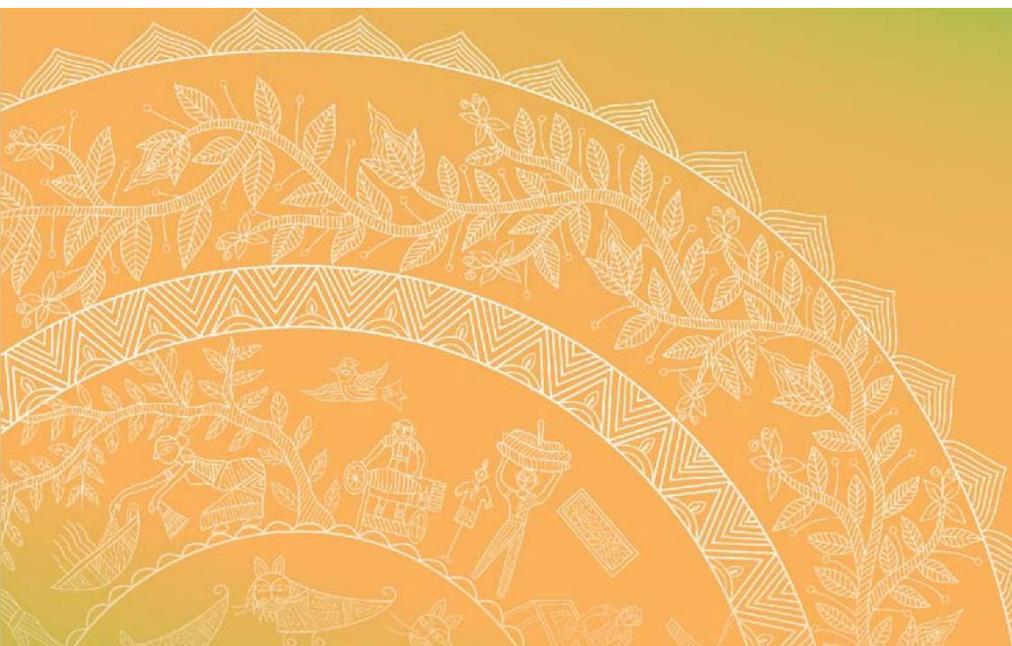# State of Food Security and Nutrition in Bangladesh 2018-19
Draft Report

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

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

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State of Food Security and Nutrition in Bangladesh 2018-19

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EXECUTIVE SUMMARY

Despite significant accomplishments in achieving the Millennium Development Goals, Bangladesh continues to have a "high" prevalence of malnutrition, which threatens to hinder the attainment of Sustainable Development Goals (SDGs). BRAC James P Grant School of Public Health (JPGSPH) under BRAC University, BRAC, Helen Keller International (HKI), and Bangladesh Bureau of Statistics (BBS) under the Ministry of Planning have been carrying out food security and nutritional surveillance since 2008. This surveillance system helped to monitor the health and nutrition situation of the country. This unique initiative captured household socio-economic status, agriculture, food security, and child health/nutrition information through a single surveillance system. Initially, it was a five-year project (January 2009 to December 2013) in which the European Commission provided 90% of the funding, while JPGSPH provided the remaining 10%. After this phase, the Government of Bangladesh has taken over the project and provided funding for the continuation of this surveillance in 2015 and 2018. As Bangladesh is passing through an epidemiological and demographic transition, it was felt necessary to collect data on adolescent, adult, and geriatric nutrition along with maternal and child nutrition. Accordingly, in the 2018-2019 round of surveillance, these population groups were included.

In this round, we listed 25,371 households in 82 clusters randomly selected from rural, non-slum urban, and slum areas of Bangladesh. The clusters were selected to ensure divisionally representative data. From the listed households, we randomly selected 17,323 with not more than one participant from any of the targeted age groups in any household and collected data from them. In these households, we interviewed the head of the households to collect data on socio-economic status and other variables, including food security, water, sanitation, and hygiene. Apart from the household heads, we collected data from and carried out anthropometric measurements of 30,005 respondents (5,033 under-five children, 5,004 adolescent boys, 5,010 adolescent girls, 5,112 20-59 years old women, 4,951 20-59 years old men, and 4,895 elderly people).

The key findings by data domain and population groups are given below.

