educated mothers were also often from wealthier households and children from wealthier households were also fed through these means in greater proportion. A mother's income earning status had no association with these practices. The proportion of children bottle fed in the wealthiest households increased significantly between 2011 and 2012 from 28% to 38%. In contrast, there was little change across maternal educational categories. As expected, food insecure households fed their children through these means less frequently (figure 7.19).

Figure 7.19 : Indicators of threats to breastfeeding by household wealth and food security status

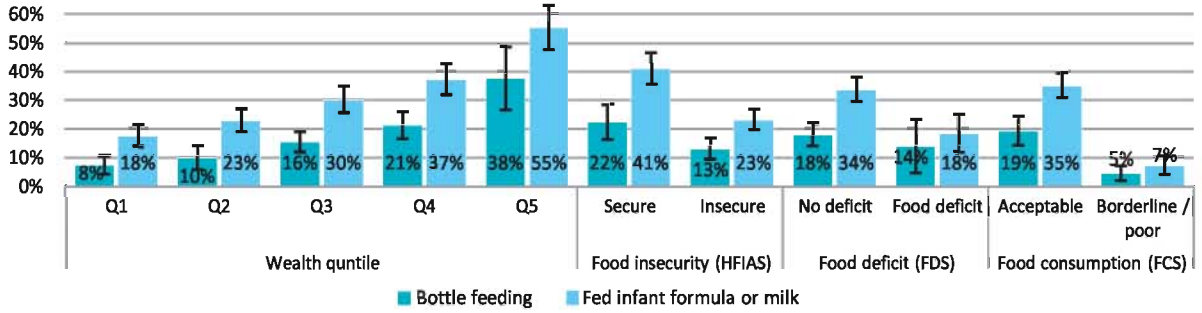
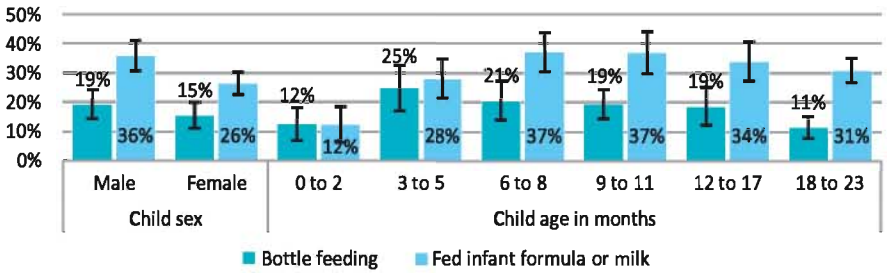


Figure 7.20 : Indicators of threats to breastfeeding by child characteristics



A significantly greater proportion of male children were fed in line with both of these negative practices than female children. This is congruent to historical patterns when male children would be fed with higher value foods (37). While the majority of bottle feeding takes place during the first year of life, one quarter of children three to five months of age were fed with a bottle and 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.

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). Appropriate complementary feeding can be difficult due to the complexity of the guidelines, caregivers' poor knowledge and time constraints, and the poor quality of usual household diets.

Figure 7.21 : Child dietary patterns for complementary foods

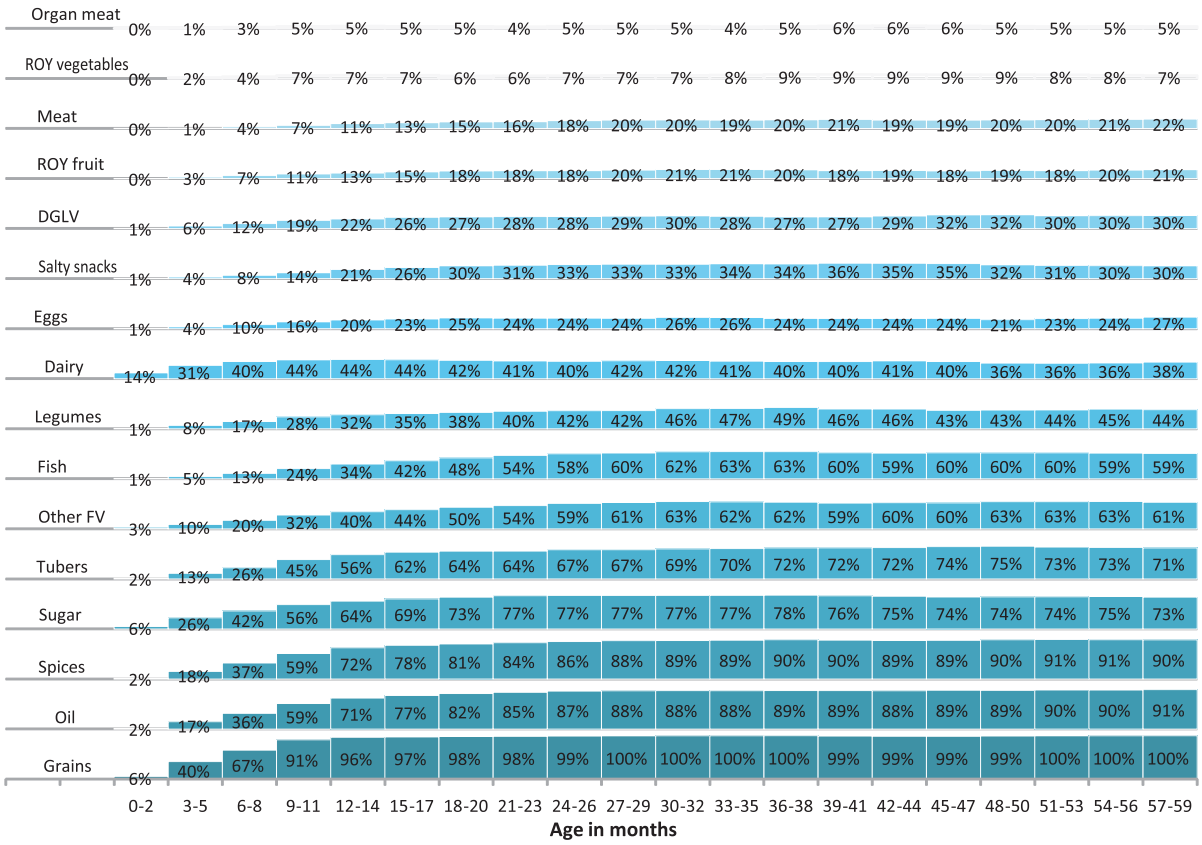


Figure 7.21 summarises the diets of infants and children in Bangladesh apart from human breast milk and non-milk liquids. In contrast to the complementary feeding guidelines listed above, a significant proportion of children were fed animal milk or breast milk substitutes from birth. From around three months of age, over a quarter of children eat rice and sugar. For older children, it is interesting that diets have mostly stabilised by about two years of age and do not change greatly after this age, except for a slight increase in meat, tubers, spices and oil consumption. Interestingly, between 2011 and 2012, the proportion of children fed oil reduced for all age groups greater than eight months, while consumption generally increased for dark green leafy vegetables (DGLV) and dairy consumption. 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 (38). Additionally, a brief review of the dietary patterns of older children in comparison to that of their mothers will be given at the end of this section.

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 (39; 7; 40).

Waiting until six months to begin feeding a child solid or semi solid foods is supported by the fact that growth has not been shown to improve when complementary foods are introduced before six months and there are significant risks to the health of the child from early introduction to complementary foods, via food-borne pathogens or breast milk displacement (7; 41; 42). Additionally, a child's development and increased interaction with external objects which starts at six months of age makes this an ideal time to begin feeding (7; 43).

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. This is referred to as timely introduction to complementary feeding. In the early 1990s only a quarter of children were introduced to complementary foods at six months, but from 1993 to 2010, there has been a large improvement in this indicator (19; 20; 21; 22; 23; 28; 27), though the level has not increased from 2010 to 2012.

Figure 7.22 : Proportion of children 6 to 8 months of age who are fed complementary food from 1993-2012[13]

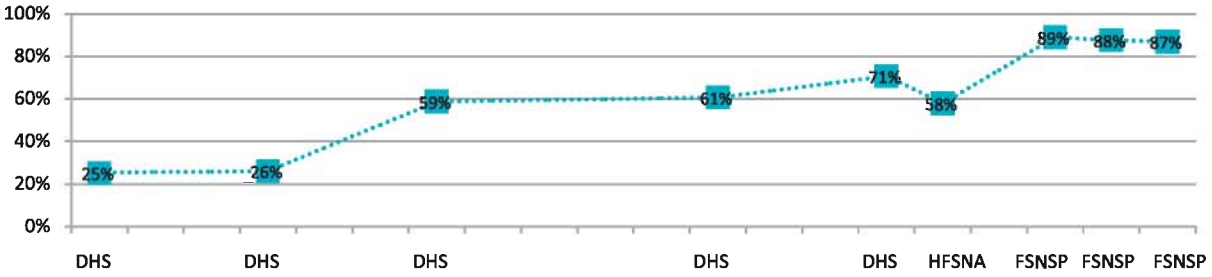
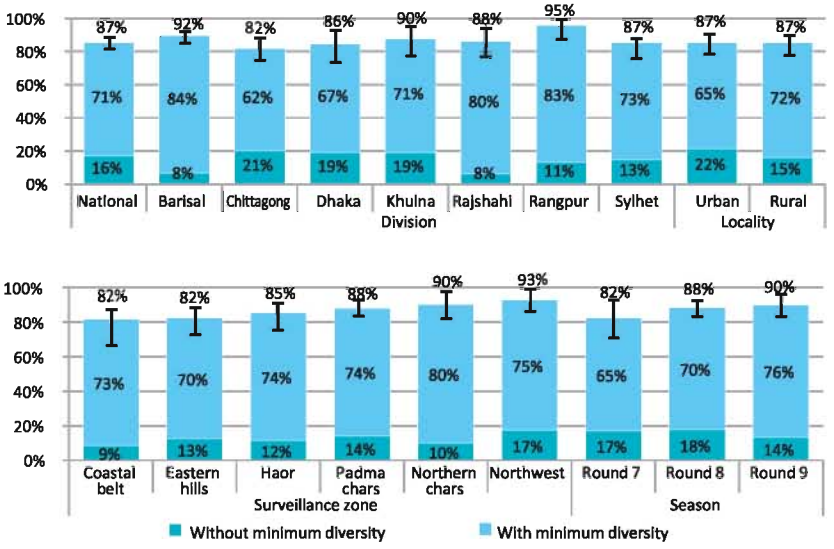


Figure 7.23 : Timely introduction to complementary foods by residence and season



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.[14] Nationally, only around 16% of infants six to eight

13 The FSNSP estimate from 2011 is significantly higher than the BDHS estimate of 64% (52). Seasonal variation, differences in the age breakdown of children surveyed, and slight differences in the way child feeding questions were asked and analysed is the likely cause of the differences in exclusive breastfeeding rates between the findings. For more information please see the 2011 report (56).

14 The seven food groups explained in greater detail in the next section (page ##) are starches (grains and tubers), legumes and nuts, dairy products (milk, yogurt, cheese), flesh foods (meat, fish, poultry, and liver/organ meats), eggs, vitamin-A rich fruits and vegetables (red, orange, and yellow fleshed), and other fruits and vegetables.

months of age are eating in line with this standard. This figure has increased by three percentage points between 2011 and 2012.

Minimum dietary diversity at these ages ranged from 8% in Barisal and Rajshahi to 21% in Chittagong, while introduction to any complementary foods ranged from 82% in Chittagong to 95% in Rangpur. The rates of timely introduction to complementary foods were the same for both the 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 8 and 9.

Figure 7.24 : Timely introduction by household wealth and food security status

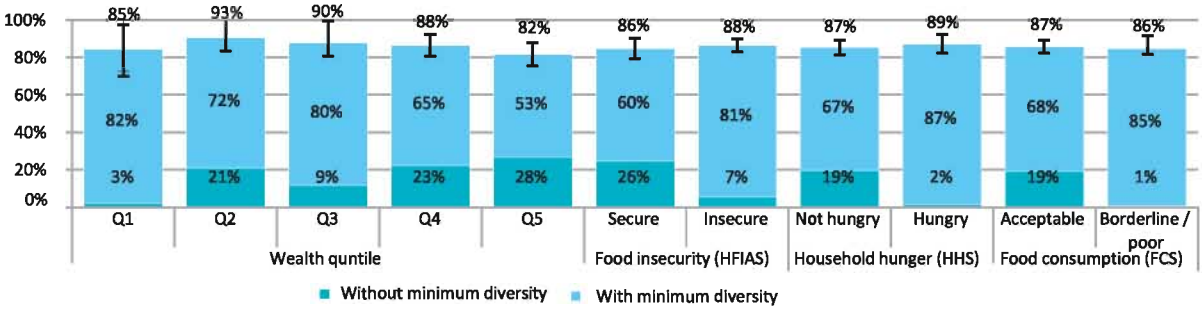
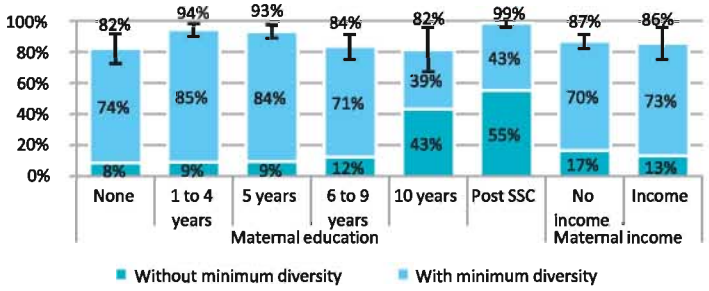
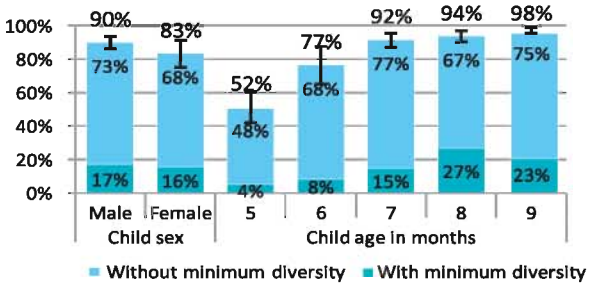


Figure 7.25 : Timely introduction by maternal characteristics



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 3% 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 7.25)

Figure 7.26 : Timely introduction by child sex and age in months



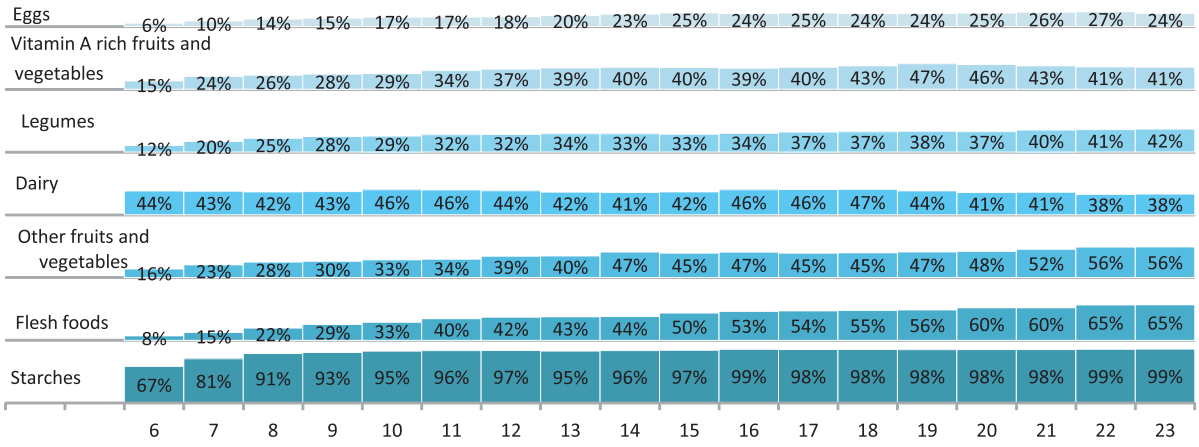
The proportion of male infants introduced to complementary foods on time did not vary significantly compared to that of female infants, likewise, there was no significant difference in the proportion of male versus female children fed foods with adequate diversity. As child age increased, the proportion 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; 7; 44). 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 (7; 44). In addition, children should consume animal source foods and vitamin rich vegetables and fruits every day (45; 7; 44). A vegetarian diet is not recommended for young children unless specialty fortified products are used. Because of the limited stomach capacity of small children, caffeinated and/or sugary beverages and even fruit juices are not recommended as these can displace the consumption of other nutritive foods (7; 44; 46). Particular attention should be paid to encouraging the consumption of local foods, for example indigenous small fish breeds (47), that provide nutrients which are less prevalent in breast milk such as iron, zinc, and vitamin B6 (39; 8). In resource poor settings, liquid animal milk is not recommended due to the high possibility of contamination, except for non-breastfed children (44), but solid milk products are an important part of the diets of young children (33; 7; 48). Dietary diversity has been shown to be strongly associated with children's linear growth in multiple countries (49).

Figure 7.27 : 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, which is constructed through the 16 food type categories included in WHO's standardised IYCF questionnaire (5; 6).[15] Figure 7.27 displays the proportion of children who were consuming foods from these groups by child age in months.[16] As was seen in 2011, 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, fewer than half of the children were consuming micronutrient-rich flesh foods. Overall, diets are lacking in diversity though there has been marginal improvement between 2011 and 2012.

15 These items are starches (grains, roots and tubers), legumes and nuts, dairy products (milk, yogurt, cheese), flesh foods (meat, fish, poultry and liver/organ meats), eggs, vitamin-A rich fruits and vegetables (red, orange, and yellow fleshed foods), and other fruits and vegetables.

16 See Figure 7.21 for consumption patterns for all food types included in the questionnaire. For further information about how these food types were combined to construct food groups, please refer to the WHO IYCF indicators guidelines and the 2011 FSNSP report (56; 5; 6).

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. Instead, 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 7.28, too few children are meeting this requirement in Bangladesh. Though virtually all children are being fed complementary foods by 11 months of age, 14% of these children are only consuming foods from one food group, usually micronutrient poor starches. Though the proportion of children meeting the standard for minimum dietary diversity increased sharply from less than 10% of children at six months to over 33% at one year of age, this increase was much more gradual after the first year of life. By two years, only slightly over half of children were eating a diet that is minimally diverse.

Figure 7.28 : Number of food groups consumed by age in months[17]

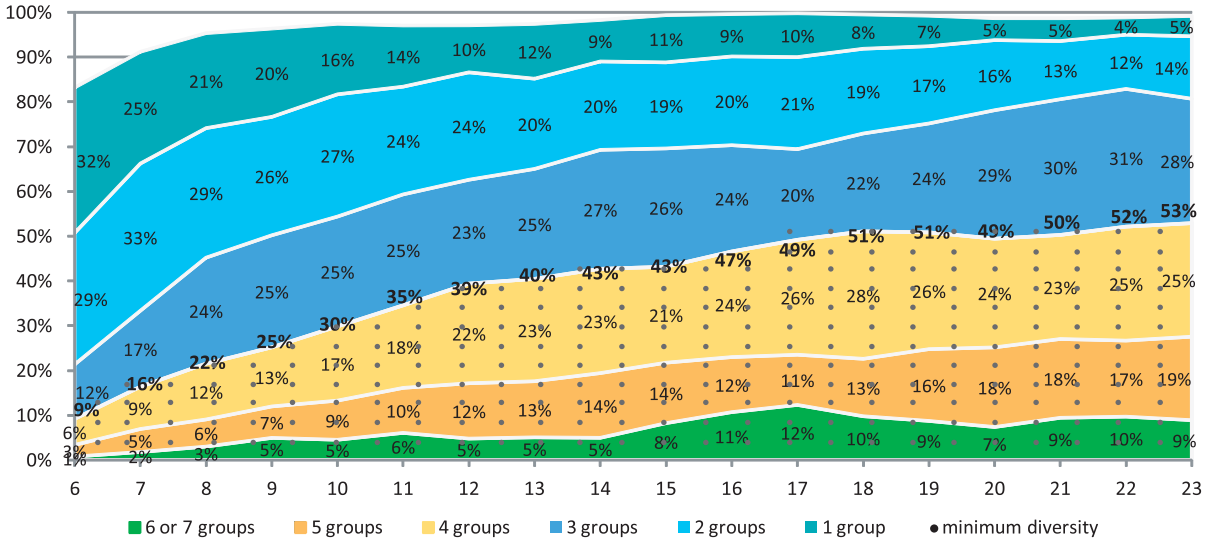
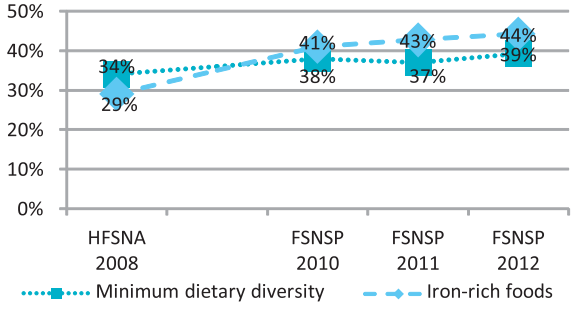


Figure 7.29 : Trends in child dietary quality indicators[18]



As shown in Figure 7.3, the proportion of children fed a minimally diverse diet has changed little since 2008, with only a little under two-fifths of children eating a minimally diverse diet in 2012 (28; 27). 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. Inclusion of iron-rich foods or iron supplementation into

17 This graph is constructed using a three month moving average. As such, it is designed to show a pattern over age in months and not provide precise point estimates. The estimates given in the figure above will differ from point estimates elsewhere in this report.

18 In BDHS 2011, the proportion of children fed with minimum dietary diversity, at 25%, was much lower than FSNSP's 2011 estimate (52). The 2011/2012 BIHS estimate for rural areas was also lower, at 22%, than the FSNSP estimate for rural areas, at 37% (Figure 7.30) (59). This difference is likely due to methodological differences between the three systems. For more information, please see the 2011 FSNSP report (56).

the diets of infants and children is required to supplement breast milk around six months of age (48). In 2012, a little over two-fifths of children six months to two years of age had diets that met this criteria; this figure has only risen slightly since 2010 at the rate of around 1% a year. The vast majority of these children met this requirement through the consumption of flesh foods, particularly fish, and only around 1% of children six months to two years of age had consumed an iron supplement or micro-nutrient powder packet the day before the interview.

Figure 7.30 : Minimum dietary diversity and iron consumption by area of residence and season

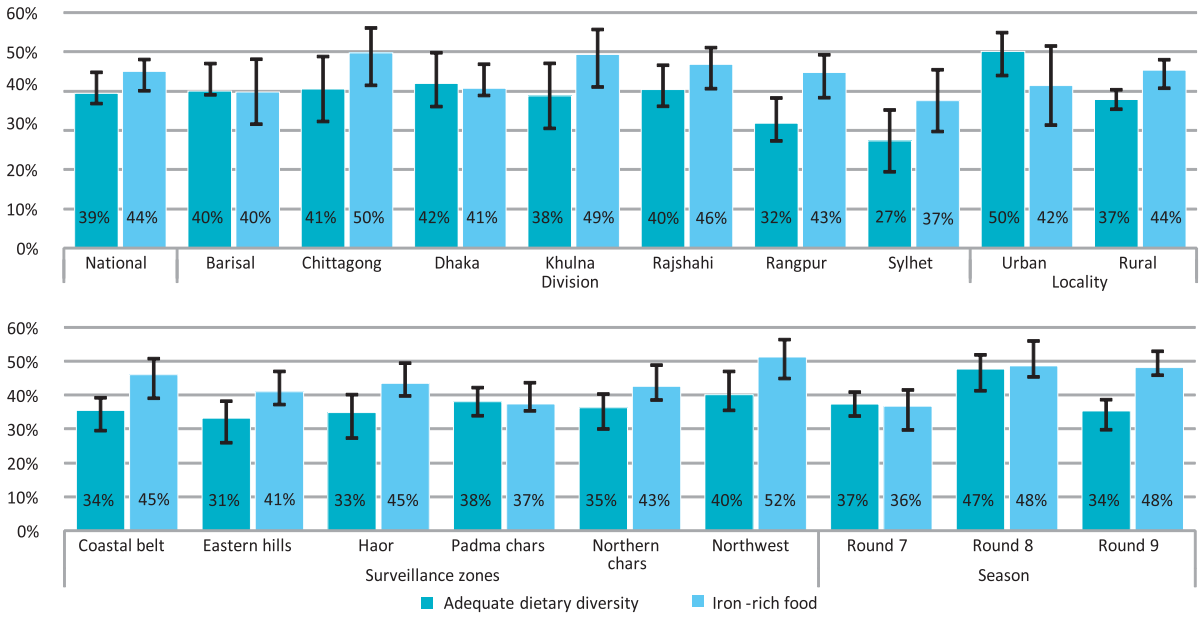
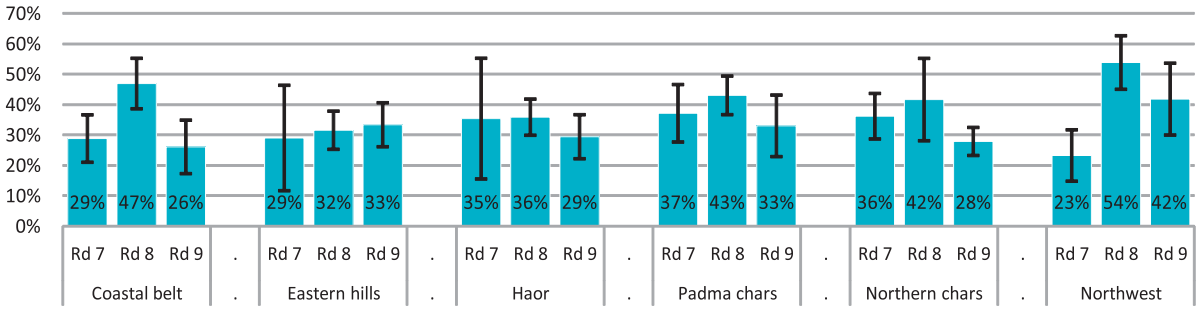


Figure 7.31 : Minimum dietary diversity seasonally by surveillance zone



These indicators did not vary greatly across the divisions of Bangladesh, however was a sizable improvement of six percentage points in the proportion of children eating diverse diets between 2011 and 2012 in Barisal and Rajshahi. Sylhet continues to stand out as the division with a very low proportion of children, only a little over one-quarter, meeting the minimum diversity standard, but in 2012 the estimate for Rangpur was not much greater than this level. In contrast, in Khulna and Chittagong almost 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 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 Eastern hills and the Northern chars have had seven percentage point improvements in the proportion of children eating a diverse diet from 2011 to 2012, leading to almost no variation between surveillance zones on this indicator. The proportion of children eating a minimally diverse diet is higher in monsoon (Round 8) compared to Rounds 7 and 9, which is in line with the pattern observed in women's diets, households' food consumption, and the pattern observed in children's diets in the food insecure zones in 2010, though not in 2011.

Notably, the Eastern hills and the Haor did not have seasonal variation, while the Coastal belt and the Northwest had the largest (figure 7.31). These are also the zones which experienced the largest seasonal fluctuation in the proportion of households consuming a poor or borderline diet (figure 4.11). As expected from the seasonal results presented in Figure 7.30 above, there was little variation in the proportion of children consuming an iron rich food seasonally in surveillance zones (Figure 7.32).

Figure 7.32 : Consumption of iron-rich foods seasonally by surveillance zone

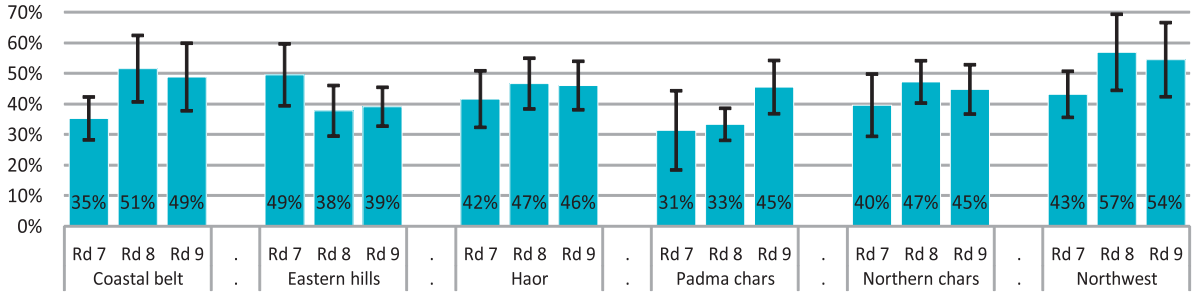


Figure 7.33 : Indicators of dietary quality by household wealth and food security status

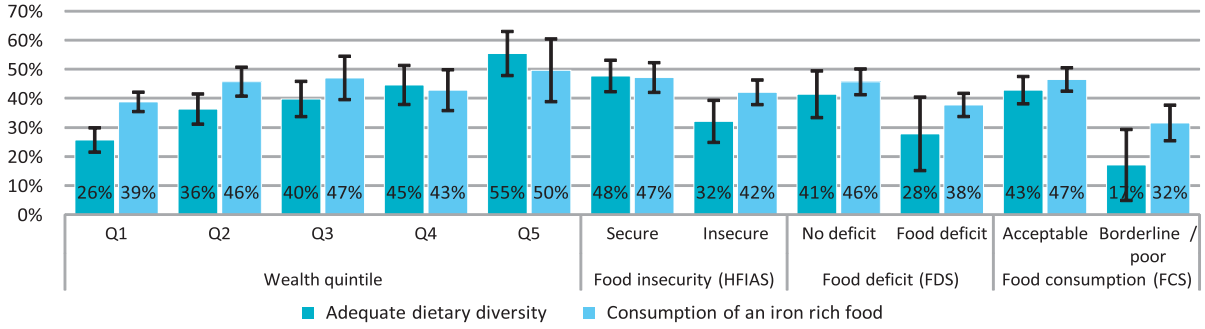
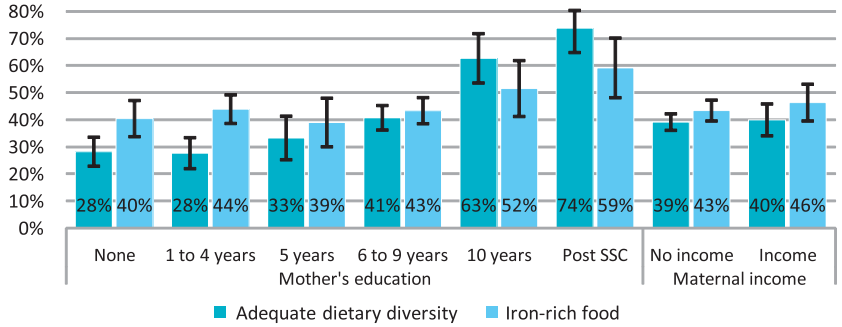


Figure 7.34 : Indicators of dietary quality by maternal characteristics



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. In contrast, between

Figure 7.35 : Minimum dietary diversity seasonally by wealth quintile

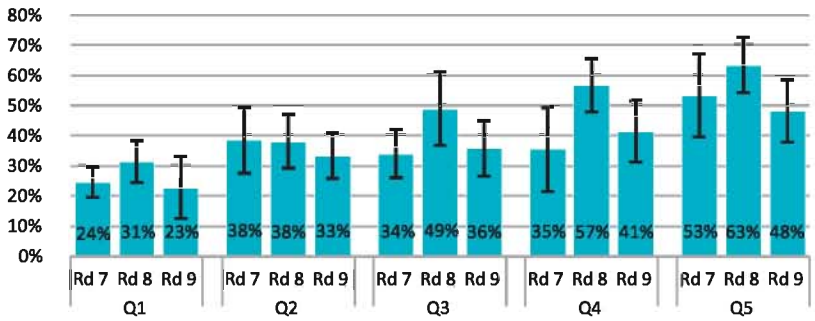
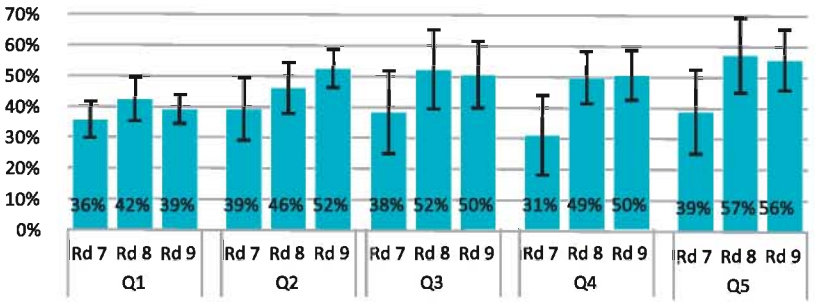
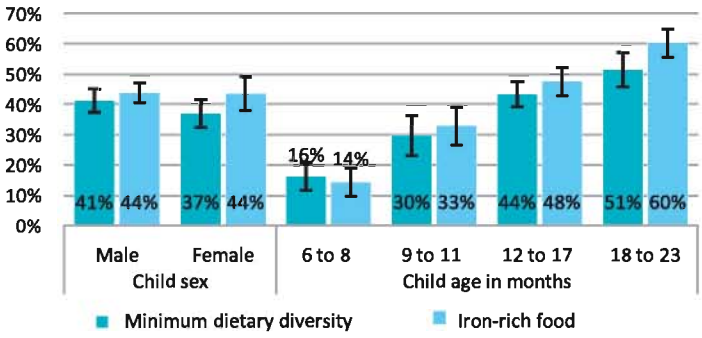


Figure 7.36 : Consumption of an iron-rich food seasonally by wealth quintile



categories of the food security indicators, a sizable difference was seen on both indicators, with the greatest difference being between the two food consumption categories. Maternal education was more strongly associated with children's dietary quality than wealth category, while maternal income was insignificant for both indicators. As was the case in 2011, the variation in the proportion of children consuming iron-rich foods over the seasons of 2012 is due to an increase in fish consumption. In contrast, the consumption of meat and poultry followed a peaked pattern (greatest in Round 8) and the proportion of children eating organ meats was constant across the year. In contrast to trends seen in 2011, this increase in the proportion of children consuming fish was similar across different wealth and food security groups, and overall there was a greater increase in consumption of iron-rich foods among the wealthier quintiles (figure 7.36).

Figure 7.37 : Indicators of dietary quality by child age and sex

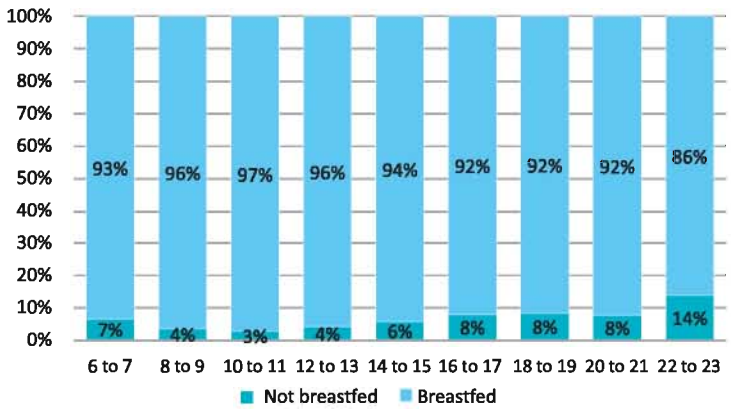


There was a small difference in the proportion of male versus female children who ate minimally diverse diets, but this difference was not statistically significant. There was no difference in the prevalence estimates of the proportion of male versus female children who ate an iron-rich food. However, age was significantly associated with the proportion of children who ate minimally diverse diets or consumed an iron-rich food as could be seen in Figure 7.28 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 half ate minimally diverse diets and 60% an iron-rich food the day before the interview. For both sexes, the proportion of children who were fed an adequate diet was greater in the monsoon season (Round 8) compared to Rounds 7 and 9; the proportion increased with progression of year for consumption of an iron rich food (graphs not shown).

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, particularly during the period between six months and one year of age. During this period, care must be taken so that complementary feeding does not replace breast milk and is in response to the child's hunger cues (7). Because children grow differently and have differing activity levels, the amount of food a child should eat at any given age cannot be precisely estimated. However, 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; 7). By one year of age, it is expected that children will be able to eat the same types of solid and semi-solid foods as the family, with a few supplemental feeds or snacks (8; 7). Snacks can be a vital part of responsive feeding as they are usually easy to prepare in response to hunger cues and are self-fed (7). Additionally, these ready-foods can prevent caregivers from holding prepared foods for the children from one meal to the next which can increase the risk of microbial contamination (7).

Figure 7.38 : Proportion of children breastfed by age in months

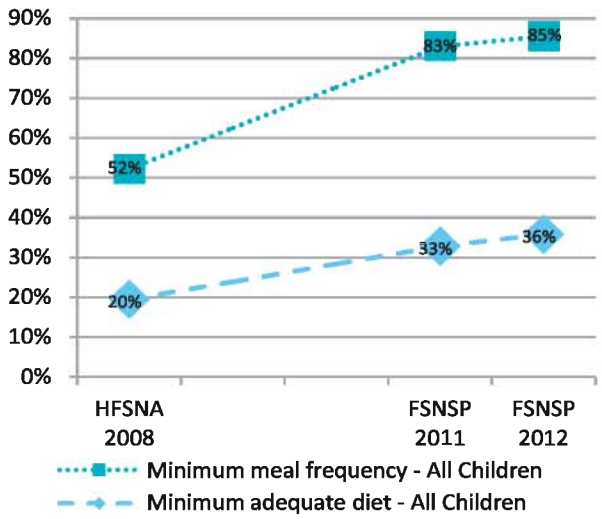


To measure the proportion of children consuming a minimum acceptable diet, FSNSP uses two indicators recommended by WHO: minimum meal frequency and minimum acceptable diet. Both of these measures require separate tabulation for breastfed and non-breastfed children, the results of which are combined into one indicator. Because the 93% of children six months to two years of age are breastfed (see figure 7.38 for a breakdown of this figure by month of age), the overall results of these indicators closely match the estimates for breastfed children. Because 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.[19] For breastfed children, the indicator for minimum meal frequency is met when a breastfed child is fed in line with the recommendations given above: at six to eight months of age at least two meals or snacks the day before the interview, or when a child nine months to two years of age eats at least three meals or snacks the day before the interview. 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 the day before the interview. In 2012, 85% of all children were fed with minimum frequency. This proportion of children is considerably greater than that estimated from the 2008/2009 HFSNA.

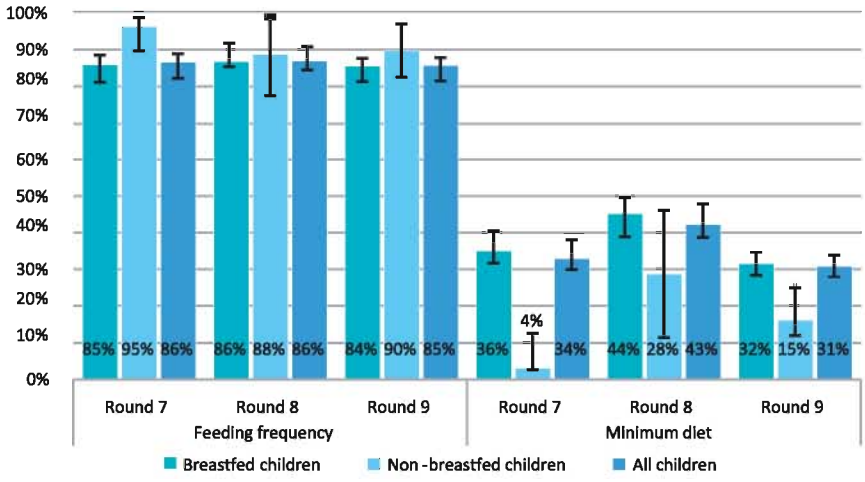
19 In line with WHO guidelines a few bites of another household member's food is not sufficient to count as a snack or meal.

Figure 7.39 : Indicators of adequate diets over time[20]



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 the day before the interview. 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, the day before the interview. In 2012, more than one-third of children were fed minimally adequate diets. This indicates a considerable increase in children eating minimally acceptable diets since 2008, but the current level is still far short of the target of 52% set in the HPNSDP.

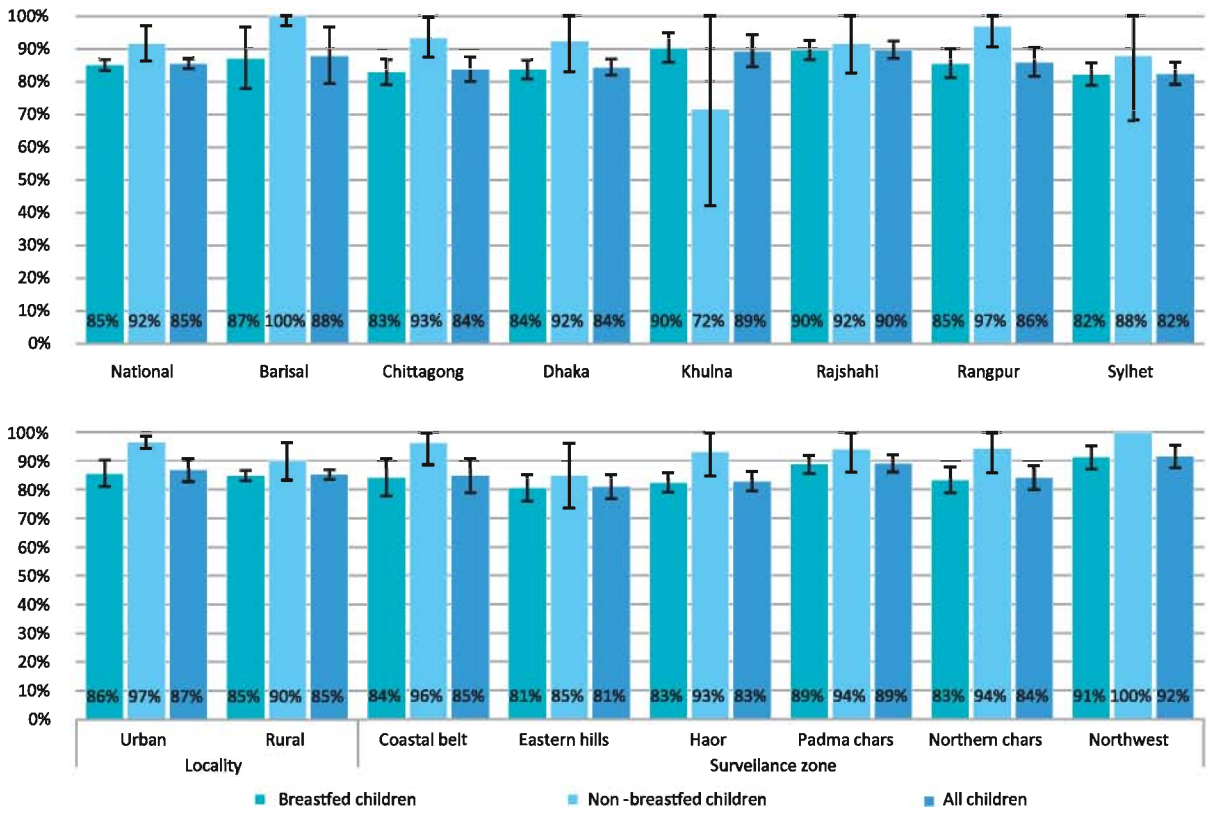
Figure 7.40 : Minimum meal frequency and adequate diet by season



The vast majority of children received meals with minimum meal frequency, and the proportion was largely the same across areas of Bangladesh and across the seasons in 2012. However, Sylhet, Chittagong, and Dhaka stood out for the slightly lower proportion of children eating with minimum frequency. Sylhet was the only division with a sizable increase in this indicator between 2011 and 2012. Children in urban areas ate more frequently than children in rural areas, but the proportion of children eating with minimum frequency fell slightly in urban areas between 2011 and 2012 while it increased slightly in urban areas. Most surveillance zones were in line with the rural average.

20 In the BDHS 2011, the proportion of children with minimum feeding frequency, 65%, and minimum acceptable diets, 21%, were much lower than these estimates (52). Even lower were the estimates from rural areas of the nation recorded in the 2011/2012 BIHS (41% with minimum dietary frequency and 11% with minimal acceptable diet) (59). Since FSNSP did not find a large variation in these indicators over the course of 2011/2012 (see Figure 7.40), this difference is most probably due to methodological differences between the three systems. For more information please see the 2011 report (56).

Figure 7.41 : Minimum meal frequency by area of residence



There was much greater variation in the proportion of children fed minimally adequate diets than those fed with minimum frequency. Across the seasons of 2012, there were a greater proportion 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. Across areas of Bangladesh, Sylhet stood out as having only a little over one quarter of children eating a minimally adequate diet (figure 7.42). In contrast, Dhaka and Rajshahi divisions had nearly two-fifths of children meet these standards. In urban areas, nearly half of children ate acceptably, while only a third did in rural areas. Between 2011 and 2012 there were sizable improvements in the proportion of children who ate minimally diverse diets in the Eastern hills and the Haor. Over most areas and nationally there was a sizable improvement in the proportion of non-breastfed children who ate in line with these dietary minimums.

Figure 7.42 : Minimum adequate diet by area of residence

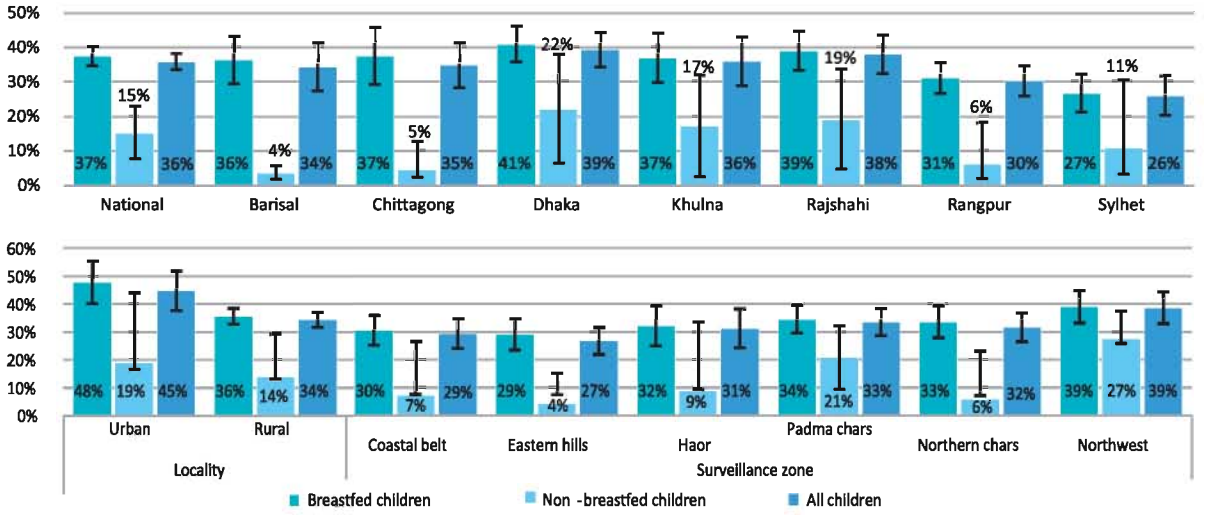


Figure 7.43 : Minimum meal frequency and diet adequacy for breastfed children by wealth and food security

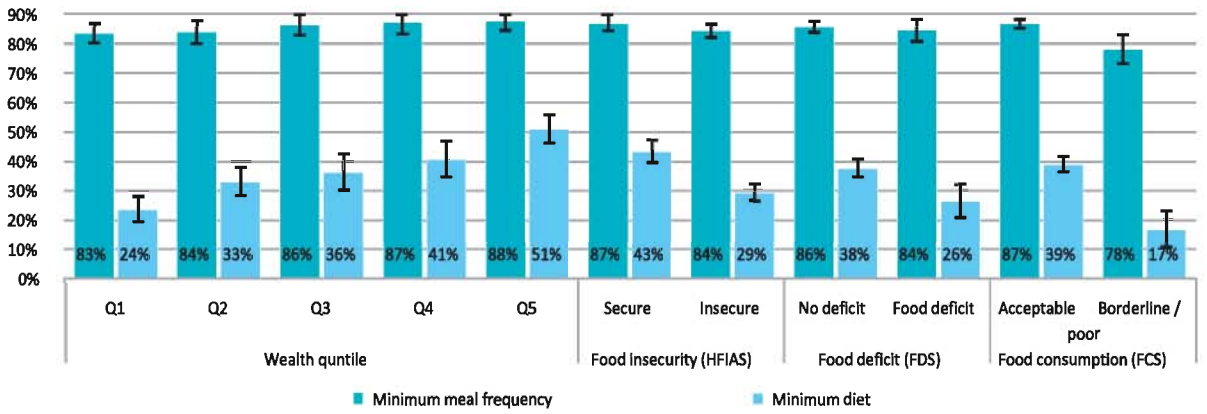
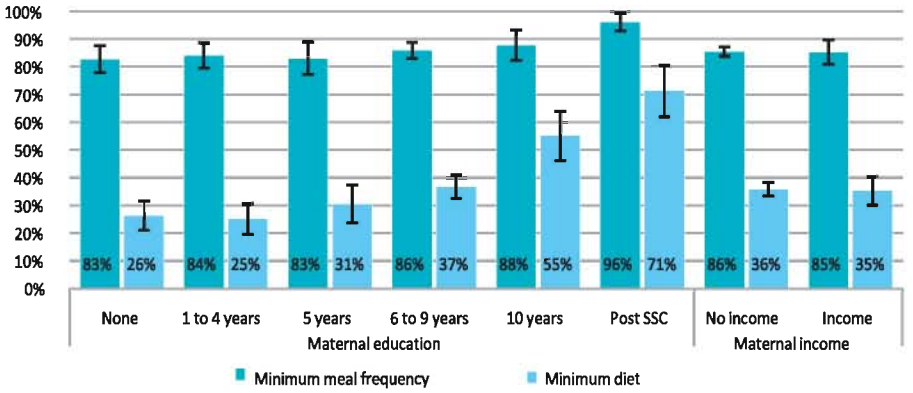