Household Characteristics

❖ Nationally, the mean household size was 4.5 members. Overall, 40% of the households had under-five children, with the smallest proportion recorded in the rural areas (40%) and the highest in the slum areas (43%).

❖ More than one-third of household heads (40%) were uneducated, and only 7% had completed education beyond SSC. The highest proportion of household heads with no formal education were in slum areas (49%). There was a wide variation of educational status of the household heads across the division.

❖ Nearly 21% of households consume vitamin A fortified edible oil, while the percentage of households using fortified edible oil containing vitamin D and E is 12% for both.

❖ Nationally, 23% of the household heads were found to be women.

❖ Rural areas were much more impoverished than non-slum urban areas. For example, in non-slum urban areas, 67% of households belonged to the wealthiest quintile. In contrast, in rural and slum areas, only 10% and 20% of households fall into the wealthiest quintile.

❖ Nationally, only 14% of households received remittances in 2018-19 - ranging from 5% of households in non-slum urban and slum and 14% households in rural.

Food Security

❖ The number of households that reported only eating rice due to lack of access to other food items is 13.5%, the rate is about the same reported in FSNS-NNS 2015 (11%).

❖ The proportion of households with no ability to purchase food from the market dropped from 51% in FSNSP 2011 to 13% in FSNS-NNS 2015, which decreased a little more in the current study (11.7%).

❖ The proportion of any members in the household who slept hungrily and skipped meals was reported by only 2.3% and 3.3% of the households, respectively. The proportion has declined from the FSNS-NNS 2015 survey.

❖ Nationally, 59% of households were food secure, and 12% of households had severe food insecurity. The highest proportion of households with food insecurity was in Mymensingh (22%).

Water, Sanitation, and Hygiene

❖ Access to an improved source of drinking water was almost universal (92%). The proportion of households without a latrine was 4%

❖ 94% of the households used soap for bathing and 82% for washing clothes. However, only 8% of them used soap for handwashing before preparing food, and 12% used soap for handwashing before eating.

Child Nutrition

- ❖ The prevalence of stunting (28%) and underweight (25%) decreased from the prevalence of stunting (35%) and underweight (31%) reported in 2015 after a stagnation between FSNSP 2013 and FSNS-NNS 2015.
- ❖ The prevalence of wasting decreased slightly to 10% from 11% in 2015.

Nutrition Status of Adolescent Girls
- ❖ Only 2.9% of adolescent girls were uneducated
- ❖ Among the adolescent girls, 71% already experienced menarche, and the mean age of onset of menstruation was 12.5 (±1.0) years. During menstruation, 37% of adolescent girls used sanitary napkins, and the rest of the girls used cloths or other materials.
- ❖ 11.3% of adolescent girls were currently married.
- ❖ Compared to boys, adolescent girls consumed less diversified diets.
- ❖ Nationally 56% of girls were underweight. The prevalence of underweight is lower in non-slum urban areas than in rural areas.

Nutrition Status of Adolescent Boys
- ❖ Only 2.9% of adolescent boys were uneducated
- ❖ Nationally, 4.5% of adolescent boys were working as day laborers.
- ❖ Compared to girls, adolescent boys consumed more diversified diets.
- ❖ Nationally 67% of adolescent boys were underweight. The prevalence of underweight is lower in non-slum urban than in rural areas.

Nutrition Status of Adult Women
- ❖ Nationally, 55% of women consumed an inadequately diverse diet. This rate is higher for rural women.
- ❖ The proportion of overweight (35%) and obesity (14%) was more than the proportion of underweight women (11%).
- ❖ A little more than one-third of the women who gave birth in the past 2 years (39%) received four or more antenatal care visits. It has shown a substantial improvement from the last FSNS-NNS 2015 surveillance (29%).

Nutrition Status of Adult Men
- ❖ Nationally, about 54% of the occupation of adult men in this study falls into the categories of farmer, unskilled labor, or business.
- ❖ Nationally, more than half (50%) of adult males consumed an inadequately diverse diet. This rate is a little bit higher among non-slum urban males than their rural counterparts.
- ❖ All anthropometric indicators were higher among the adult male population living in the non-slum

urban areas compared to rural and slum areas.

❖ The prevalence of underweight is higher among the adult male population in slum and rural areas, whereas the prevalence of overweight and obesity is higher in non-slum urban areas.