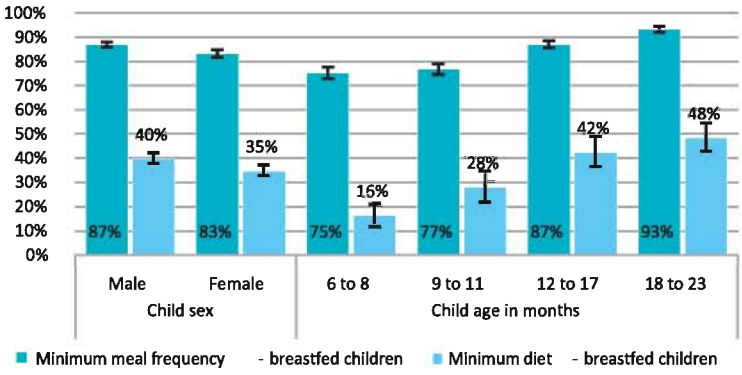
Figure 7.44 : Minimum meal frequency and diet adequacy for breastfed children by maternal characteristics



The proportion of children fed with the minimum frequency was slightly but significantly lower in the lowest quintile compared with that in the highest wealth quintile. There was a step-wise increase in the proportion of children fed with minimally adequate

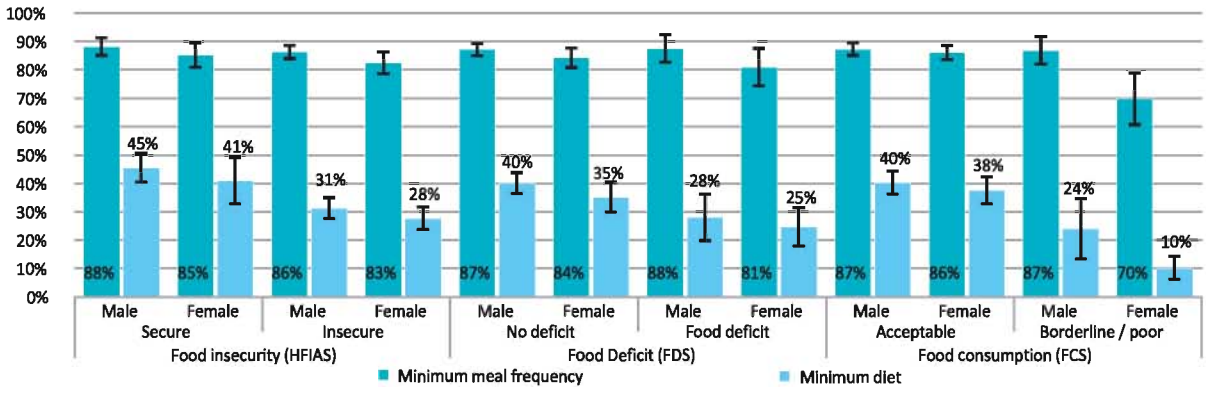
diets as wealth quintile increased (figure 7.43). However, even in the wealthiest quintile only a little over half of children received the minimum diet. There was little or no difference in the proportion of children fed with minimum frequency in food secure compared to food insecure households, but there were sizable differences in the proportion of children being fed minimum adequate diets. The proportion of children fed with adequate frequency and minimum acceptable diets was associated positively with the level maternal of education (figure 7.44). However, there was no difference in the feeding frequency or adequacy of children with income earning mothers in contrast to those who did not earn income. Over seasons, there were no notable patterns in these indicators by wealth or food security characteristics (graphs not shown), though food insecure households had less variation over the year.

Figure 7.45 : Minimum meal frequency and diet adequacy by child sex and age



A slightly higher proportion of male children were fed minimally acceptable diets than female children, but this difference was not statistically significant. However, the difference in the proportion of male versus female children fed with these practices increases when households were food insecure compared to food secure households (figure 7.46). This same pattern held for less wealthy households, though the difference is not statistically significant. 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 close to half of children in the oldest age group. Over the seasons of 2012, in only the first season of the year (Round 4) were a significantly greater proportion of male children fed minimally adequate diets compared to female children (graph not shown).

Figure 7.46 : Minimum meal frequency and diet adequacy by child sex and food security status



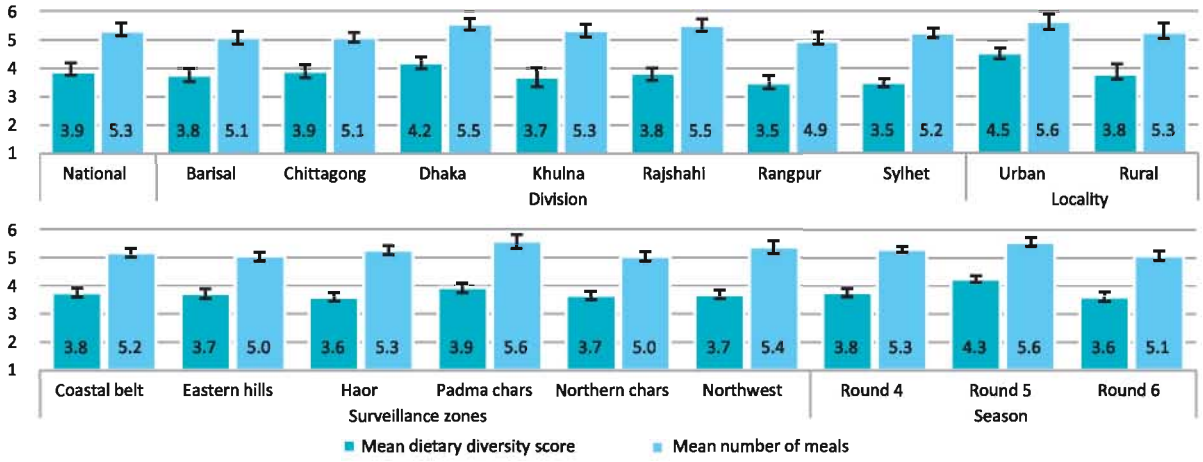
Dietary patterns among older children

FSNSP includes pre-school children older than two years of age from 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 and obtain information on the continuation of breastfeeding as was mentioned earlier in this chapter (5; 6; 50). Figure 7.47 compares the dietary patterns of mothers to their children. 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 eggs, beverages, dairy and sweets. A lower proportion of children eat spices, oil, flesh foods, dark green leafy vegetables, and other fruits and vegetables than their mothers. This is troubling because of the nutrient rich nature of these food types and the use of oil in aiding in metabolising nutrients from plant sources.

Figure 7.47 : Proportion of mothers and children (24 to 59 months of age) consuming food types by division

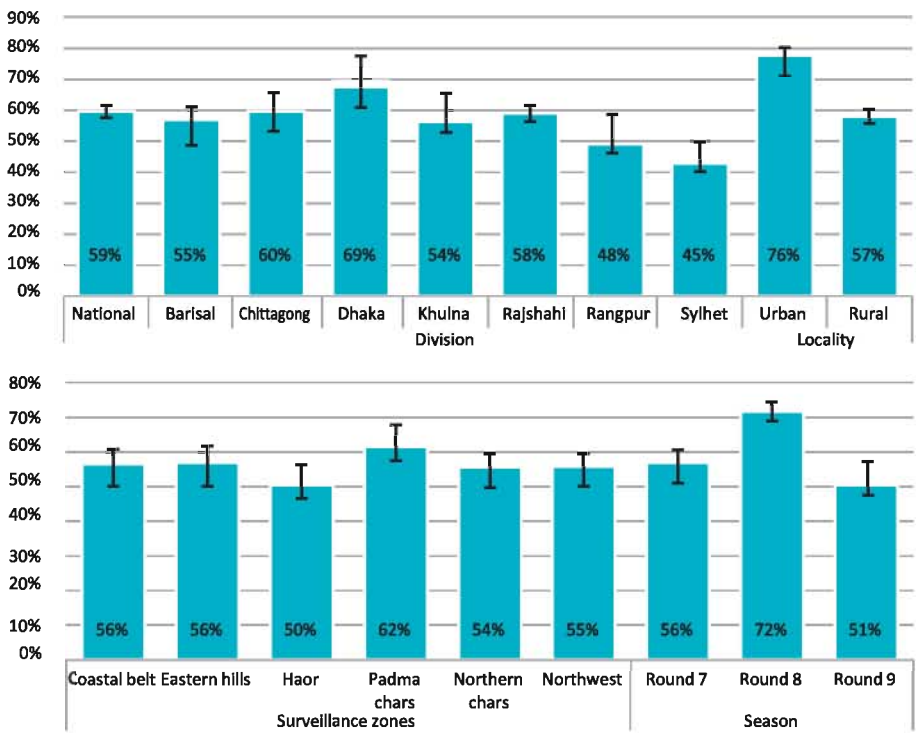
In some divisions, the gap between mothers and children's diets is larger. Sylhet - where beverages, dark green leafy vegetables, lentils, other fruits and vegetables, and flesh foods were consumed by a considerably lower proportion of children compared to mothers - and Chittagong - where dark green leafy vegetables, lentils, other fruits and vegetables, flesh foods, oil, and spices were consumed by a considerably lower proportion of children compared to mothers - had the largest gaps. In Rajshahi and Barisal the gap was the smallest, and a greater proportion of children compared to mothers ate eggs and dairy.

Figure 7.48 : Mean dietary diversity scores and meals fed to children two to four years of age by residence



Children ate less diverse diets in Sylhet and Rangpur, in line with the pattern seen for younger children (compare Figure 7.30 and figure 7.48). Children ate more diverse diets and more frequently in urban areas compared to rural areas. There was much less variation across surveillance zones than across divisions. The diversity of child diets also increased during the monsoon (Round 8), similar to what was seen in households', women's, and young children's diets (figure 7.48). Frequency of feeding also increased slightly during this period.

Figure 7.49 : Proportion of children two to four years of age eating four or more food groups by residence



By applying the IYCF indicator principals to older children, excluding the breast milk requirements, FSNSP estimates that 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%), and many are eating much more frequently than this. Nationally, on average, children are fed standard meals plus two to three snacks a day (figure 7.48). In contrast, many children still

did not meet the requirement of eating four out of seven food groups the previous day. Less than half of children in Sylhet and Rangpur ate diets which were minimally diverse (Figure 7.49). Nearly three fourths of urban children ate minimally diverse diets, while only a little over half of rural children did so. As with many indicators, there was less variation across surveillance zones. Significantly, more children ate a diverse diet during the monsoon months (Round 8), which is consistent with the observed dietary diversity patterns of women (figure 5.2) and households (figure 4.11).

Interestingly, the proportion of children two to five years of age in the least wealthy quintiles was similar to the proportion of children six months to two years of age eating diverse diets in the wealthier quintiles (compare Figure 7.33 with figure 7.50). 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 7.51).

Figure 7.50 : Children two to four years of age eating four or more food groups by wealth and food security

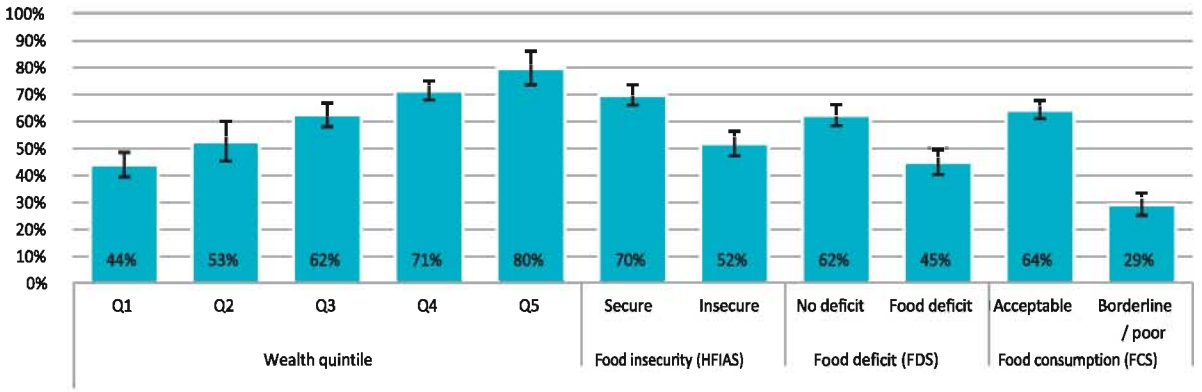
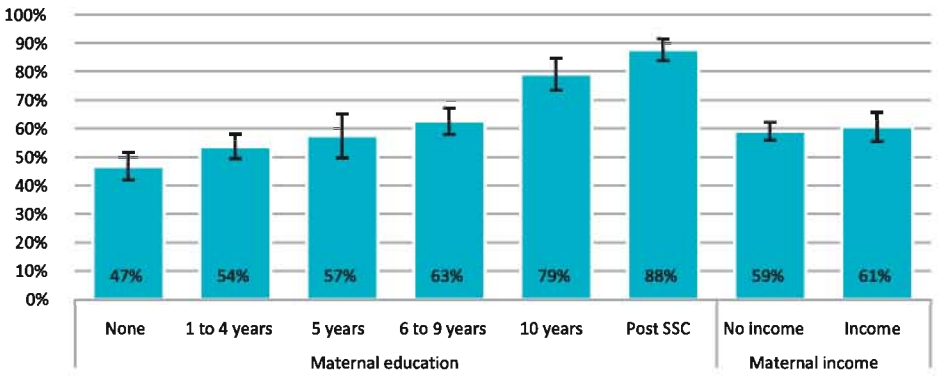


Figure 7.51 : Children two to four years of age eating four or more food groups by maternal characteristics



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). This finding is in line with the pattern presented in figure 7.21.

Child health and hygiene

Less than one-fifth of caregivers of small children in Bangladesh practice appropriate hand washing behaviours.

The levels of hand washing practices are lower in rural areas, less wealthy households, households with poorer facilities, less educated mothers, and food insecure households.

Nationally, only around 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 number of children affected by clinical vitamin A deficiency has fallen dramatically since the 1990s. This is no doubt due to large scale interventions that seek to improve breastfeeding, diverse diets, and provide vitamin A supplementation.

Coverage rates of deworming programmes in Bangladesh are well above 70% which treat and/or prevent helminthes infections, malnutrition and growth faltering.

Since independence, Bangladesh has experienced remarkable increases in child survival due in part to innovations like oral rehydration therapy (ORT), zinc therapy, vitamin A supplementation and initiatives such as the Expanded Programme for Immunisation. As a result, Bangladesh has already met the target of reducing the under-five mortality rate by achieving a two-thirds reduction in child mortality per 1000 live births in 2011, and it is on track to reach Millennium Development Goal (MGD) 4 - a two-thirds reduction in child mortality (1). However, the country remains slightly off track in reaching the MDG 1 goal of reducing child under nutrition (2; 1), despite achieving the adult hunger (under nourishment) goal in 2006 (3), in part due to gaps in health seeking behaviour and adequate hygiene at home.

As mentioned previously, a frequently ill child is much more likely to become malnourished due to reduced appetite as well as a decreased ability to absorb nutrients consumed (4). Routine childhood illnesses can be prevented through adequate child care and feeding paired with preventative health care. Additionally, the potentially disastrous effects of child illness can be alleviated though timely and proper treatment of child illness both at home and through consultation with formal health care providers. Improving hygiene and reducing the parasite load in a country like Bangladesh can be expected to dramatically improve child development outcomes in line with The Lancet framework presented in the last chapter.

Household hygiene

Hygiene refers to conditions and a specific set of practices associated with the preservation of health, for example environmental cleaning, hand hygiene, water and sanitation and safe disposal of wastage etc. (5). Diseases resulting from inadequate water facilities, sanitation, and hygiene account for 4% of all deaths and approximately 6% of the total disease burden worldwide (6). According to a recent estimate by WHO, about two million people die every year due to diarrhoeal diseases most of them are children younger than five years of age. Poor hygiene behaviors, and a lack of water supply and sanitation services are key explanatory factors (7). The majority of diarrhoeal deaths occur in developing countries where an estimated two million child deaths from diarrhoea occur annually. In many of the counties, diarrhoeal disease is one of the leading causes of illness and death in infants and young children. 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 (8). Furthermore, acute illnesses due to these infections result in significant costs to the health care system.

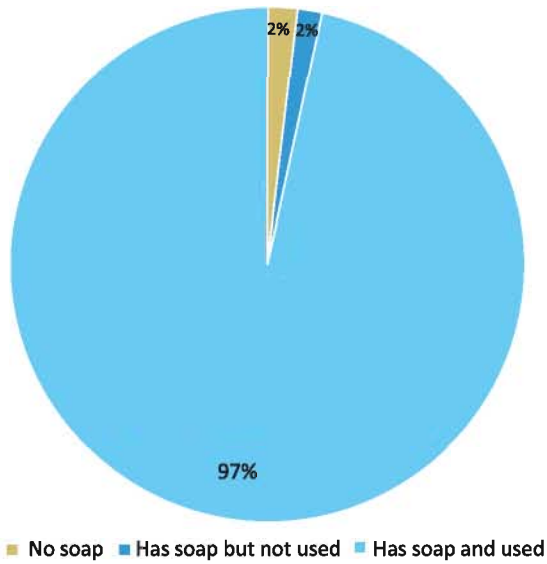
As was shown in the third chapter of this report, Bangladesh has made tremendous progress in providing safer drinking water and improved toilet facilities to citizens. However, certain components of a healthy environment for child development are still lagging behind. Notably, in spite of progress, only a little over a third of households have access to non-shared improved sanitation facilities (see figure 3.11). Additionally, only around one-tenth of households have been shown to treat their drinking water at the source, and inadequate hand washing practices are a common barrier to child health (9; 10). In spite of its importance, these activities are difficult to assess. Unlike child feeding, there have been few internationally standardised and reliable measures (11). Since its inception in 2010, FSNSP has measured a few key indicators of hand washing, but these have not been widely reported due to a lack of comparative data. Beginning in

2012 and continuing in 2013, FSNSP has expanded these indicators using sections from the modules contained in the Maternal Child Integrated Programe Project (MCHIP) - formerly the Child Survival Technical Support Project (CSTS), knowledge practices and coverage (KPC), and survey tools (12), supplemented by indicators shown to be effective at predicting diarrhoea episodes in Bangladesh (13). This section will be expanded into a chapter and will include all households in the 2013 report as more indicators become available. In this report, analysis will be limited to households with young children.

Hand washing

Interventions that promote hand washing through education and/or through provision of hand washing supplies, such as soap, have been shown to be efficacious in reducing episodes of diarrhoeal disease by one-third. However, the amount of behavior change communication required to motivate individuals to wash their hands at key moments should not be underestimated (14). 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 (15). In Bangladesh, observational studies have indicated poor hand washing practices, with hand washing being limited to just a little over half at key times and both hands being washed with soap and water less than 2% of the time (10).

Figure 8.1 : Soap among households with young children



In 2012, FSNSP sought to measure hand washing behavior by asking mothers of young children about the presence or absence of soap in the household and how they had used soap the previous day. As seen in Figure 8.1, soap was present in around 98% of households with children less than five years of age, and it was used the day before the interview in almost all of these households. However, the key times in which this soap was used is limited (figure 8.2). 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 around half of caregivers reported washing their hands with soap after using the toilet, less than one tenth of caregivers reported washing their hands before feeding the child, before preparing food, and before eating. 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, poor appetite, and eventually malnutrition and death (12). Due to the importance of hand washing during the preparation and consumption of food, FSNSP classifies hand washing practice through the use of a KPC indicator that measures the proportion of caregivers in households soap for hand washing at least two critical times in the past 24 hours (10). These two times include after own defecation and at least one of the following: after cleaning a young child, before preparing food, before eating, and/or before feeding a child.

Figure 8.2 : Proportion of care givers who reported using soap at key moments the day before the interview

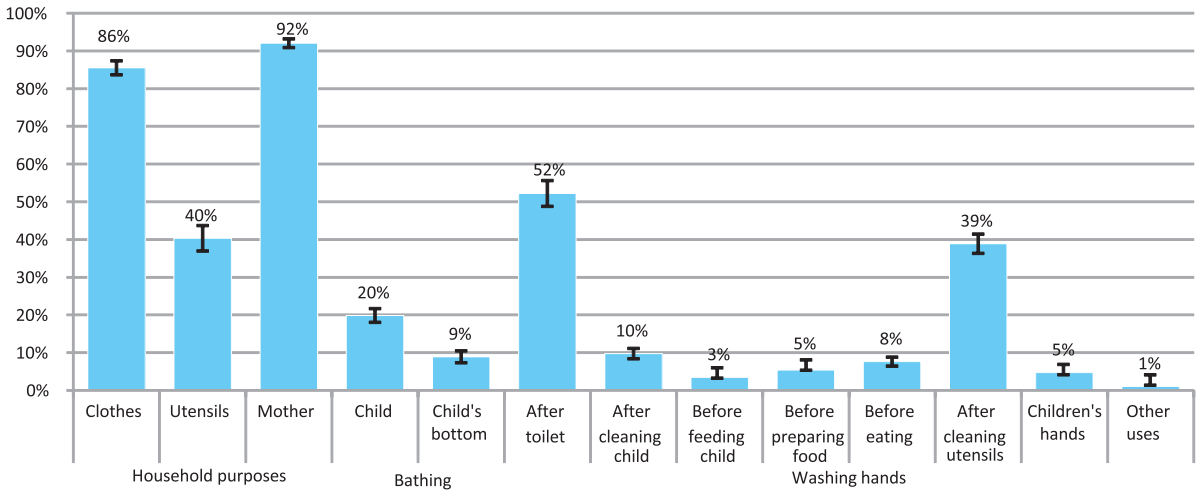
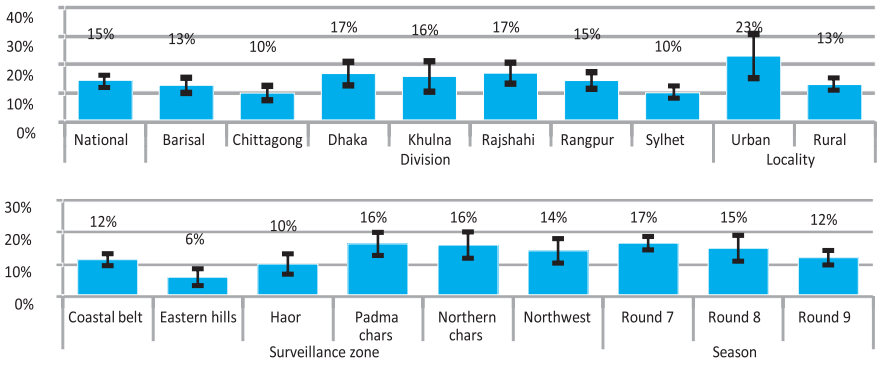


Figure 8.3 : Proportion of caregivers with appropriate hand washing behavior by area of residence



Based on this measure, less than one-fifth of caregivers in Bangladesh were practicing appropriate hand washing behaviors. These practices vary somewhat over the country, with lower levels of hand washing apparent in Chittagong and Sylhet than in Dhaka, Khulna, and Rajshahi (figure 8.3). A much greater proportion of caregivers in urban areas washed hands at key moments than caregivers in rural areas. Across surveillance zones, care givers washed hands much less frequently in the Eastern hills.

Figure 8.4 : Proportion of caregivers with appropriate hand washing by household characteristics

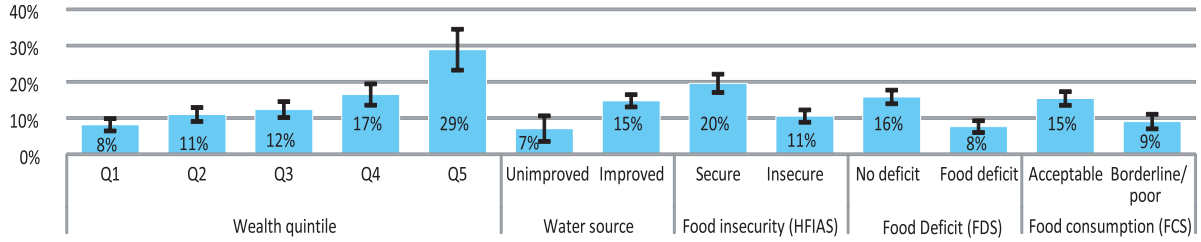
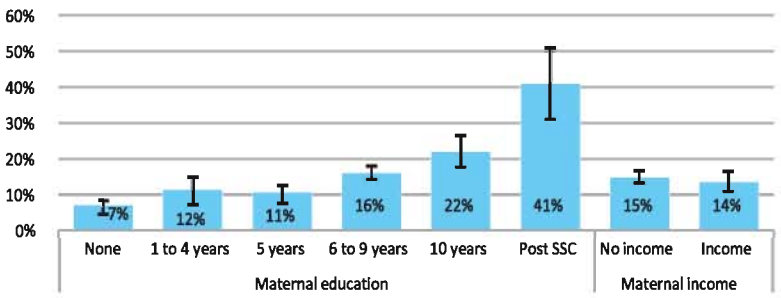


Figure 8.5 : Proportion of caregivers with appropriate hand washing by maternal characteristics

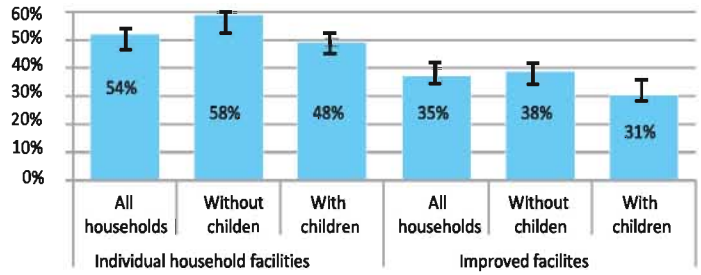


Appropriate hand washing requires timely access to water; as such, the provision of a convenient water source is a necessary precondition to this behavioral pattern. Not surprisingly, caregivers from less wealthy households, or households with poorer facilities, practice appropriate hand washing much less frequently than households with better facilities. Furthermore, caregivers who use unimproved water sources, see Chapter 3, 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. Though food security is likely not leading to the poor hand washing behavior, this finding is important because it indicates that these children who are already receiving more limited diets due to food insecurity are also at increased risk of infection. This leads to a reduction in child growth and development from both proximate pathways (see figure 7.1 on page 113). Similarly, less educated mothers report appropriate hand washing behavior much less frequently than mothers with greater educational attainment.

Sanitation

The majority of water-borne diseases and helminthes infections are spread through faecal contamination of soil and water. Without provision and use of adequate sanitation facilities, control of contamination is not possible. In Bangladesh, toilet provision is largely a private sector matter with a sizable contribution by NGOs. On the other hand, activities to promote proper utilisation of toilets and to eliminate open defecation are backed by all parties including the government. FSNSP measures the proportion of households which have an improved toilet not shared with any other households (DHS indicator) (17). In 2012, among households with children younger than five years of age, 47% had toilet facilities for their individual household, 48% used toilet facilities shared by one or more households, and 5% used facilities that were completely open, such as open defecation or a hanging toilet (figure not shown). Troublingly, households with young children had individual and improved facilities in a much lower proportion than households without children (Figure 8.6), though the relative differences in proportions of households with facilities is the same as the national picture.

Figure 8.6 : Proportion of households with individual and improved toilet facilities



The actual observed distribution of toilet types among households with young children is given in Figure 8.7. Notably, only 5% of households had access to piped facilities, while nearly a fifth of households with young children had access to toilets that were piped to a septic system. The majority of ring toilets were without a water seal and did not prevent the escape of contaminated water.

Figure 8.7 : Types of toilet facilities used by households with young children

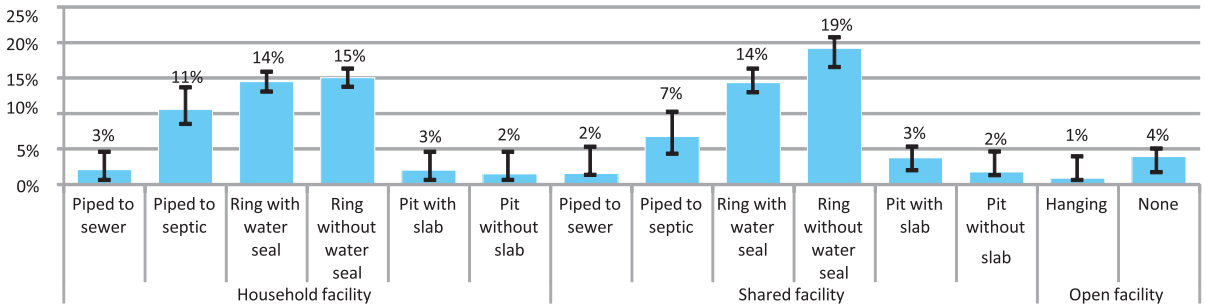
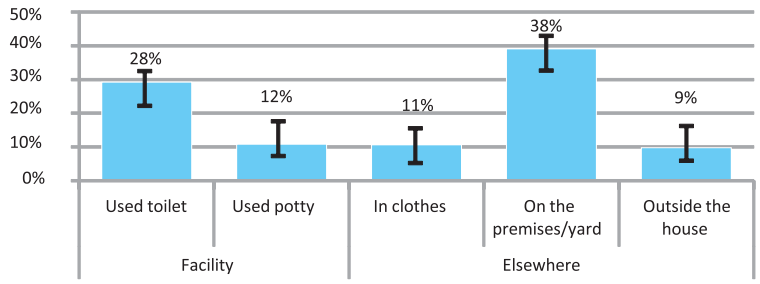
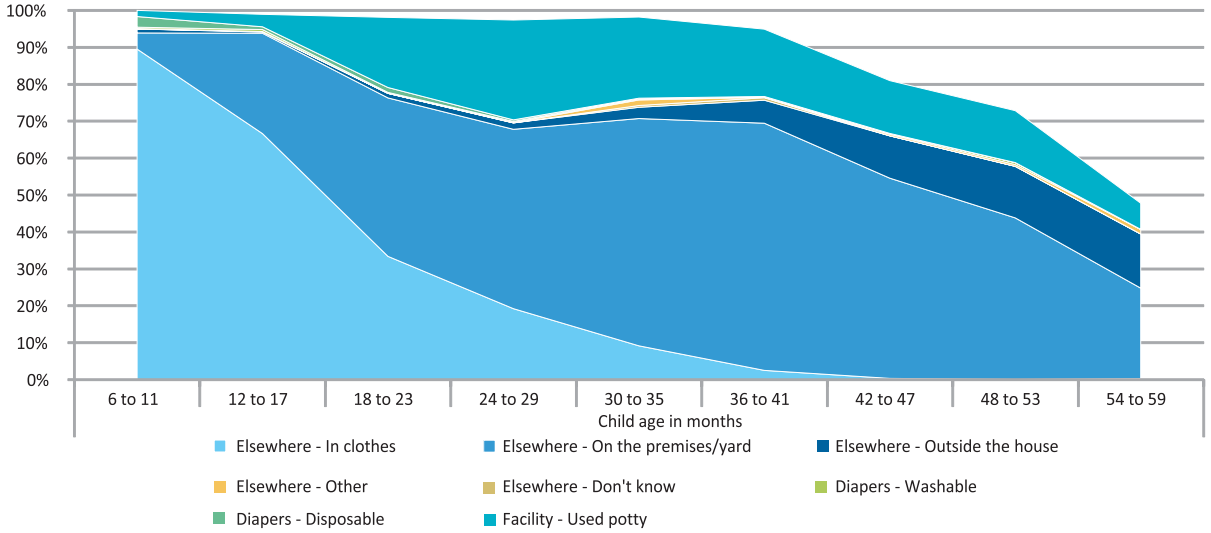


Figure 8.8 : Location of child defecation[1]



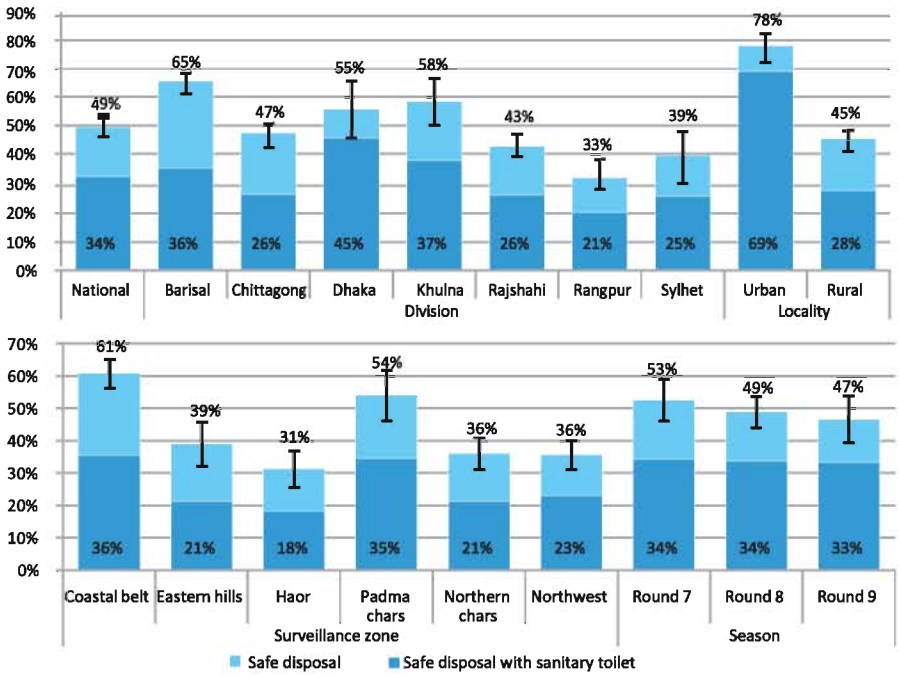
Young children predominantly do not use sanitation facilities on their own, however these children are equally or more likely to be disease vectors than are adults. Figure 8.8 displays the most common locations where children defecated.[1] This clearly indicates that the most used location is outside the home and not in a toilet facility. Location of defecation also varies by child age, as to be expected (figure 8.9). While infants and young children most commonly use defecation in their clothes in Bangladesh, after one and a half years of age, children begin to use the outdoors and potties. Even at five years of age, only around half of children are using a toilet facility.

Figure 8.9 : Location of child defecation other than a toilet facility by child age group



1 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 8.10 : Proportion of households that safely dispose of child's solid waste by area of residence



Due to this, complementary to having a sanitary toilet facility is proper disposal of children's solid waste. FSNSP 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 (12; 17). Additionally, FSNSP examines the proportion of these households who also have access to an improved toilet facility, whether shared or individual, as only through a combination of these indicators can contamination be controlled. Nationally, only around 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, at nearly two-thirds of households, and lowest in Rangpur, where only one-third 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 Haor had a much greater proportion of households that disposed of child solid waste safely than in the other zones. Across the year, as expected, there was no major change in the proportion of households safely disposing of waste (figure 8.10).

Figure 8.11 : Proportion of households that safely dispose of child's solid waste by household characteristics

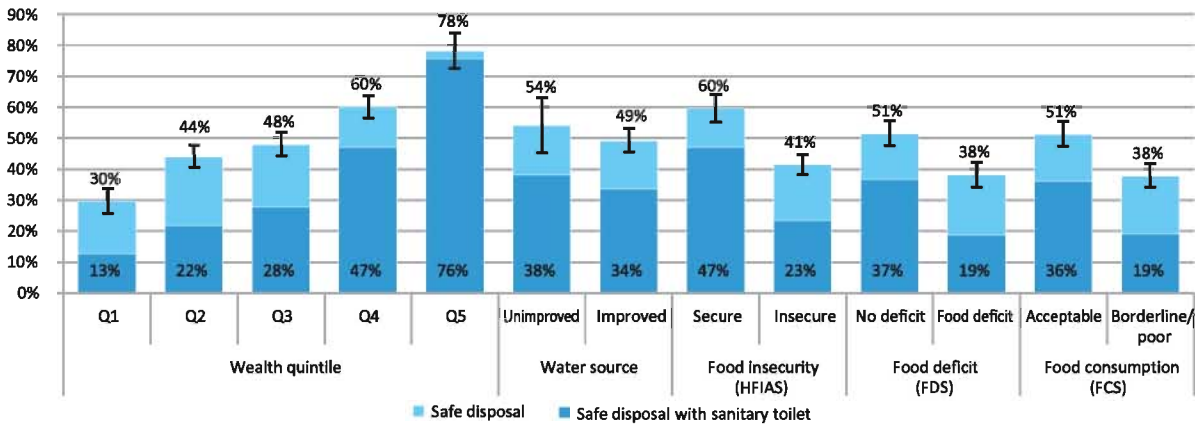
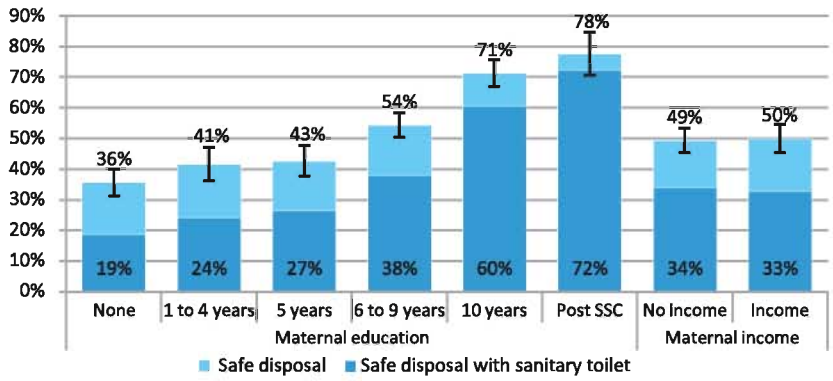


Figure 8.12 : Safe disposal of child's solid waste by maternal characteristics



Similar to the patterns seen between appropriate hand washing and background characteristics, wealthier and food secure households appropriately dispose of child waste in greater proportions. 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 (figure 8.12).

Preventative health care

Preventing illness in infants and young children begins with proper feeding and adequate household hygiene. In addition, nutritional supplements and routine medicines 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 (18). 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 (19). Vitamin A deficiency leads to dry eyes, stunting, anaemia, and an increased risk of infection (20). 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 the problems it causes for the visual system; Vitamin A related blindness was responsible for bringing this micronutrient deficiency to the fore in the early 1990s (21). 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 (22).

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. Animal source foods - such as fish oils, organ meats, and whole fat milk - directly supply the vitamin, while dark green leafy vegetables and most red/orange/and yellow (ROY) fruits and vegetables supply vitamin A precursors. Because of the cost and high resource requirements of animal source foods, the majority of dietary vitamin A in low

2 In the initial stages of clinical vitamin A deficiency eyes become dry and they have difficulty seeing at night since vitamin A is an important component of rod production. At more advanced stages the cornea of the eye becomes affected, with ulceration and drying leading to scratching, scarring, and permanent blindness. Sub-clinical levels of vitamin A deficiency can only be measured by assessing levels of serum retinol in the blood (14).

income communities is from plant sources, which are poorly metabolised, leading to deficiencies (19). The Government of Bangladesh currently implements a large scale vitamin A supplementation programme coordinated out of the Ministry of Health, Directorate of Health Services (22). This programme provides low potency vitamin A supplementation (100,000 i.u.) to children six to 11 months of age[3] 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 (NID) and national vitamin A campaign (NVAC) days. Recent WHO recommendations support this programme (23). 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 (22; 24; 23).

Figure 8.13 : Historical trends in VAC coverage for children 12 to 59 months of age (1993 to 2012)[4]

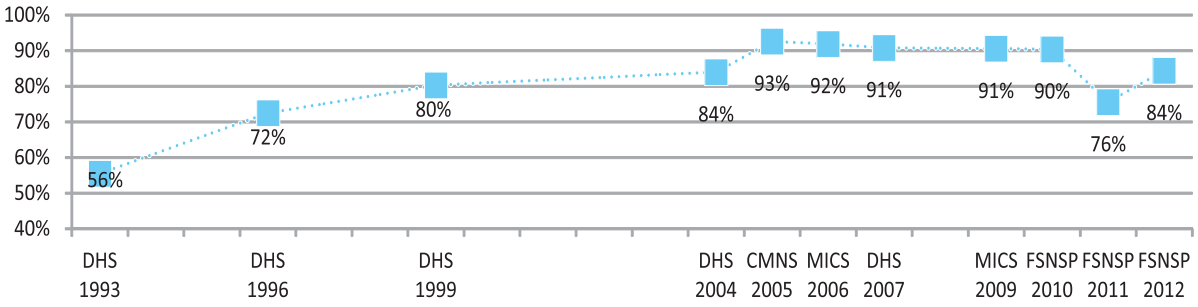


Figure 8.14 : Source of VAC during 2012 (6 to 59 months)

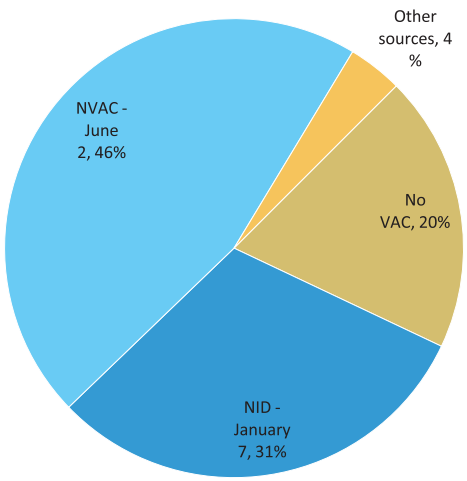


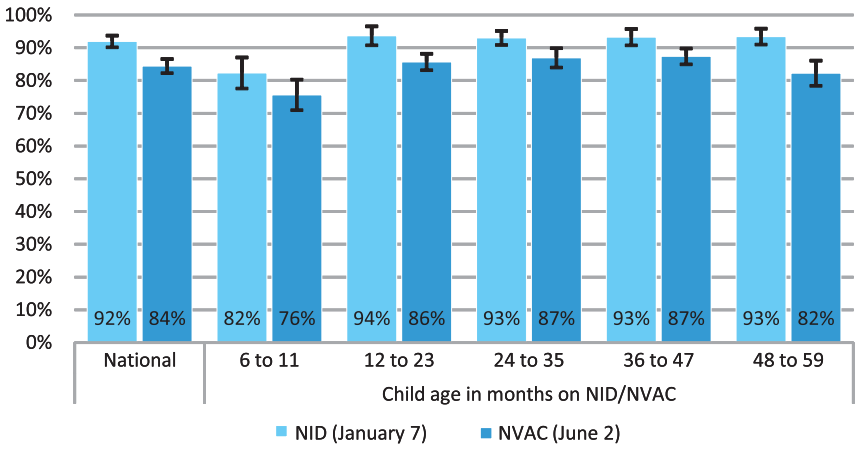
Figure 8.13 displays the proportions of children 12 to 59 months of age who had received vitamin A capsules (VAC) in the six-months prior to interview over several surveys completed in the last 18 years (25; 26; 27; 28; 29; 30; 31; 32; 33; 34). Notably, the level of coverage improved dramatically from 56% in 1993 to 80% in 1999. Between 1999 and 2005, coverage rates improved more slowly, but settled at over 90% consistently during the period 2005 to 2010, before falling to 76% in 2011 and increasing slightly to 84% in 2012. However, similar to 2011, the low coverage rate of the VAC campaigns in 2012 are due both to gaps in the scheduling of these programmes and to slight drops in programme coverage since 2010. In 2012, the NID (January 7th) and the NVAC day (June 2nd) were both held in the first half of the year (only about five months apart). The completion of the NVAC day in early June resulted in most children included in FSNSP during December having not received VAC in the six months prior to interview.[5] This analysis is also supported by the source of VAC in 2012 (figure 8.14). Far more children received VAC from the June 2 NVAC because a full six months followed this event before another VAC event.

3 This guideline was changed in February 2011. Prior to this, low dose VAC capsule was delivered with measles vaccination at around nine months of age.

4 Please note that the figure for 1993 DHS is taken from children only 12 to 35 months of age. Since the rates of VAC receipt do not change greatly over the older age cohorts in recent surveys, the figure for the entire group of 12 to 59 months was likely similar.

5 Some children, however, still reported having had a VAC in the prior six months due to supplementation that can occur at health facilities outside of the NID and NVAC days.

Figure 8.15 : Coverage of the VAC campaigns in 2012 by event



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. This is especially important for children under one year of age, as none of these children would be eligible for VAC if the capsule distribution had occurred more than six months in the past. Figure 8.15 looks at the coverage rate of the two VAC campaign days in 2012 by the age in months of the child on the VAC distribution day. This analysis indicates that coverage rates for both events in 2012 were greater than those in 2011. However, similar to 2011, the event in the middle of the year (NVAC) had lower coverage rates than the NID event, particularly for the youngest children. Troublingly, the coverage for the NVAC event was lower than the HPNSDP target of 90% for 2016.

Figure 8.16 : Coverage of the NVAC campaigns in 2012 by area of residence

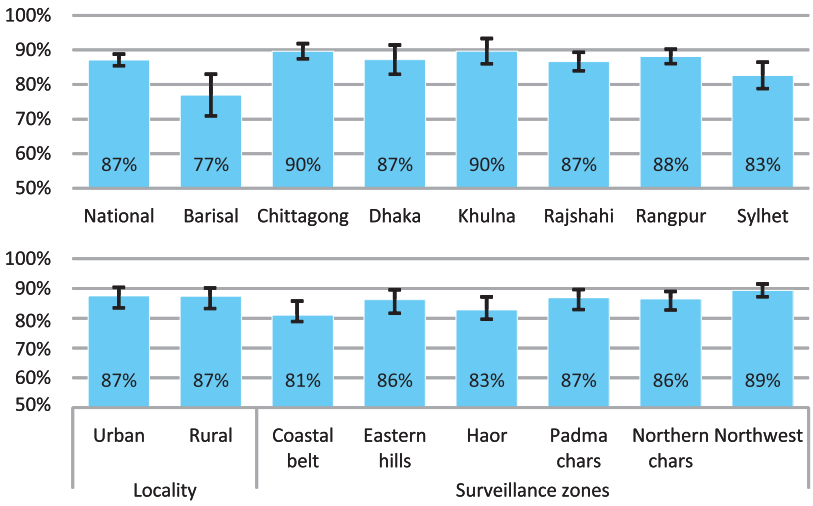


Figure 8.16 pools these two estimates to show overall coverage of the NVAC events during 2012. Promisingly, coverage rates increased by five percentage points nationally and did not decline dramatically in any division between 2011 and 2012. Dhaka and Rajshahi divisions had the greatest increase in coverage. In 2012, there was no variation in coverage between urban and rural areas. The Eastern hills zone stands out with high coverage rates.

Figure 8.17 : Coverage of the NVAC campaigns in 2012 by household characteristics

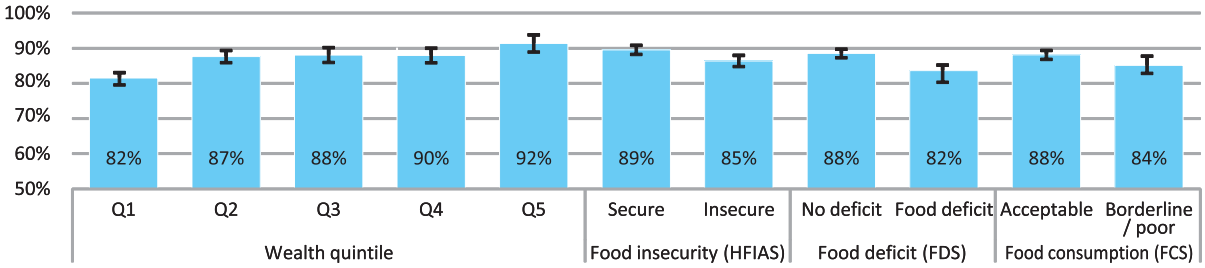
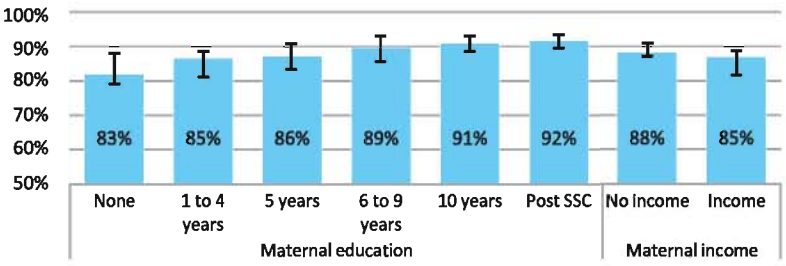
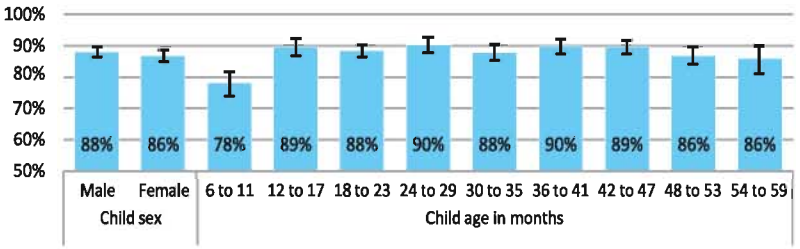


Figure 8.18 : Coverage of the NVAC campaigns in 2012 by maternal characteristics



Unfortunately, there were small but significant differentials in coverage between children from wealthier and less wealthy households and by food security category. Additionally, children whose mothers had greater educational attainment had 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 7.33) and thereby had less opportunity to obtain adequate vitamin A from their diet. Additionally, these differentials are harder to overcome than regional differences because these individuals are not concentrated in any one area and thus are more difficult to target.