Nutrition Status of Elderly Population

❖ The mean age of elderly persons was 68.7±8.1 years. The mean age of non-slum urban and slum elderlies is a little bit lower than the elderly persons living in rural areas.

❖ 64% of elderly people were illiterate; only 4% of them had education above SSC.

❖ Nationally, 59% of elderly persons consumed an inadequately diverse diet. This rate is highest among elderly persons living in slum areas (69%).

❖ Nationally, 27% of elderly people were underweight, 46% had normal BMI, 22% were overweight, and 5% were obese. The rate of overweight and obesity was highest in non-slum urban areas compared to rural and slum areas.

❖ Nationally, the mean ± SD of systolic BP is 130.8 ± 23.5 mm Hg. The mean ± SD of diastolic BP is 79.5 ± 12.4 mm Hg.

❖ Nationally, the self-reported prevalence of heart diseases, asthma, kidney diseases, diabetes, stroke, cancer, and mental health problems prevalence was 16%, 14%, 3%, 9%, 7.5%, 0.5%, and 1%, respectively. The prevalence of hypertension, heart disease, asthma, kidney diseases, diabetes, and mental health problems was higher in non-slum urban areas.

A comparison table of the major indicators from this study and the recent national surveys has been added as Annex -1.

CHAPTER 1: INTRODUCTION

State of Food Security and Nutrition in Bangladesh 2018-19

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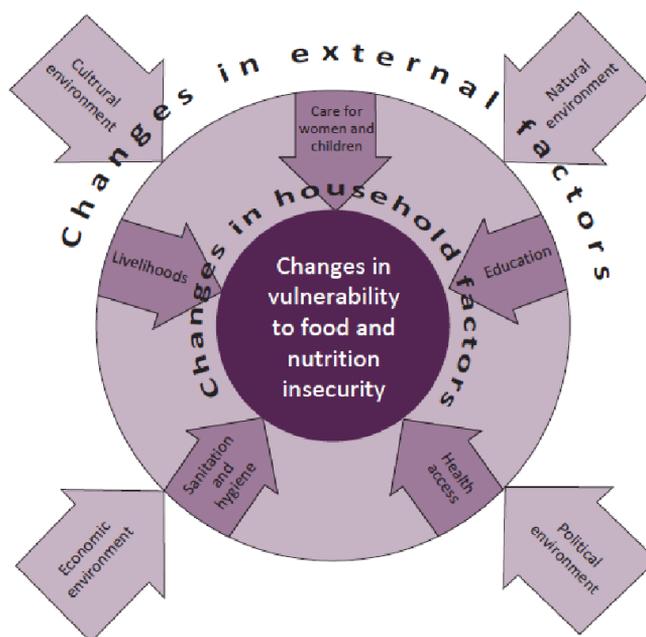
Figure 1.1: Conceptual Framework

Despite significant accomplishments in achieving the Millennium Development Goals, Bangladesh continues to have a "high" prevalence of malnutrition, which threatens to hinder the attainment of Sustainable Development Goals (SDGs). Factors behind the remarkable decline in maternal and child mortality in Bangladesh include an overall improvement in the economy, decreased poverty levels, reduction in fertility rates, immunization, and increased access to health care and primary health services. All these factors are expected to benefit nutrition. Moreover, all these positive developments have coincided with effective nutrition programming by the government and its development partners over the past decades. What then is impeding accelerated improvements in nutrition in Bangladesh? By all accounts, such a question can only be answered in the presence of a surveillance system that continuously

captures changes in health and nutrition indicators of all population groups, and a range of micro- and macro-variables is known to influence them. The Bangladesh Government has considered a well-coordinated surveillance system to guide the program initiatives and their effectiveness in the Health, Population, and Nutrition Sector investment plan.