Figure 8.19 : Coverage of the NVAC campaigns in 2012 by child sex and age

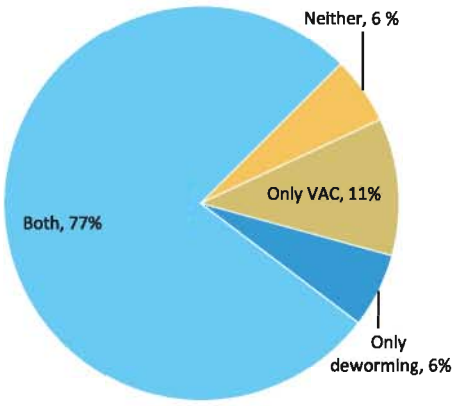


There was little variation in proportion of children who received VAC by age, except for the youngest age group, and no significant difference in coverage between male and female children. Similar to the 2011 findings, the youngest children, aged six to eleven months, received VAC in a lower proportion in 2012. This group will need to be a target for future outreach campaigns.

Deworming

Another programme linked to preventive health care and the NVAC campaigns is mass provision of allopathic deworming to children in Bangladesh. Around 25% of the world's population is infected with one or more types of worms (roundworms, hookworms, whipworms, etc.), which are widely distributed in tropical and subtropical areas. 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. Children with helminthes infections are also much more likely to be anaemic. Moreover the burden of these infections falls disproportionately on the poor living in areas with inadequate sanitation. Though the estimated prevalence for the country as a whole is not available from other sources, all estimates available from Bangladesh point to a combined helminthes

Figure 8.20 : Coverage of deworming and VAC (24 to 59 months)

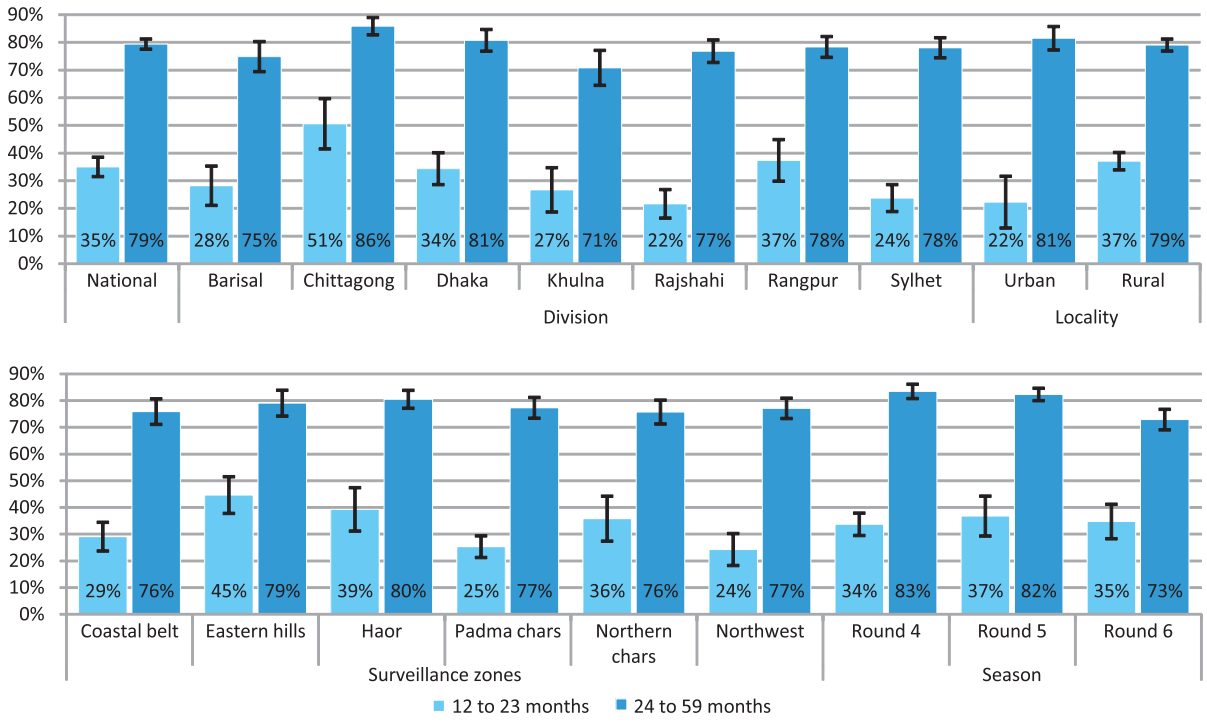


prevalence above the 20% cut-off for intervention (35). In addition, the nearest available data from India also points to an infection level above this cut-off.

Treating helminthes infections is inexpensive; multiple effective drugs exist in the market and are provided through government health services. As a country with endemic lymphatic filariasis, WHO recommends that preventative treatment be given for worm infections in addition to curative treatment after diagnosis (36). Most of these recommendations have been adopted by the Government of Bangladesh. The Government recommends regular (six-monthly) receipt of allopathic anti-helminthes tablets by all children 24 of 59 months of age as part of the country's anaemia control programme (37), but does not extend the provision of these tablets to children aged 12 to 23 months as stated in WHO recommendations (38). These tablets are often distributed at the same time as, or shortly after, the NID or NVAC days; as is seen in Figure 8.20, where of the children who have received an allopathic deworming tablet, only one-tenth had not received VAC. Promisingly, between 2011 and 2012, the proportion of children who received both VAC and allopathic anti-helminthes tablets increased by four percentage points.

Coverage of this programme was measured by the proportion of children who had received an allopathic anti-helminthes tablet in the last six months. In line with government guidelines, well over double the proportion of children two to four years of age were given allopathic anti-helminthes tablets than children one year of age. Coverage rates were well above 70% in all parts of the country, and nationally there was a two percentage point increase in coverage of children above two years of age. Round-wise estimates show a drop in coverage rates during Round 6; this is no doubt due to the scheduling of the NID and NVAC dates. The coverage rate for anti-helminthes showed much less variation than coverage for the VAC campaign, moreover, variation by households and maternal characteristics was in line with that given in the VAC campaign and thereby is not shown here.

Figure 8.21 : Coverage of allopathic deworming by area of residence



Illness and recuperative health care

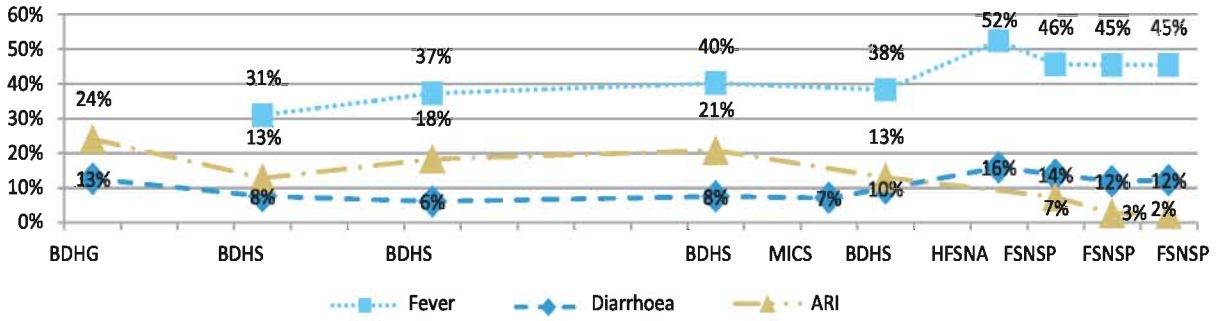
Government of Bangladesh endorsed infant and young child feeding practices (IYCF) include proper recuperative care when children fall ill (39; 40). One barrier to child growth and development is inappropriate feeding during illness, particularly during diarrhoea, which remains a leading cause of infant death. During and after illness, children have greater fluid and nutrient requirements to overcome the nutrient loss and mal-absorption that occurred during illness, however, sick children tend to have diminished appetites and may refuse food (41; 42). When the child has diarrhoea or vomiting, caregivers may have the misperception that feeding the child is counterproductive, as the child cannot retain food or liquids. As a result, caregivers traditionally decrease feedings, including breastfeeding, which contributes to insufficient nutrient and fluid intake, dehydration, and slower recovery (41; 42).

WHO and UNICEF recommend that caregivers continue feeding (or breastfeeding) the child throughout the illness and increase feeding immediately after the illness (41; 42). WHO guidelines for integrated management of childhood illness (IMCI) recommend that during treatment for diarrhoea, children younger than six months should be given extra fluid; they should continue to be breastfed but breastfeed for longer at each feed and also receive ORS. Children older than six months who are not exclusively breastfed should be given extra fluids (including ORS, soup, other clear liquids) and they should continue to be fed complementary foods and breast milk as usual (43). Counselling and guidelines for appropriate sick child feeding should be provided to caregivers through 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. Over past survey periods, the proportion of children suffering from fever appears to have increased slightly while the proportion of children suffering from ARI has decreased dramatically (25; 26; 27; 28; 29; 30; 31; 44; 33; 34). The period prevalence for children suffering from diarrhoea appears to have remained relatively constant over the years, in spite of seasonal variations. Between 2011 and 2012, the FSNSP estimates for all three of these illnesses have remained identical or nearly identical.

Figure 8.22 : Trends in the proportion of children ill over recent years (1993-2012)[9]



There was significantly greater variation in the proportion of children with recent episodes of fever in 2012 compared to 2011, in spite of the fact that overall prevalence rates did not change. In contrast there was less variation in the proportion of children with recent episodes of diarrhoea and ARI. Fever period prevalence was lower in Khulna than in other divisions. Children in rural areas have slightly higher period prevalence rates for fever and ARI, but there was no difference in rates of diarrhoea. In contrast to 2011, over the seasons of 2012, the period prevalence of fever was lowest during the monsoon period (Round 8). As the relationship between illness prevalence and households and maternal characteristics is nearly identical in 2011 and 2012, these graphs are not included in this report.

Figure 8.23 : Proportion of children ill by area of residence

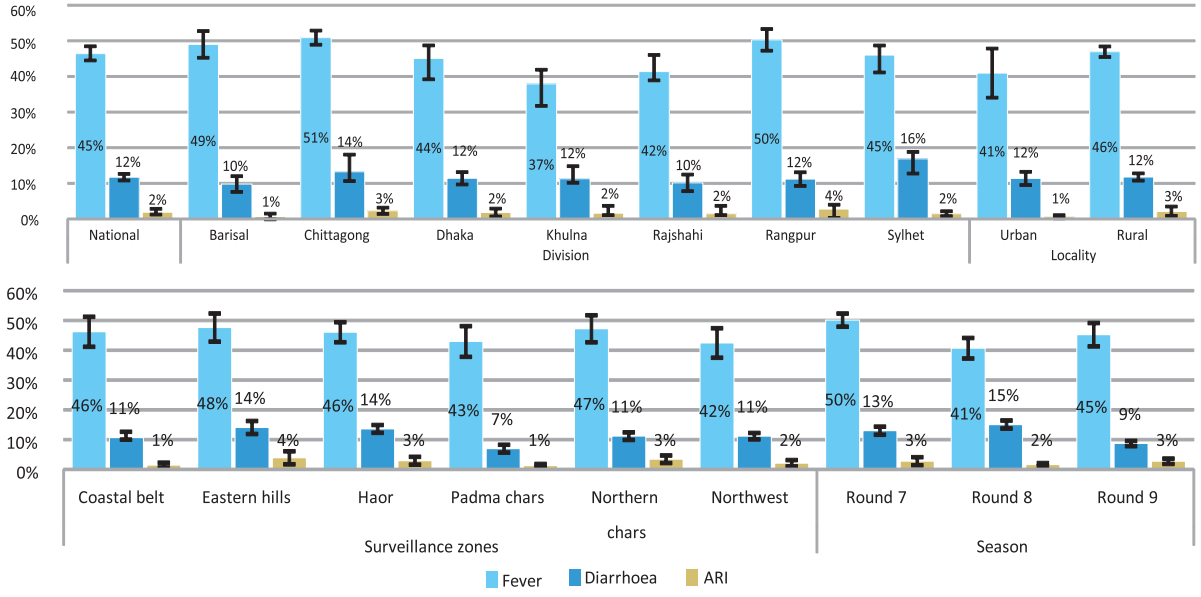
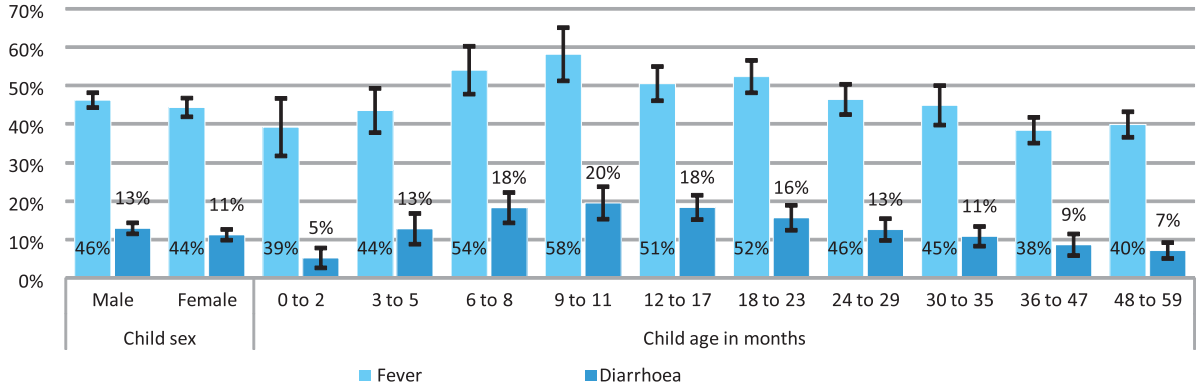


Figure 8.24 : Proportion of children ill by child sex and age[10]



8 These figures vary somewhat from those provided by the most recent BDHS (2011), however this variation may be due to seasonality. Diarrhoea rates listed above are much higher than that given in the DHS (BDHS: 5%), while FSNSP's ARI results are somewhat lower (BDHS: 6%), and FSNSP's results for fever are significantly lower (BDHS: 37%) (9).

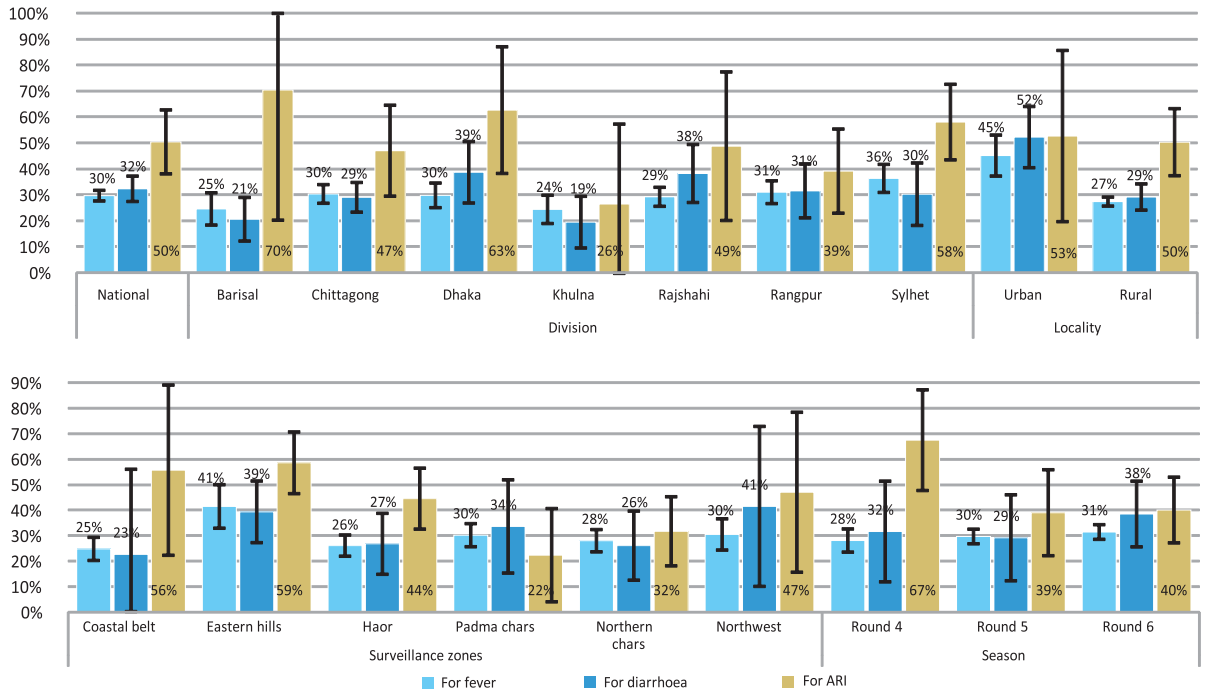
9 Please note that the figures given for BDHS 1993 are based only on children 0 to 36 months of age. Overall, the methodology of FSNSP differs slightly with the DHS, which calculates across all children born in the past five years and not just the youngest child.

Similar to the relationship between illness prevalence and households and maternal characteristics, there was nearly no change in the relationship between child age and sex and child illness between 2011 and 2012. In 2012, as in 2011, there was no difference in the proportion of boys compared to girls who had been sick, but the age of the child was associated with recent illness. Both diarrhoea period prevalence and fever period prevalence peaked at nine to 11 months of age. In addition, households with safe disposal of child waste coupled with sanitary toilet facilities had significantly lower rates of diarrhoea prevalence (9% versus 13%, graph not shown).

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, FSNSP records the proportion of children who were taken to a health facility or provider, excluding pharmacies, shops, or traditional practitioners (29; 17; 9). 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 8.25 : Proportion of children ill who were taken to a medical provider by area of residence



Between 2011 and 2012, there was a general increase in the proportion of children taken to a health care professional during or after illness. Nationally, the proportion of children with fever or diarrhoea increased by three to five percentage points, from over a quarter to nearly a third of ill children. Due to the small sample of children who suffered from ARI, it is not possible to identify the trend. Across divisions, Dhaka, Rajshahi, Rangpur, and Sylhet had the largest increases. Rural areas also had a greater increase than urban areas. Seasonally there was very little variation in the proportion of children taken to health care providers.

Figure 8.26 : Proportion of sick children taken to a medical provider by household wealth and food security

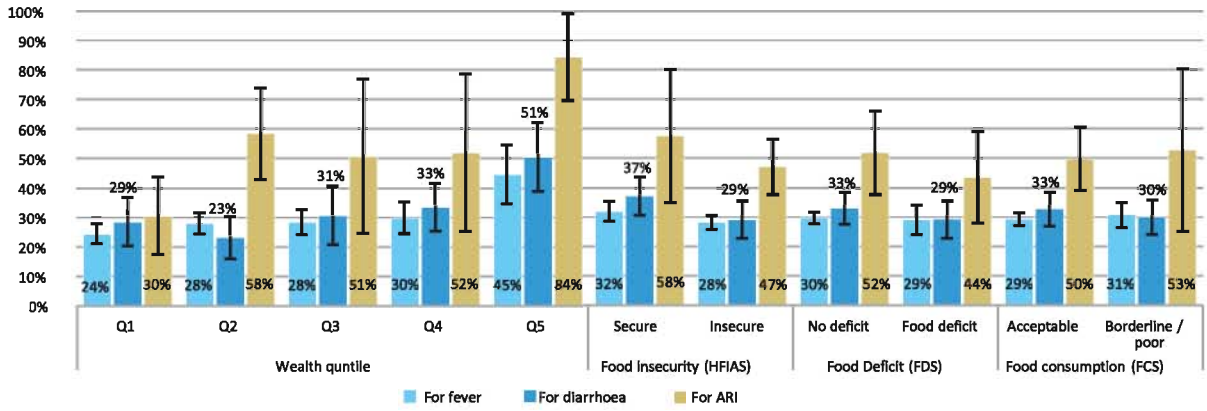
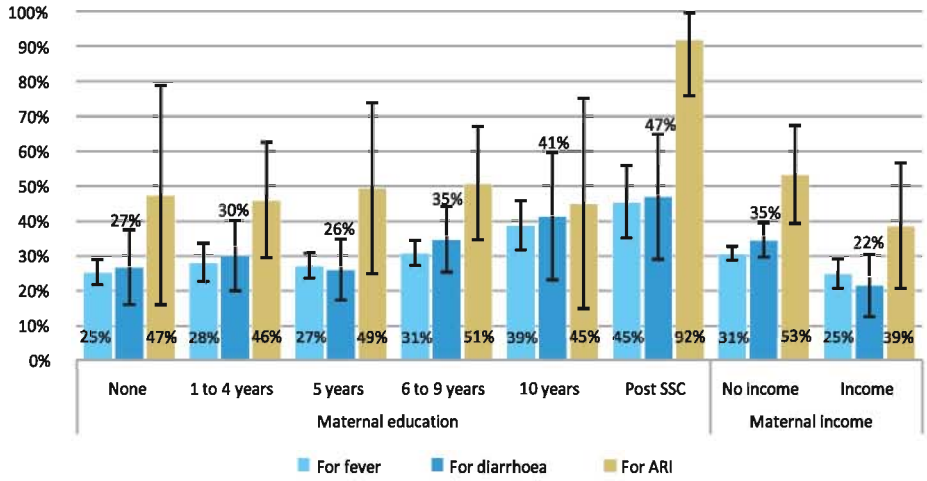
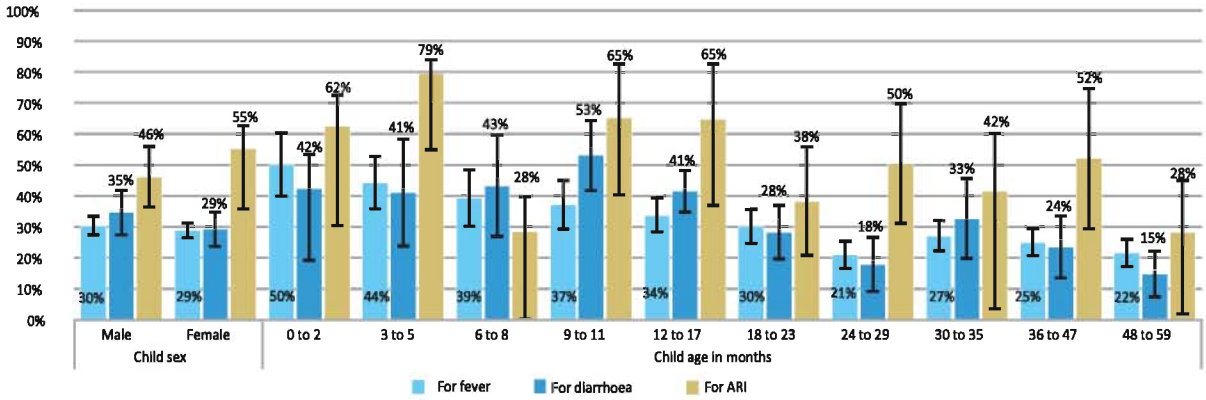


Figure 8.27 : Proportion of sick children taken to a medical provider by maternal characteristics



Similar to 2011, in 2012, wealthier and more food secure households accessed medical care for their children in a greater proportion than less wealthy and food secure households. However, between 2011 and 2012, there was a greater increase in the proportion of less wealthy and food insecure children who sought care. This same increase was seen among ill children of less educated mothers (figure 8.27). Professional medical care is sought more frequently for children in their first year of life (figure 8.28). In contrast to 2011, in 2012 there was a slight difference in the proportion of male and female children who received care for illness, with slightly but not significantly more male children being taken to a health care professional.

Figure 8.28 : Proportion of sick children taken to a medical provider by child age and sex



Home care for diarrhoea

In addition to medical and facility based care, care at home can greatly improve recovery time for children, particularly those suffering with diarrhoeal illness. Effective treatment of children during diarrhoea can prevent over 90% of deaths due to this cause. Advances in oral rehydration therapy have no doubt contributed to the reduction in under five mortality rates since 1980 (45). 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 from symptoms of acute or persistent diarrhoea (46). In addition, many children in developing countries are zinc deficient and the provision of zinc has benefits for the immune system, appetite, cognition, and growth (47). Some evidence points to additional benefits of supplementation for children with respiratory infections, however, the findings are not yet conclusive (48) and care must be taken, as zinc can have adverse effects if given in high doses (47). Though recommended as a treatment to lessen the duration of diarrhoea by both WHO and UNICEF as part of their programme for clinical management of childhood diarrhoea, guidelines are not yet available for this intervention (39).

The Government of Bangladesh has been an active proponent of zinc supplementation. The Ministry of Health and Family Welfare was a partner in the Scaling-up Zinc in Early Childhood (SUZY) public-private partnership. From 2003 to 2007 this partnership aimed to strengthen capacity for in-country production of zinc supplements, support the creation of distribution channels and promote the use of zinc supplementation as a treatment to lessen the duration of diarrhoeal illness (49). 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 (50).

Focusing on home care for diarrhoea, FSNSP 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. It appears that knowledge and use of zinc during diarrhoea episodes has increased since the end of the SUZY programme; nationally, 17% of children who had diarrhoea diagnosed by their caregiver were given zinc supplementation.

FSNSP found that in rural areas, an estimated 16% of children with diarrhoea were identified as using zinc which is greater than the 10% estimate for rural areas obtained from a SUZY programme survey in February-May 2009 (49). Nationally, this is a two percentage point increase from 2011 to 2012. Moreover, over two-thirds of children were treated with ORT, a five percentage point increase between 2011 and 2012.

The proportion of children treated varied somewhat between regions of the country and over the seasons of 2012, but most of these differences were not significant, including that between urban and rural areas. Infants and young children from 9 to 17 months of age were given ORT and zinc therapy in a greater proportion than older and younger children. Additionally, male children were provided with this care in greater proportion than female children (figure 8.30).

Figure 8.29 : Proportion of children with diarrhoea given zinc or ORT therapy by area of residence

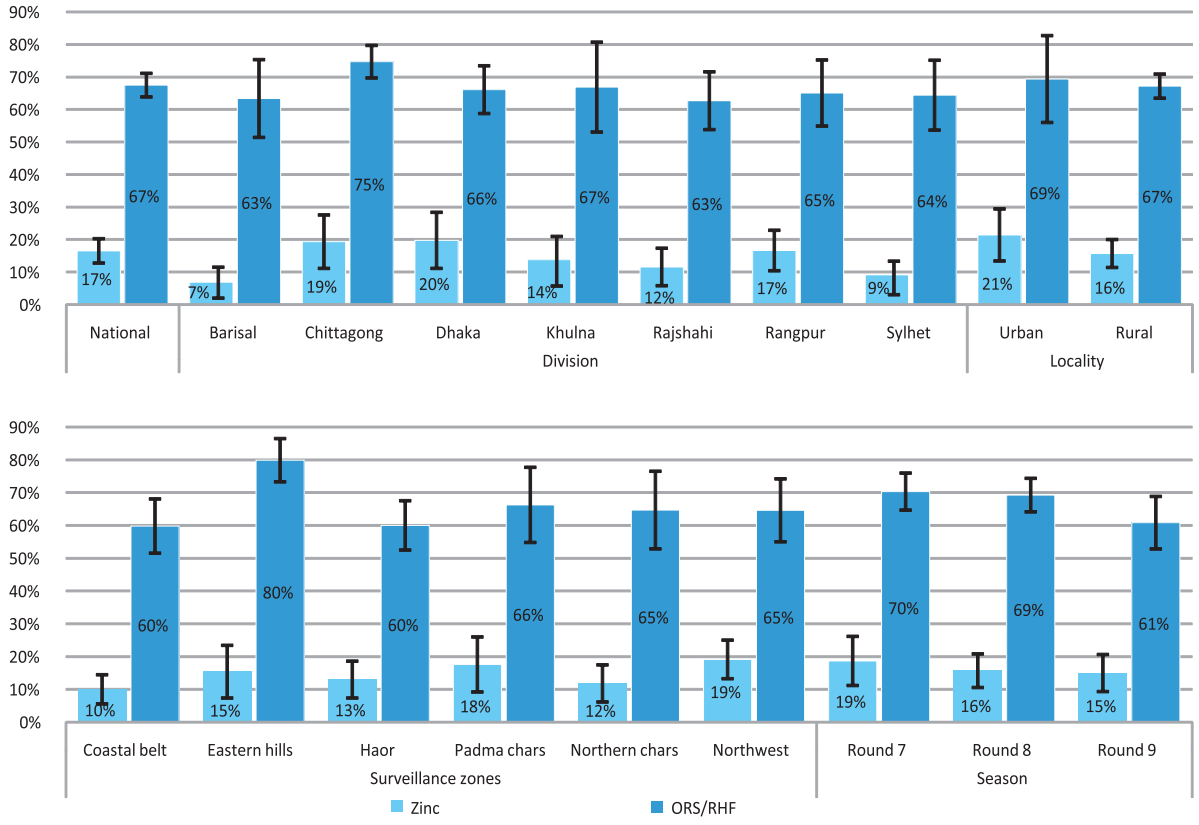


Figure 8.30 : Proportion of children with diarrhoea given zinc or ORT therapy by child age and sex

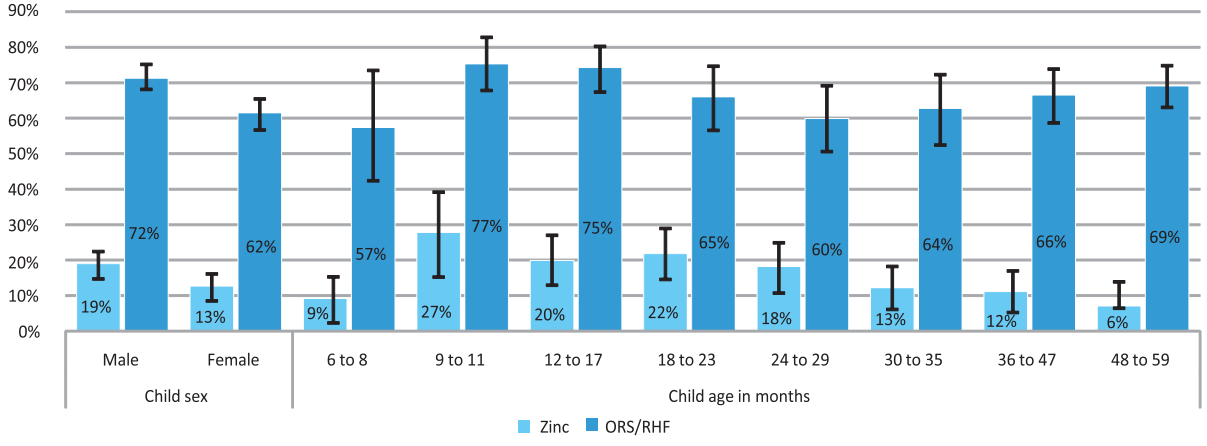
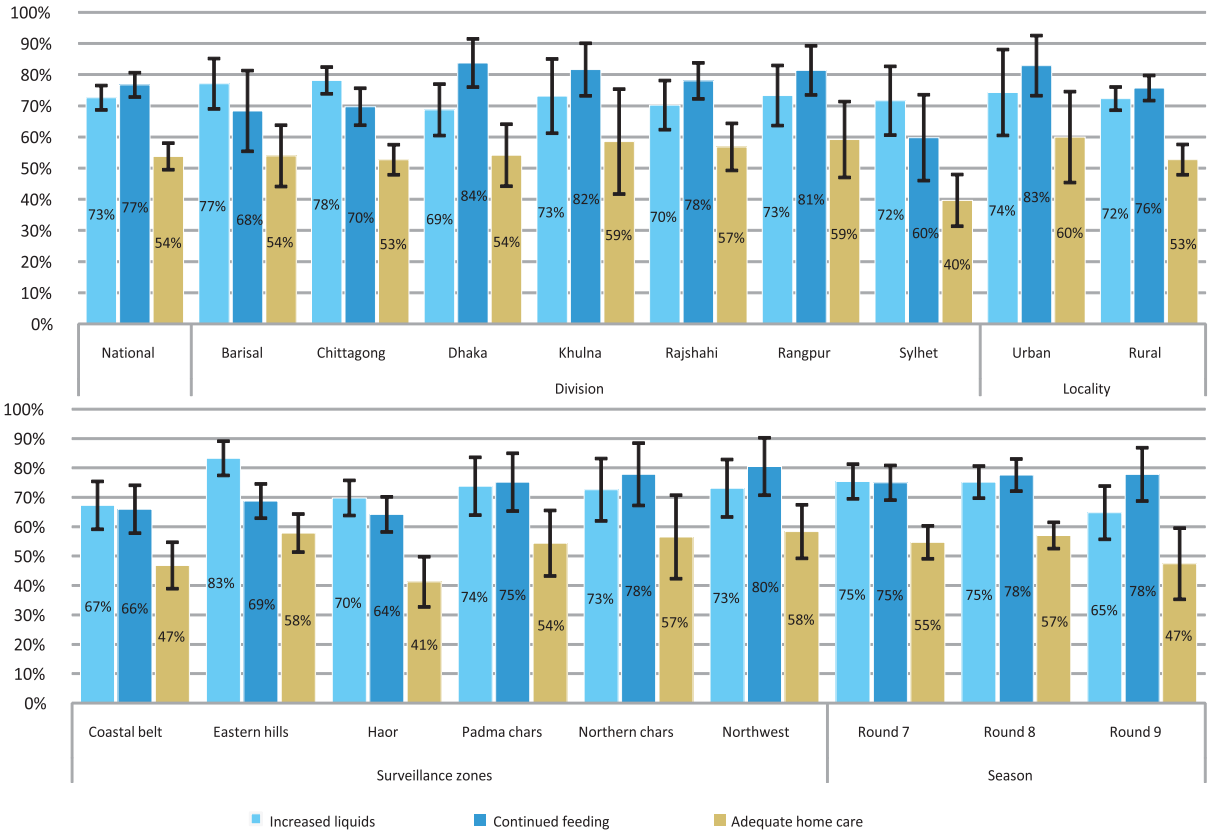


Figure 8.31 : Proportion of children with diarrhoea given increased fluids and continued feeding by residence



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. Finally, 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.[12] Finally, children recently sick with diarrhoea are classified as having received adequate home care if they received both increased liquids and continued feeding.

It is clear from Figure 8.30, that a far greater proportion of children were given adequate home care than ORT during their more recent illness. Nationally, around three quarters of children recently ill with diarrhoea were given increased liquids and continued feeding during their most recent illness, yet only a little over half of recently ill children received both of these care practices. These indicators show a strong improvement of five to ten percentage points between 2011 and 2012.

12 This definition varies slightly from that used in the DHS system. In the DHS system a child is classified as having received continued feeding even if the amount of food offered to the child in "somewhat less" than the usual amount (17), while FSNSP does not include this category.

Nutritional status of children

FSNSP recorded the height, weight, and MUAC measurements of over 13,500 children in 2012 in order to estimate the nutritional status of children in Bangladesh.

Based on trends in child stunting, from 46% in 2005 to 37% in 2012, Bangladesh is likely to meet the fifth World Health Assembly global nutrition target of a 40% reduction in child stunting by 2025.

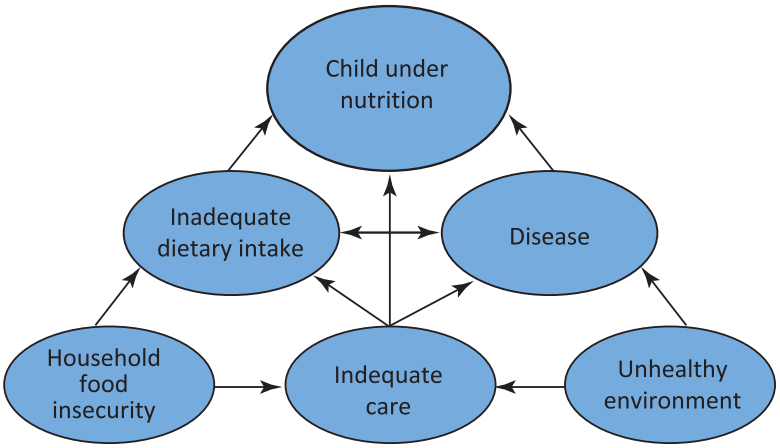
Estimates of child stunting declined in all divisions except Chittagong, Khulna, and Sylhet between 2011 and 2012; rates of stunting were much higher in Sylhet than in the rest of the country.

Over 4.3 million children suffered from wasting at some point during 2012, with significant seasonal variation particularly in the Haor, Northwest, and Northern char zones.

The children of uneducated mothers, and those living in poor or food insecure households, experience the highest rates of wasting and stunting.

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. In line with the United Nations' Children's Fund's (UNICEF) framework for the causes of child malnutrition (1), this report has discussed some of the underlying and immediate determinants of child malnutrition including unhealthy home environments, household food insecurity, and inadequate care practices for pregnant mothers, women, and young children. To conclude the framework, this chapter details the level of child malnutrition in Bangladesh in 2012.

Figure 9.1 : UNICEF conceptual framework of child malnutrition



Under nutrition has a staggering cost. As under nutrition and infection are closely interrelated, an under nourished child is more susceptible to disease, and a sick child is more likely to become under nourished. 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 (2). 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 (3). Changes in levels of child under nutrition in developing countries tend to be closely related to mortality trends (4), making health interventions less effective unless nutrition is addressed concurrently (5; 6). In addition, under nutrition during critical periods of child development can result in lower worker productivity in adulthood (7). 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 (8). 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 (9).

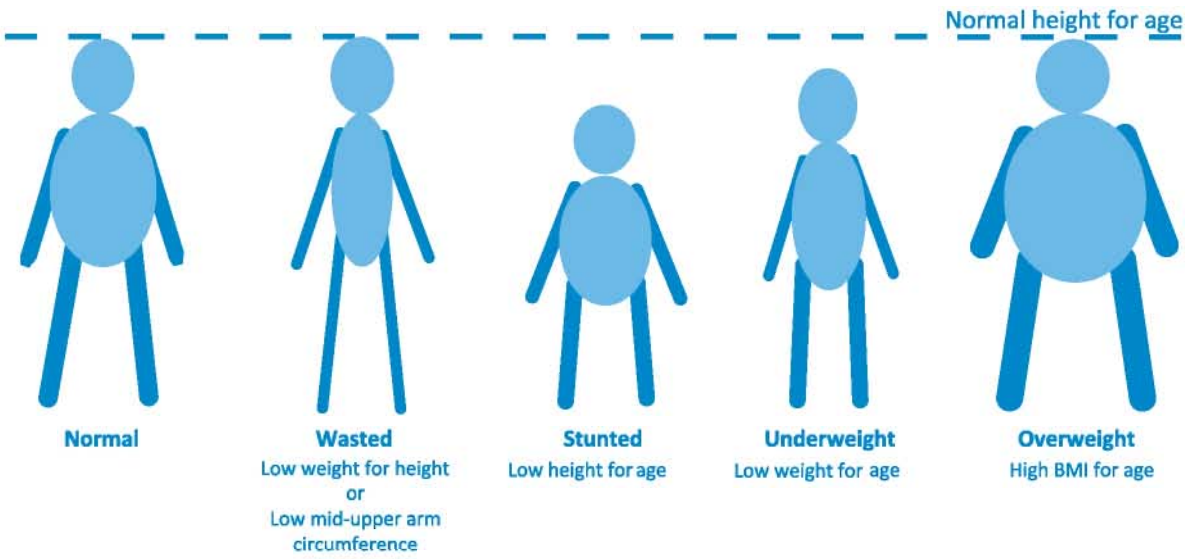
Table 9.1 : Children measured by age

Age group in months	Number	Weighted proportion
0 to 5	1,067	8%
6 to 11	1,338	10%
12 to 17	1,247	10%
18 to 23	1,266	10%
24 to 29	1,344	10%
30 to 35	1,299	10%
36 to 41	1,293	10%
42 to 47	1,291	10%
48 to 53	1,345	10%
54 to 59	1,299	10%

In order to estimate the nutritional status of children in Bangladesh, FSNSP records the height, weight, and MUAC measurements of all able-bodied children in interviewed households. In 2012,

FSNSP measured over 13,500 children across the country (detailed in Table 7.1). 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 (10). Developed by the World Health Organization (WHO), this reference is valid for all populations as the seven-year study on which it is based indicated that children have the same growth potential up to age five, irrespective of their ethnic background.

Figure 9.2 : Indicators of childhood under nutrition



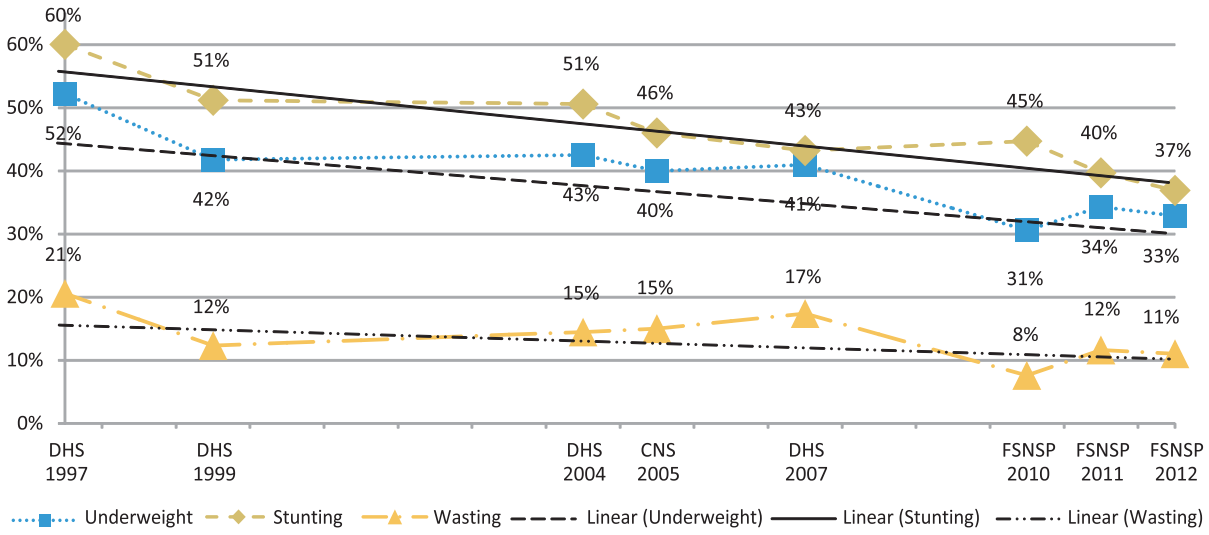
FSNSP examines multiple measures of childhood malnutrition using this reference population. To estimate the level of chronic under nutrition, comparisons are made between height/length by age as this measures the cumulative effects of growth retardation. This measure is called "stunting" or low height/length 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. A depiction of the four main indicators is given in Figure 9.2.

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 (11).

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.[1] 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 (11).

Children grow with slightly different trajectories, and lulls and spurts in growth occur even among well-fed children (12; 13). 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 : Recent trends in the prevalence of child under nutrition (moderate and severe, 0 to 59 months)[2]



Since independence, Bangladesh has greatly reduced levels of child under nutrition and is one of the few countries worldwide in which reductions in under nutrition have kept pace with reductions in poverty (14). Figure 9.3 tracks the three most common measures of child under nutrition from 1997 to 2012 (15; 16; 17; 18; 19; 20; 21). As was stated last year, since 1997 there has been a small reduction in child wasting and more sizable declines in child stunting and underweight. However, these declines have not been uniform. A rapid decrease in rates of child under nutrition occurred between 1997 and 1999, slowing from 1999 to 2004, and then a subsequent period of inconsistent declines that are most likely a reflection of measurement differences between studies.[3] Between 2010 and 2012, consistent improvements are apparent. Notably the prevalence of stunting fell significantly from 40% to 37%, and, for the first time, the level of stunting in Bangladesh is below the WHO cut-off for very high prevalence (22).

1 BMI for age is the recommended indicator for determining childhood overweight and obesity according to the WHO (36; 37). However, survey systems, such as the DHS system, more commonly uses the weight-for-height or weight-for-age measures.

2 Though not included on the graph above, the 2012 preliminary BDHS results are congruent with FSNSP 2012 findings (48).

3 This trend should be examined while taking into account the different seasons in which the surveys took place. The BDHS in 1999/1997 and 1999/2000 took place from November to March, the 2004 BDHS was from January to May, and the 2010 FSNSP took place from January to April.

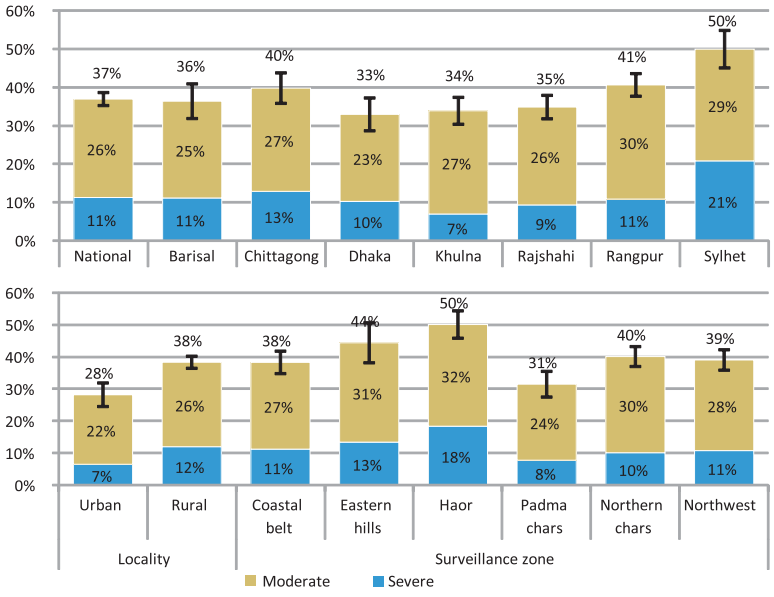
Chronic child under nutrition

Chronic child under nutrition is often invisible. When the majority of children in a population are growing sub-optimally, this pattern is often seen as normal and not warranting concern, even though children who suffer from chronic under nutrition will fail to fulfil their genetic potential, both mentally and physically. As such, prevention of stunting is often a goal of development programmes. As described in the UNICEF framework, 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 (23; 24; 25).

As described above, the most common way to measure chronic child under nutrition is to compare children's growth attainment to what is usual in a well-nourished population. In line with a decrease of childhood stunting from 40% to 27% globally and from 49% to 28% in Asia between 1990 and 2010 (26), rates of stunting reduced greatly in Bangladesh. As shown in Figure 9.3, rates of childhood stunting have dropped by over one-third in the 16 years between 1997 and 2012. This decline of 1.5 percentage points a year is well over double the worldwide annual rate of reduction of 0.6 percentage points from 1990 to 2000 (26). For the first time in 2012, the rate of stunting was below the cut-off for the very high prevalence level of 40% as defined by WHO for describing a critical public health problem (22). However, Bangladesh is still classified as having a high prevalence of chronic malnutrition and over five and a half million children in Bangladesh stunted (22). As stunting during childhood has been associated with a 20% reduction in adult earnings, further declines in the current high rates of stunting would help to produce a stronger and more productive labour force and contribute to faster and more equitable national economic growth (7).

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 the results shown in 2011, rates of childhood stunting in Sylhet were much higher, and rates in Dhaka, Khulna, and Rajshahi were much lower than in the rest of the country. On average, as expected, urban areas fared much better than rural areas. Estimates for all divisions except Chittagong, Khulna, and Sylhet declined between 2011 and 2012. This failure to improve is especially troubling for Sylhet as this division has significantly higher rates of chronic under nutrition than other divisions in both 2011 and 2012. Among the surveillance zones, rates of stunting were lowest in the Padma chars zone, and highest in the Haor zone, where one-half of children sampled were stunted in both 2011 and 2012.

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



Consistent with previous FSNSP 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 a higher proportion than children from food secure households. However, a significant proportion of children were chronically malnourished even in the wealthiest and food secure households. Between 2011 and 2012, rates of chronic child malnutrition did not change among households consuming poor or borderline diets (46% both years) or households with a food deficit (47% in 2011 and 48% in 2012). Whether or not mothers were engaged in earning income had a small but significant association with rates of child stunting. This could be due to the fact that mothers from poorer households are more often those who earn income due to the household's greater need.

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

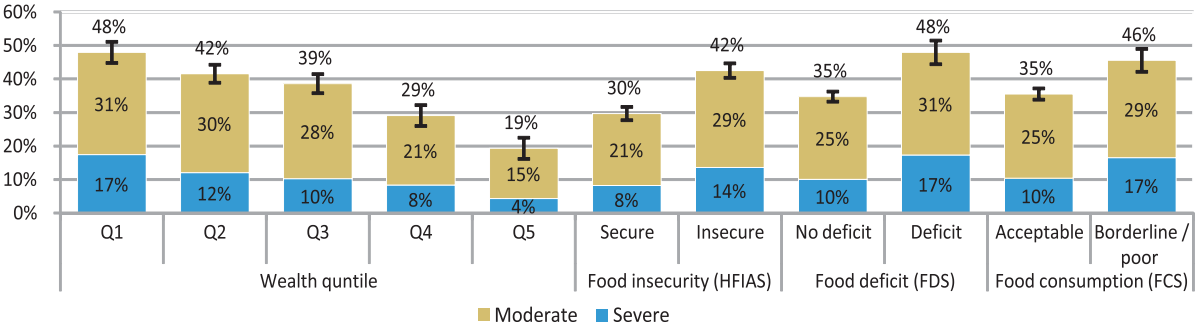


Figure 9.6 : Chronic under nutrition by maternal characteristics

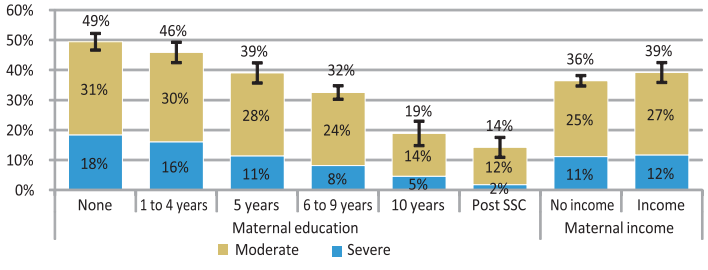


Figure 9.7 displays rates of chronic under nutrition by child age and sex. As was seen in 2011, there were no differences in rates of under nutrition between male and female children, but some age-related patterns are apparent. Chronic under nutrition starts before birth with intrauterine growth retardation, and 16% of

children zero to two months of age in Bangladesh were stunted. However, the greatest reduction in rates of chronic malnutrition occurred among this age group (24% in 2011). Rates of chronic under nutrition continue to increase over the first year of life and the proportion of children with chronic under nutrition peaks in the second year.

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

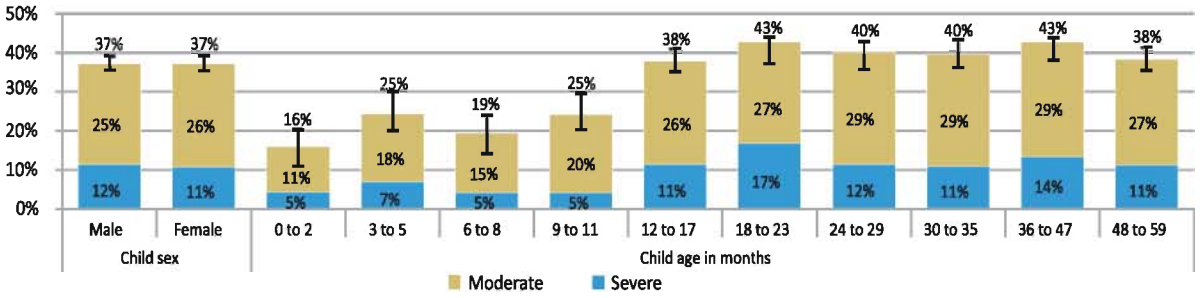
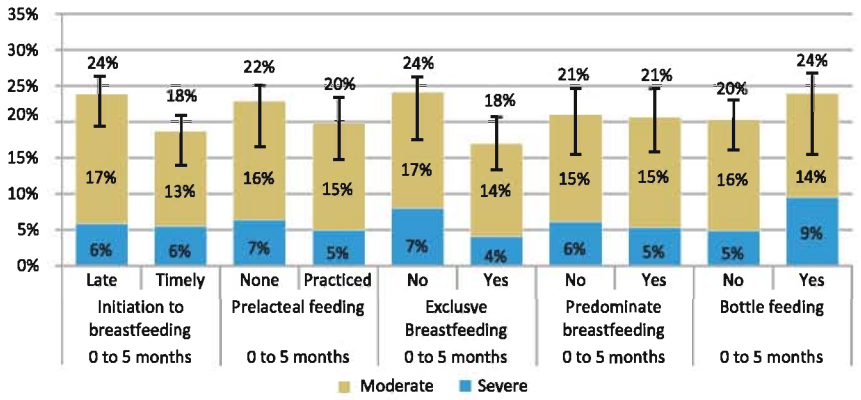
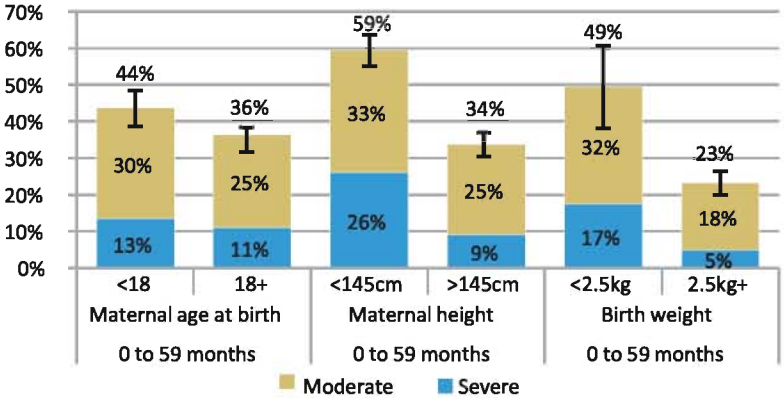


Figure 9.8 : Prevalence of chronic under nutrition by early child breastfeeding



As depicted in Figure 9.8, the rate of stunting was higher among children who were not initiated to breastfeeding within the first hour of life, though the difference was not significant. Similarly, there were large differences in the rates of stunting between children exclusively breastfed in the past 24 hours compared to those not breastfed, though again the difference was not significant. Interestingly, higher rates of stunting were found among children who continued breastfeeding (data not shown); though this is likely to be related to the characteristics of households in which children are breastfed for a long time (See page 120).

Figure 9.9 : Prevalence of chronic under nutrition by maternal characteristics

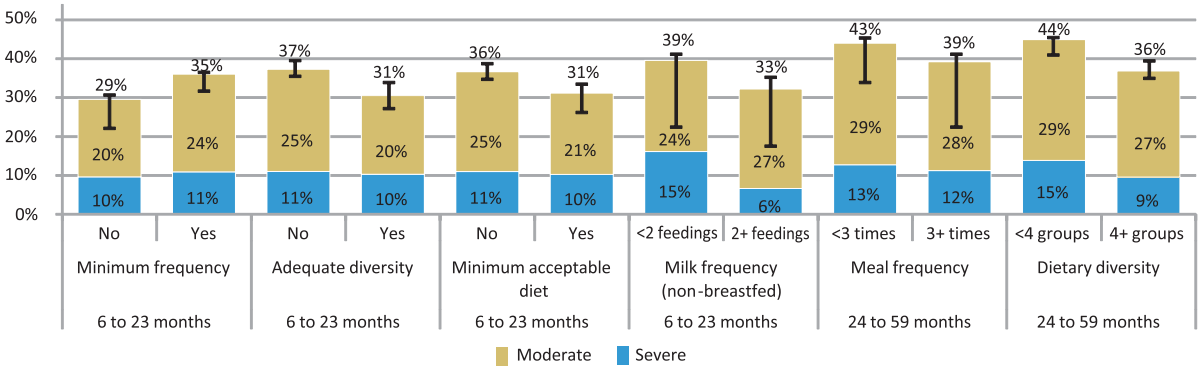


In line with 2011 FSNSP results, in 2012, early maternal age at birth, maternal height, and a low birth weight were significantly associated with greater levels of childhood stunting. Mothers who were younger than 18 years old at birth had children that were stunted in greater proportion than mothers who gave birth

at 18 or later. In line with the numerous studies that have documented the intergenerational nature of under nutrition (27; 28; 25; 29), children of women shorter than 145 cm were stunted in a much greater proportion than children of taller mothers. Among children for whom birth weight was recorded, children whose birth weight was below 2.5 kg (low birth weight) were stunted at more than double the rate of children who were over 2.5 kg at birth (23%).

In 2012, 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). In contrast, adequate diversity of diet for children both 6 to 23 months of age and 3 to 5 years of age was associated with lower stunting rates (figure 9.10). Meal frequency and milk feeding frequency of non-breastfed infants were not significantly associated with stunting. Infants and young children less than six months to two years of age who were fed in line with minimum standards were stunted in a lower proportion than children not fed in line with these standards, but the difference was not significant.

Figure 9.10 : Prevalence of chronic under nutrition by complementary feeding

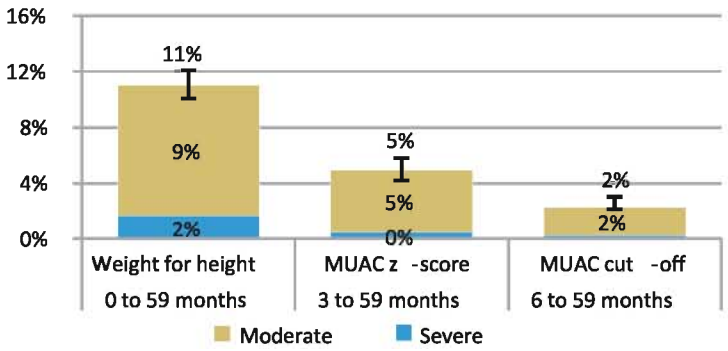


Acute child malnutrition

Worldwide in 2011, an estimated 52 million children under five years of age were moderately or severely wasted, an 11% decrease from 58 million in 1990 (30). In contrast to chronic child under nutrition, acute malnutrition is starkly visible to the observer. Children who are acutely malnourished are emaciated (marasmus) or have lost muscle mass while developing swollen limbs and bellies (kwashiorkor). Acute malnutrition is caused by a sharp reduction in the absorption of sufficient nutrients required for health, due to recent inadequate dietary intake or illness. Lacking essential calories and nutrients, a wasted child's body will begin to metabolise its own muscle to meet its need for protein, minerals and energy. A child who suffers from severe acute malnutrition has a risk of death up to 20 times greater than that of a healthy child. Wasting may result from severe food shortages, poor feeding practices, or infections. In Bangladesh, kwashiorkor is rare, and, in recent years, acute malnutrition is largely a function of infection or poor feeding practices, rather than failed harvests or famine (1). Acute malnutrition can often be prevented though adequate feeding practices and improved hygiene, assuming that households are food secure and able to access health care. Once acute malnutrition develops, it is treated in line with WHO protocols which have been regulated by the Government of Bangladesh.

As mentioned at the outset of this chapter, acute malnutrition 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 malnutrition defined as a MUAC<125mm and severe acute malnutrition defined as a MUAC<115mm (31). These three indicators are often used by different stakeholders. While weight-for-height is considered the most accurate measure of acute child malnutrition and is used most frequently in nutrition studies and evaluations, MUAC measurements are much easier to collect and more widely applied in screening children for entrance into treatment. In contrast, MUAC z-scores are rarely used as they require a similar amount of time to collect as weight-for-height measures. In addition to the low effort required to collect MUAC measurements with set cut-offs, screening staff with very low levels of education and literacy are able to identify cases of acute malnutrition using colour-coded MUAC tapes. The ages over which the three indicators are valid differs. 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 (31; 11). In addition, the MUAC cut-off loses its value in older children because, after approximately two years of age, children commonly have MUACs above 125 mm even if they have very low weight for height.

Figure 9.11 : Comparison of measures of acute malnutrition



Rates of acute malnutrition in Bangladesh vary considerably depending on what classification system is used. As shown in Figure 9.11, the prevalence of global acute malnutrition (GAM) in Bangladesh is halved when the MUAC z-score is used in contrast to weight for height z-scores (from 11% to 5%), and the prevalence was halved again, to 2%, when the MUAC cut-off criteria is used. These differences were also apparent when prevalence was examined over age in months (Figure 9.12). While the MUAC cut-off and weight for height prevalence rates are very similar from six to ten months of age, they diverge sharply after that period. Beyond 30 months of age, very few children are found to be acutely malnourished using the MUAC cut-off criteria. In contrast, the proportion of children identified as acutely malnourished 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 (32; 21). In some countries and ethnic groups, the proportion of children classified as acutely malnourished by MUAC derived criteria will be greater than that derived by weight for height z-scores (33). For the rest of this section, weight for height z-score criteria will be used to determine acute malnutrition.

Figure 9.12 : Comparison of measures that estimate the prevalence of GAM by age in months

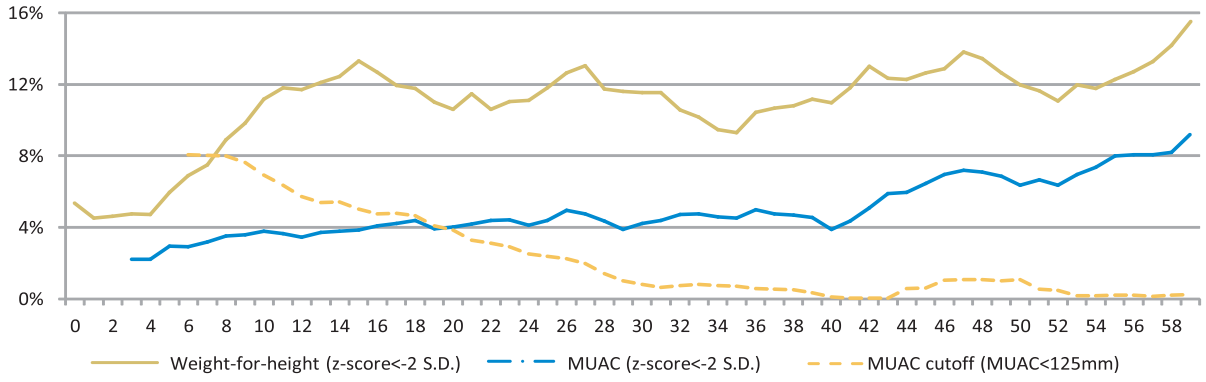
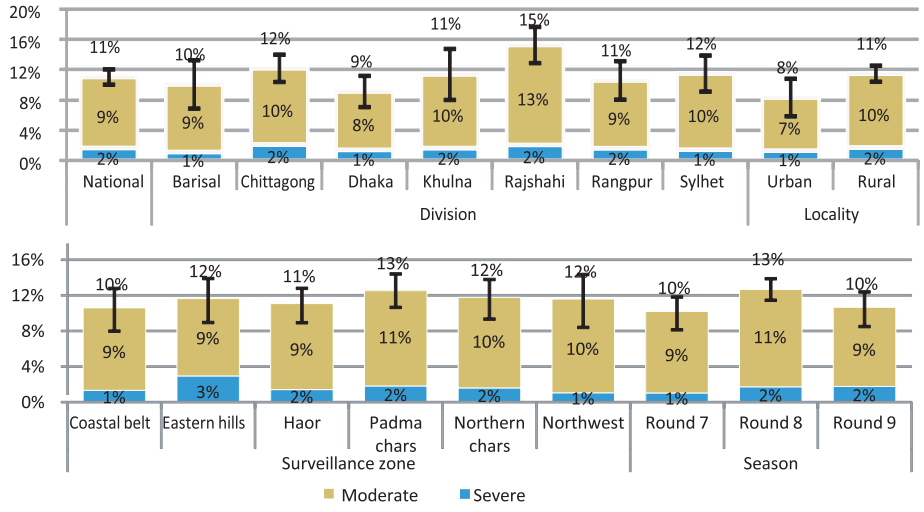


Figure 9.13 : Prevalence of acute malnutrition by area of residence and season



Though harder to discern in figure 9.3, it is likely that Bangladesh has experienced reductions in the proportion of children acutely malnourished, or wasted, once seasonality is taken into consideration.[4] In 2012, Bangladesh had a serious public health problem with respect to acute child malnutrition, according to the WHO classification system (22). Moreover, in the monsoon months, rates of acute malnutrition rose and assumed the characteristics of a critical public health problem in regions of Bangladesh (22). 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 2012 (34).

There was limited variation in the annualised rates of wasting across regions, but few were statistically significant (figure 9.13). All divisions, except Khulna, had significantly lower rates of wasting rates than Rajshahi. The rate of childhood wasting in Dhaka was significantly lower compared to Chittagong. 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 regions of the country were more remarkable. In line with historical variation, rates of wasting spiked during the monsoon months (figure 9.14). In 2012, this pattern was especially prevalent in the Haor, the Northwest, and the Northern char zones. Overall, the variation was slightly less than that observed in 2011.

4 While survey results show that in the winter of 1996/1997 wasting rates were over 20%, in recent years wasting has been much less prevalent even in the monsoon months when acute malnutrition typically peaks. In the last annualised estimate, 2005 CNS, is slightly higher than the current level. In addition, a review of wasting levels as recorded though the Nutritional Surveillance Project from 1998 to 2006, shows sizable reductions for the same season across years (32), and the longer term trend provides additional evidence that wasting in Bangladesh has reduced slowly over recent decades (figure 9.26 and figure 9.27).

Figure 9.14 : Variation in prevalence of acute malnutrition by season

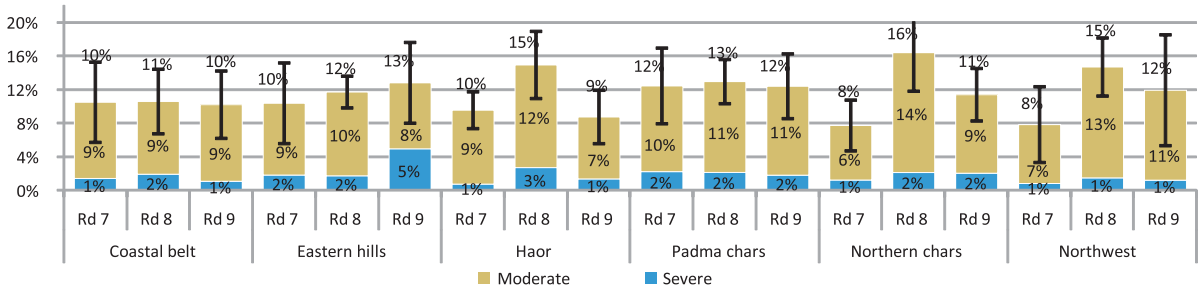
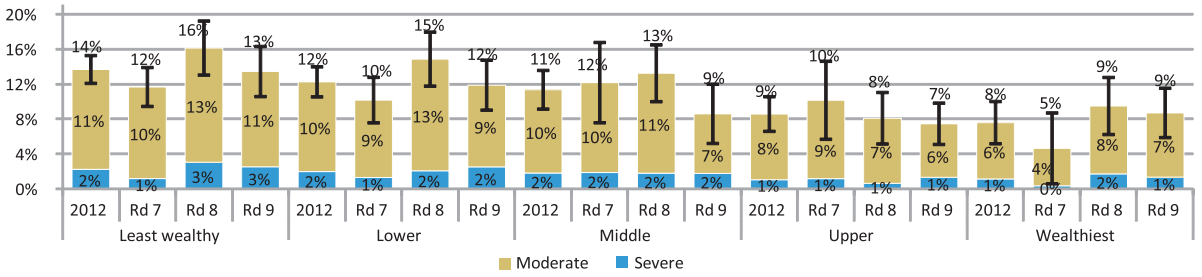


Figure 9.15 : Prevalence of acute malnutrition annually and seasonally by household wealth



Patterns of acute malnutrition 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. Similar to 2011, in 2012 there were 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 (Round 8), reaching critical levels (Figure 9.15). Children from food insecure households had higher rates of wasting annually than food secure households by every measure (figure 9.16); these disparities became even more apparent during the post-*Aus* harvest season (Round 9). However, the differences in acute malnutrition rates between food secure and a food insecure household were much less than that for chronic malnutrition and, in most cases, not statistically significant. In line with the 2011 results, children with more educated mothers were wasted in a lower proportion than those with less educated mothers. However the variation in 2012 was much less than that in 2011, ranging from 12% for uneducated mothers to 7% for mothers with education beyond SSC (annualised, graph not shown). 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 malnutrition annually and seasonally by household food security status

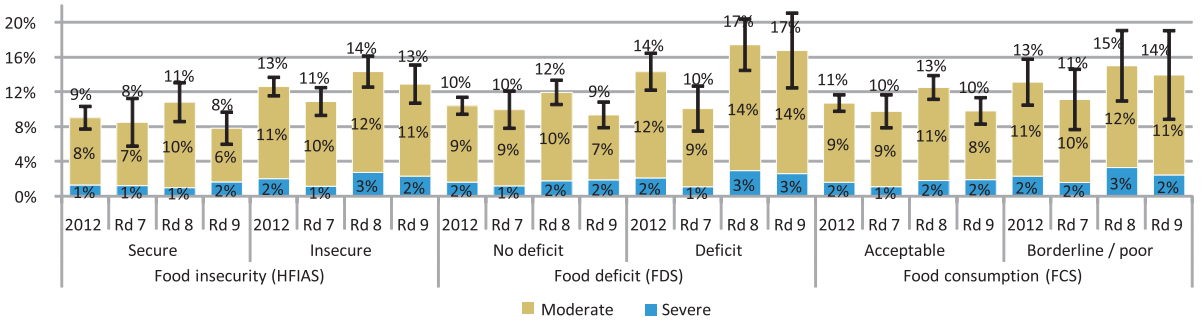


Figure 9.17 : Prevalence of acute malnutrition annually by child sex and age

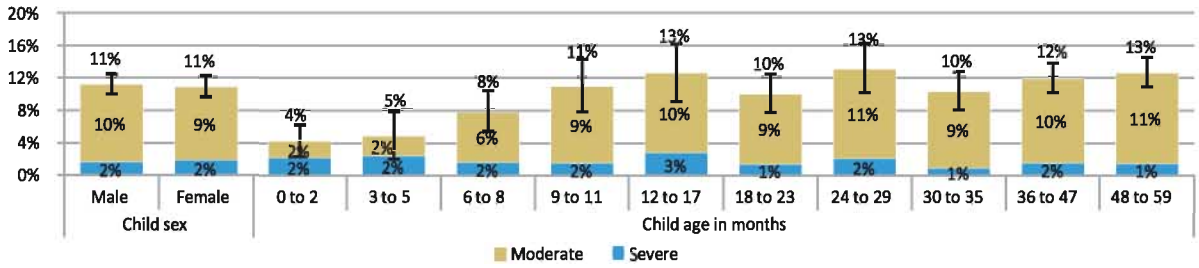
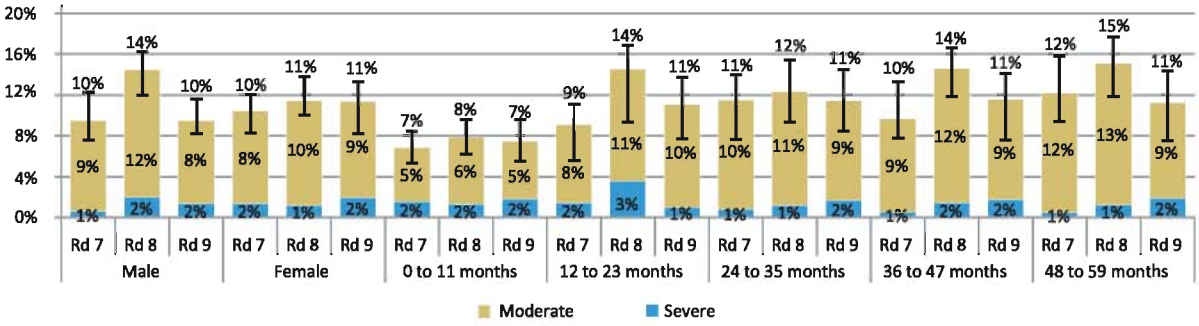


Figure 9.18 : Prevalence of acute malnutrition seasonally by child sex and age



While there were no differences in the proportion of male and female children wasted annually (Figure 9.17), there was considerable variation between the sexes seasonally (figure 9.18). During the monsoon season, a significantly higher proportion of boys were wasted compared to girls (Round 8). In addition, there were differences across ages. Rates of wasting are lower before nine months and greater after one year of age. There was seasonal variation in these estimates; wasting peaked during the monsoon season, Round 8, for every age group except the youngest.

Figure 9.19 : Acute malnutrition by complementary feeding

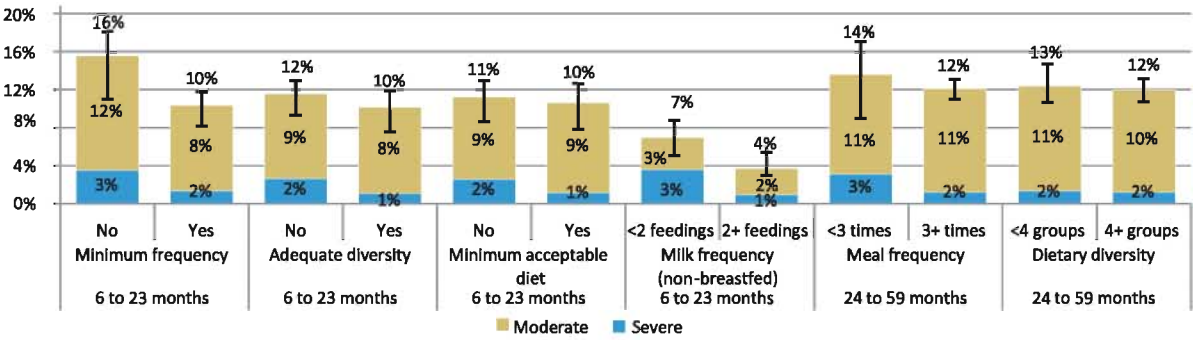


Figure 9.20 : Acute malnutrition by maternal characteristics

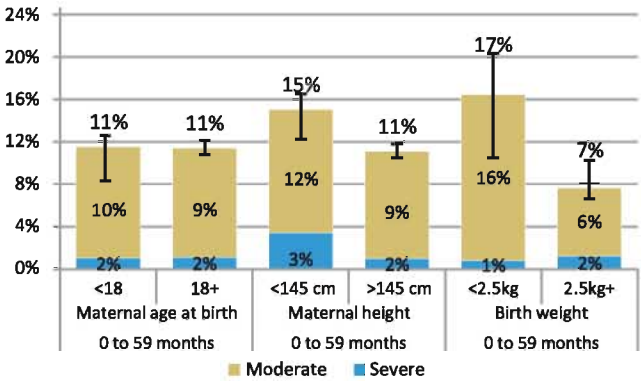
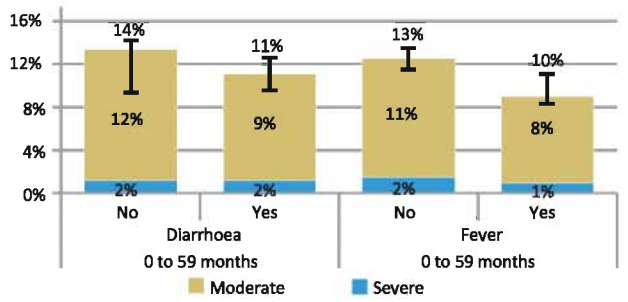


Figure 9.21 : Acute malnutrition by recent illness

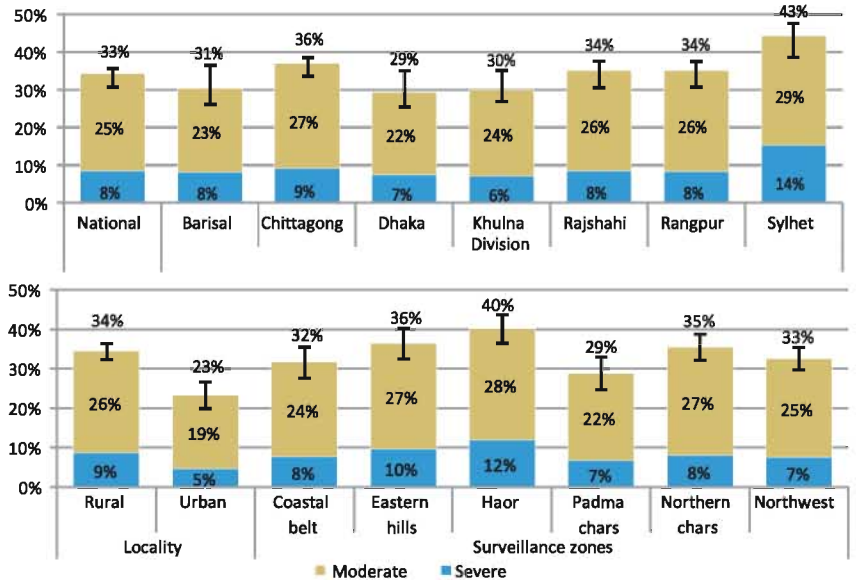


Few indicators of maternal and child care were significantly associated with acute malnutrition. Early breastfeeding behaviours such as early initiation, no pre-lacteal feeding, and exclusive breastfeeding were not linked to reduced rates of wasting in children zero to six months of age (not shown). No statistically significant differences in rates of wasting across complementary feeding indicators, except minimum frequency among children aged six to 23 months, were apparent (figure 9.19). No variation was found in the level of wasting based on maternal age but wasting was related with maternal height (Figure 9.20). 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 much higher rate, and both diarrhoea and fever were significantly associated with wasting (figure 9.21).

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.

Figure 9.22 : Prevalence of child underweight by area of residence



Prevalence rates for child underweight by regions of the country, child sex and age in months are presented in figure 9.22 and Figure 9.23. Nationally, the rate of child underweight was 34%. Based on the WHO cut-off values for public health significance, this very high prevalence rate indicates a critical situation (22).

Sylhet had the highest proportion of children underweight in 2012 as

was the case in 2011. Less than one quarter of children in urban areas were underweight, while over 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 ninth month of age and stabilised above 30% after one year (figure 9.23). Because child underweight is a composite measure, variations by household characteristics were very similar to those observed for wasting and stunting and are therefore not presented.

Figure 9.23 : Prevalence of child underweight by child age and sex

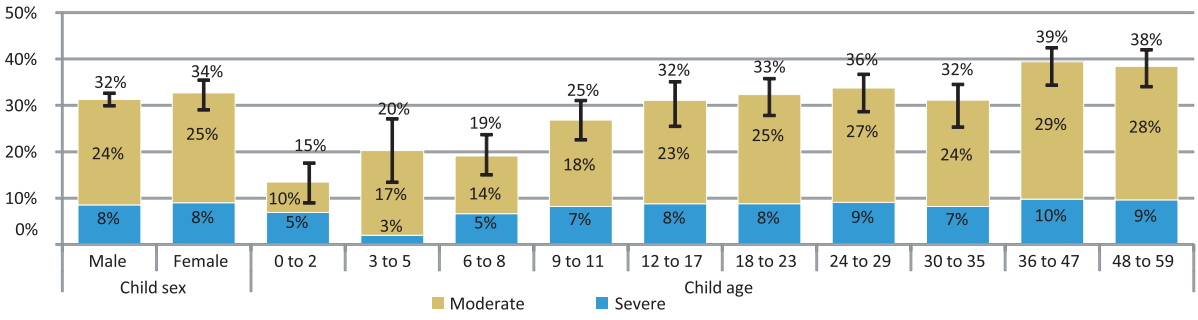
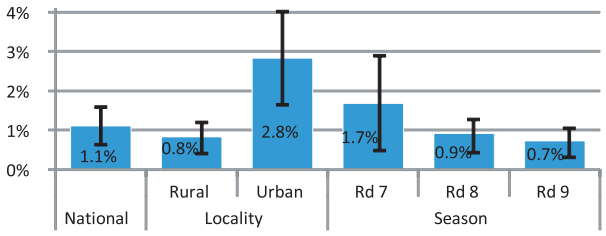


Figure 9.24 : Early childhood obesity



In contrast to child underweight, overweight and obesity among young children is not yet a large concern in Bangladesh, as has been indicated in FSNSP and recent surveys. In 2012, based on BMI for age, 1% of young children were moderately overweight and almost no young children were severely overweight (figure 9.24). This proportion is similar to the proportion of children overweight using weight-for-age z-scores (0.5%) and weight-for-height z-scores (1.0%). Troublingly, the proportion of young children in urban areas who are overweight has doubled from 1.2% in 2011 to 2.8% in 2012. This change may be the start of a worrying trend, although the 2012 level of obesity was still in line with the 2.2% expected in a well-nourished population.[5] Worldwide, although the prevalence of overweight remains higher in high-income countries (8%) than in low-income countries (4%), in 2011 an estimated 69% of the global burden of overweight children under 5 years old was in low- and middle-income countries (35).

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 (36; 37). Ratified in 2002 by 189 member states of the UN, the MDGs were constructed during a time when global development debates focused on better aid from rich countries and better policies in poor ones (37) al though many of the themes are still relevant. However, as the 2015 target date for the MDG's approaches, new goal setting processes are being discussed that differ from those used at the turn of the 21st century. Future targets will be

5 This change may also be linked to the change in sampling methods used in 2012 compared to 2011 as the sample in 2012 was drawn from areas of greater population density. The 2013 FSNSP data will shed more light on these underlying trends.

further imbedded within country contexts and increasingly led by southern partners. This section will review progress towards MDG 1 - Child hunger and give key indicators for the new World Health Assembly goals.

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.[6] 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 9.25, 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.[7] 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 (39) .

Figure 9.25 : Rates of global child under nutrition (6 to 59 months)

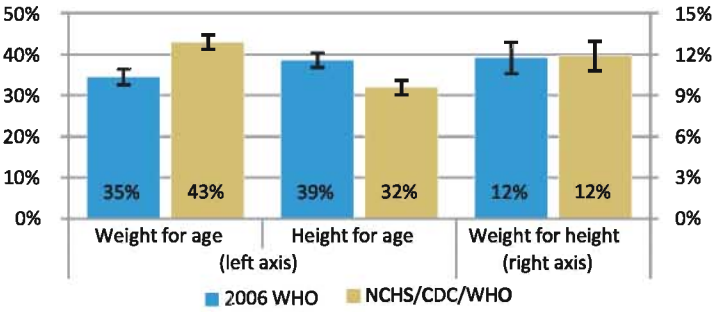


Figure 9.26 graphs FSNSP alongside past survey results in order to track Bangladesh's progress toward the MDG 1 child underweight goal - to halve rates of child underweight from 66% in 1990 to 33% by 2015 (15; 16; 17; 18; 19; 36; 37; 38; 20; 21) (39; 40). Because of the seasonality of these estimates, care in interpretation is required. Given that figures from the 1990 CNS and 2012 FSNSP represent national averages across seasons, a comparison of these two estimates is the most reliable and long term means to assess progress. Results indicate a reduction of 1% per year in average child underweight in Bangladesh from 1990 to 2012. In order to reach the MDG goal, the rate of reduction would have to triple to slightly over 3% per year for each of the next three years. While the rate of reduction in child underweight has continued to decline with a 2% reduction from 2011 to 2012, 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, it would have been likely that Bangladesh would reach the goal (figure 9.27).[8] 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 9.26).[6]

6 Unlike the updated WHO child growth reference, the children from the NCHS/CDC/WHO reference group were all from the United States of limited ethnic diversity and, being primarily formula fed, were not fed in line with current WHO recommendations for child feeding (49; 50). The NCHS/CDC/WHO reference was used from 1977 until 2006.

7 Though the MDG goal refers to reducing child underweight for all children under five, in Bangladesh this goal has been tracked only for the age group six to 59 months, because the MDG benchmark survey in 1990 only included children aged from six to 72 months.

8 The values in this graph are based on a re-analysis of the original data, or if this was not available, the algorithm given in Yang & de Onis was used (51).

Figure 9.26 : Long-term trends in child under nutrition in Bangladesh (NCHS reference, 6-59 months)[7]

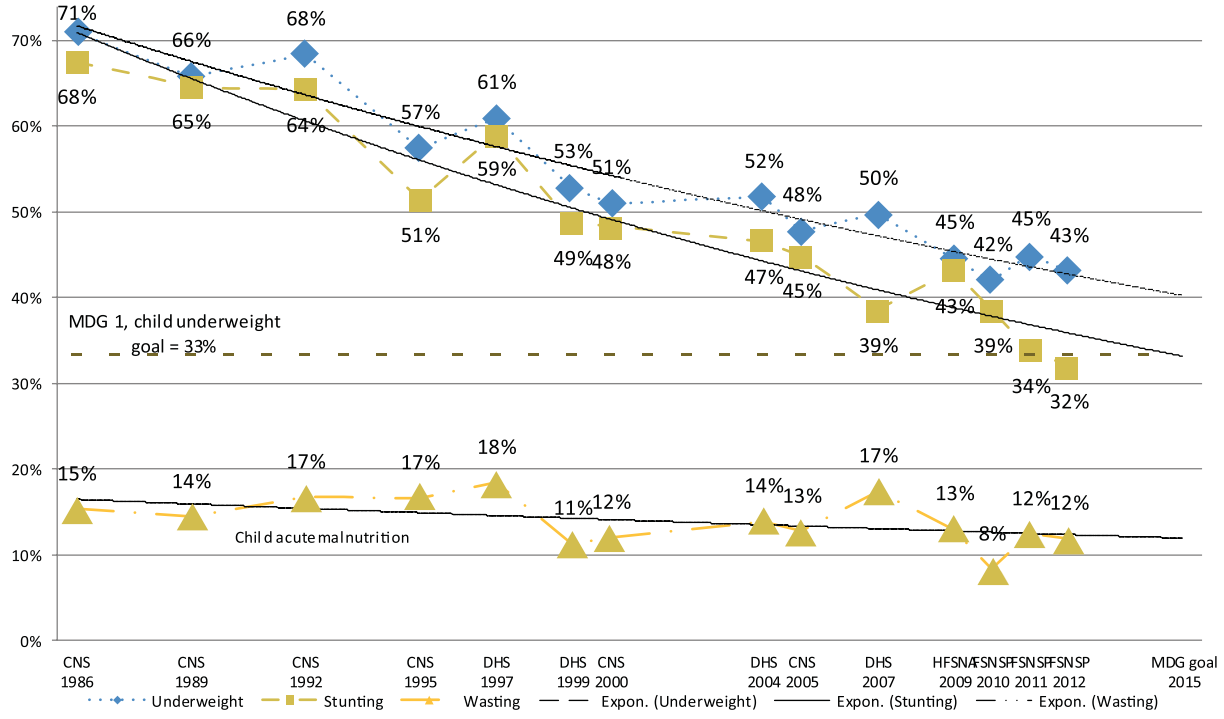
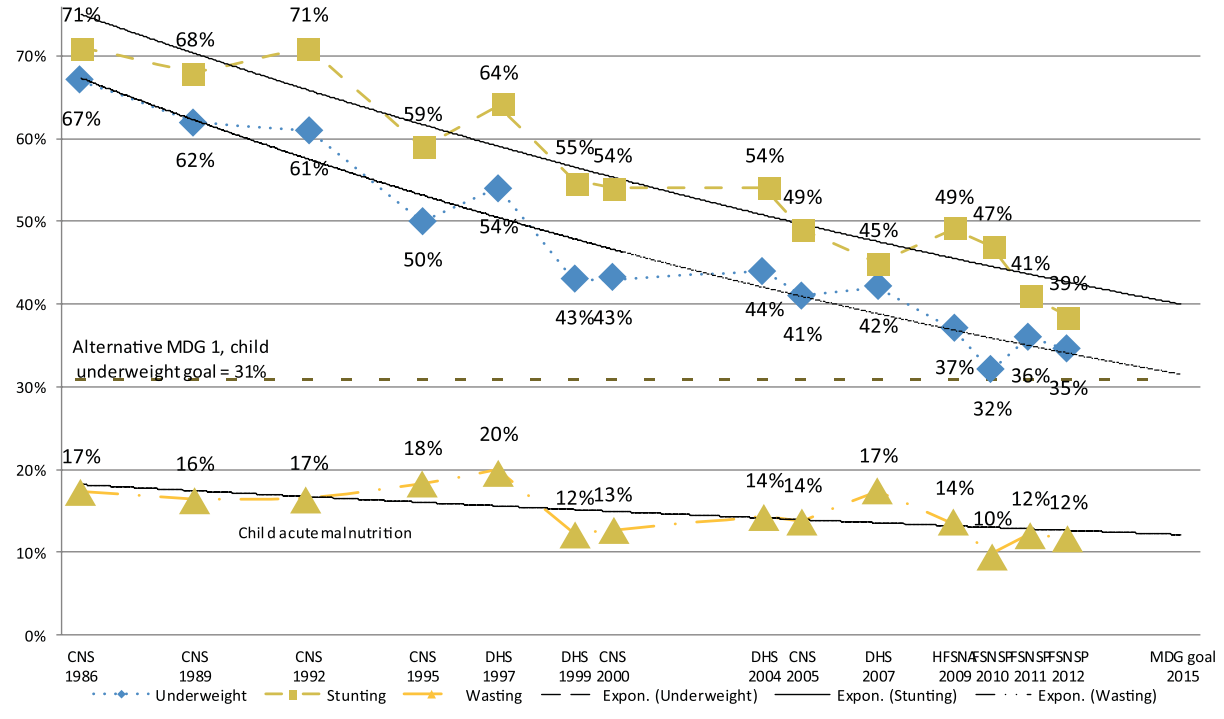


Figure 9.27 : Long-term trends in child under nutrition in Bangladesh (WHO reference, 6-59 months)[8]



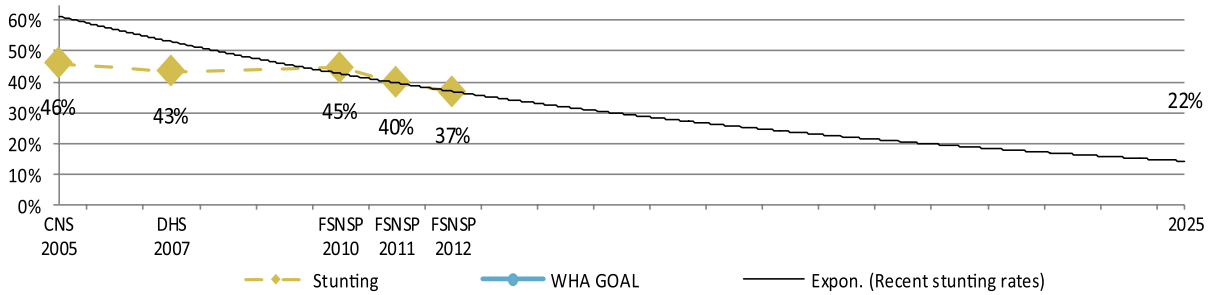
World Health Assembly goals

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 (41). These six targets 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 to less than 5% (41).

The criteria used in selecting indicators included their epidemiological and public health relevance; availability of effective and feasible evidence-based public health interventions; evidence that targets can be achieved in all countries regardless of income level; consistency with targets included in existing policy frameworks; existence of surveillance systems or data collection instruments with the potential for establishing baselines and monitoring changes over time; and national capacity for monitoring proposed target indicators (45). In total, four of the six targets are related to children's nutritional status. Encouragingly, preliminary analysis on indicators that directly or indirectly measure these targets show that Bangladesh is on track to meet three of these four goals.

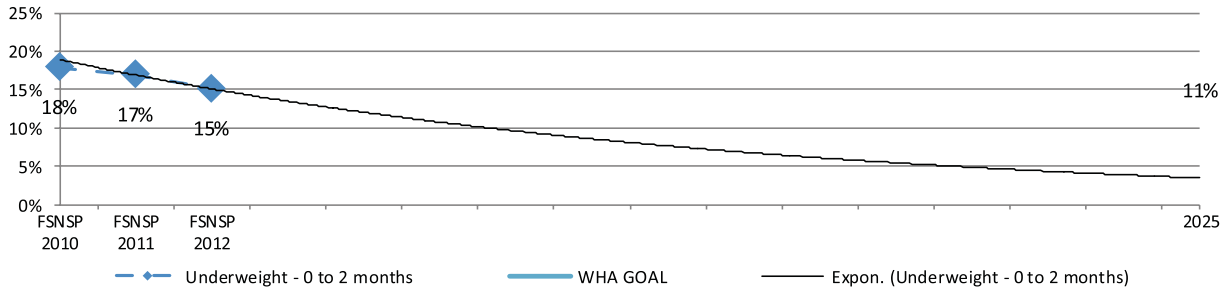
Stunting in children was included as the first World Health Assembly global nutrition target. Stunting is also one of the key indicators recommended by both the *Countdown to 2015 for Maternal, Newborn and Child Survival* (43) and the *Commission on Information and Accountability for Women's and Children's Health* (44). The specific goal is to reduce the prevalence of stunting by 40% by 2025. Based on decreasing trends from 46% in 2005 to 37% in 2012, this goal can likely be met (figure 9.28). In the year between 2011 and 2012 alone, the prevalence rate of stunting reduced from 40% to 37%.

Figure 9.28 : Trends of stunting for under five children in Bangladesh



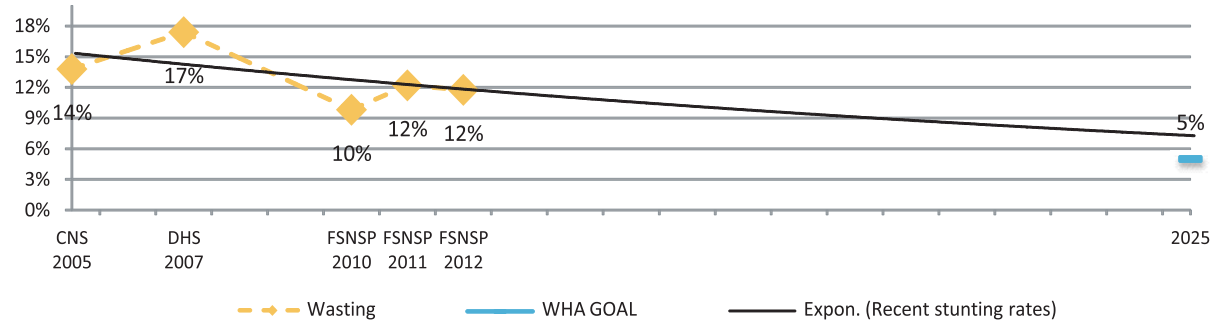
The second goal is to reduce low birth weight by 30 percent between 2010 and 2025. Globally, more than 20 million infants, an estimated 15 percent, were born with low birth weight in 2011 (35). The greatest regional incidence of low birth weight is in South Asia with one in four newborns weighing less than 2500 grams at birth (35).Though FSNSP 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 can be used as a proxy for low birth weight. Promisingly, in recent years there have been steady reductions in the proportion of infants zero to three months of age who are underweight.

Figure 9.29 : Trends of underweight for infants zero to 2 months of age in Bangladesh



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. If this continues and the worsening rates of obesity in urban areas are mitigated (48), Bangladesh will reach this goal. The final nutritional status related World Health Assembly target is to reduce and maintain childhood wasting to less than 5% by 2015. Currently, Bangladesh is very far from this goal and has had only a very small decline in wasting rates in recent years.

Figure 9.30 : Trends of wasting for under five children in Bangladesh



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 (Banshkhali, 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, Kuliar 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, Shibalaya); Munshigonj (Lohajang, Munshiganj Sadar, Sreenagar, Tongibari); Natore (Lalpur); Pabna (Ishwardi, Pabna Sadar, Sujanagar); Rajbari (All 4 upazilas); Rajshahi (Bagha, Charghat, 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).[1] 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 and 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	■			

1 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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List of acronyms

ANC	Antenatal Care
ARI	Acute Respiratory Infection
BARC	Bangladesh Agricultural Research Council
BBS	Bangladesh Bureau of Statistics
BDHS	Bangladesh Demographic and Health Survey
BMI	Body Mass Index
BRAC	Bangladesh Rural Advancement Committee
BIGH	BRAC Institute of Global Health
CDC	Center for Disease Control
CED	Chronic Energy Deficiency
CHT	Chittagong Hill Tracts
CIP	Country Investment Plan
CMNS	Child Mother Nutrition Survey
Dfid	Department for International Development
DGHS	Director General of Health Services
DHS	Demographic and Health Survey
EC	European Commission
FANTA	Food and Nutrition Technical Assistance Project
FAO	Food and Agriculture Organization of the United Nations
FPMU	Food Planning and Monitoring Unit
FSNSP	Food Security and Nutrition Surveillance Project
FtF	Feed the Future
FWA	Family Welfare Assistant
FWV	Family Welfare Visitor
GAM	Global Acute Malnutrition
GoB	Government of Bangladesh
HA	Health Assistant
HFIAS	Household Food Insecurity Assessment Scale
HFSNA	Household Food Security and Nutrition Assessment
HHS	Household Hunger Scale
HIES	Household Income and Expenditure Survey
HKI	Helen Keller International
HNPSSP	Health, Nutrition, and Population Sector Strategy Programme
ICDDR,B	International Diarrheal Disease Research - Bangladesh
IFA	Iron and Folic Acid tablets
IPHN	Institute of Public Health and Nutrition
IYCF	Infant and Young Child Feeding
JPGSPH	James P. Grant School of Public Health
LBW	Low birth weight
MA	Medical Assistant
MDG	Millennium Development Goal
MI	Micronutrient Initiative
MICS	Multiple Indicator Cluster Survey
MoFDM	Ministry of Food and Disaster Management
MoHFW	Ministry of Health and Family Welfare
MUAC	Mid-upper Arm Circumference
NCHS	National Center for Health Statistics
NFPCSP	National Food Policy Capacity Strengthening Programme
OMS	Open Market Sale
ORS	Oral Rehydration Salts
PDA	Personal Digital Assistant
PSU	Primary Sampling Unit
REACH	Renewed Efforts against Child Hunger and Malnutrition
SACMO	Sub-assistant Community Medical Officer
SAM	Severe Acute Malnutrition
SBA	Skilled Birth Attendant
SD	Standard Deviation
SMA	Statistical Metropolitan Area
SUN	Scaling Up Nutrition
SSU	Secondary Sampling Unit
TALC	Teaching Aids at Low Cost
TBA	Traditional Birth Attendant
TCG	Technical Consultative Group
UN	United Nations
UNICEF	United Nations Children's Fund
WFP	World Food Programme
WHO	World Health Organization

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Helen Keller International (HKI): Helen Keller International is a technical assistance agency that emphasizes building the technical and operational capacities of local government and non-governmental partners. In the past two decades, HKI has successfully designed, implemented, monitored, and evaluated more than 40 community-based, health and nutrition projects in 22 countries. During its 30 years of working in Bangladesh, HKI has provided technical leadership in nutritional surveillance, homestead food production, vitamin-A supplementation, and nutrition behaviour change education.

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