From 1990 to 2007, the Institute of Public Health Nutrition (IPHN) under Directorate General of Health Service (DGHS), Ministry of Health and Family Welfare, Helen Keller International (HKI), and other partners conducted food security and nutritional surveillance program (FSNSP) in all six divisions of Bangladesh. Following this, the BRAC James P Grant School of Public Health of the BRAC University, along with BRAC, HKI, and Bangladesh Bureau of Statistics (BBS) under the Ministry of Planning, carried out the surveillance from 2008. The surveillance system has helped chart the country's health and nutrition situation. It has yielded significant findings on the impact of urbanization, the factors associated with malnutrition, and the fallout from natural disasters, among other key development issues. In addition, this unique initiative captured household socioeconomic status, agriculture, food security, and child health/nutrition information through a single surveillance system. It was a five-year project (January 2009 to December 2013). The European Commission provided 90% of the funding, while BRAC provided the rest 10%.

While the funding support from the European Commission ended in 2013, the government of Bangladesh, its development partners, and other stakeholders recognized the need to ensure continuity of the surveillance system. They understand that making information accessible to a broad range of stakeholders is vital for informed decision-making and policy formulation at all levels of the government and society. Accordingly, the Government of Bangladesh took the lead and provided funding to continue the surveillance in 2015 and 2018. As Bangladesh is passing through an epidemiological and demographic transition, it was necessary to collect data on adolescent, adult, and geriatric nutrition, along with maternal and child nutrition. Accordingly, the 2018-19 round of surveillance included population groups other than women and children. Therefore, data were collected on nutritional status and the determinants of nutritional status in this round, including food security of the adolescent boys, adult men, and elderly people, along with the under-five children, adolescent girls, and adult women. Below are the specific areas addressed in the FSNSP 2018-19.

Food security

The poverty rate declined steadily, reaching 21.8% in 2018. This trend, along with the per capita GDP growth rate, suggests that the estimated extreme poverty rate for 2019 is 9% (1). However, poverty and food insecurity remain challenging problems for Bangladesh. Ensuring food security is one of the priority areas of work undertaken by the Government of Bangladesh. During 2015, 4% of Bangladeshi households were food insecure, and to cope with the situation, women and adolescent girls of the households had sacrificed at most (2). Household food insecurity influences diet, nutrition, and health of adults, infant feeding practices, and child growth in rural Bangladesh (3, 4). Children of food-secured households are less underweight and stunted compared to food-insecure households. Household food security is associated with child growth, child development, the academic performance of school children as well as early childhood language development (5).

Dietary diversity

Though Bangladesh achieved food security, Bangladesh is yet to ensure dietary diversity. Inadequate dietary diversity is a critical factor for malnutrition, especially for poor people. The diet of the Bangladeshi population is rice-based, and inadequate dietary diversity is common; animal products and fruits are not consumed regularly, especially by pregnant and lactating women (6). Evidence suggests that a diversified diet is associated with micronutrient adequacy among women of reproductive age in Bangladesh (7) and among lactating mothers in Nepal (8). Nearly 60 percent of women in Bangladesh consume an inadequately diverse diet (9). A diversified diet can not only contribute to the reduction of micronutrient deficiencies but can reduce the prevalence of non-communicable diseases through decreased consumption of energy-dense cereals and fatty foods and increased consumption of less energy-dense vegetables and fruits. A low intake of fruits and vegetables is reported to be associated with non-communicable diseases (NCDs), such as cardiovascular diseases, cancer, and diabetes, and with its risk factors (10).

Water, Sanitation, and hygiene

During the MDG era, Bangladesh has remarkably reduced child mortality. In the new era of SDGs, the country needs to work further on the preventive approaches to reduce childhood stunting (31% as per BDHS 2017). Water, sanitation, and hygiene are essential as it is related to child malnutrition and stunting.

In Bangladesh, around 98% of households have access to safe drinking water, and 41% have improved toilet facilities (2). Improvement of nutritional status needs a multisectoral approach. Considering this, the GoB undertook the strategy for nutritional planning through national Food Policy (2006), the National Food Policy Plan of Action-NFP PoA (2008-2015), and the national plan of action for nutrition (NPAN 2), which was developed by 17 ministries. Ministries of Local Government, Rural Development and Co-operatives; Health and Family Welfare; and Water development are working together to ensure safe water and sanitation.

Infant and Young Child feeding

Infant and young child feeding (IYCF) practices behaviors are not changing fast enough across families in Bangladesh, making it challenging to reduce the rate of malnutrition. According to the BDHS 2014, continued breastfeeding at 2 years rate was 87%, but early initiation of breastfeeding rate and exclusive breastfeeding rate was as low as 51% and 55%. Besides, only about one-fourth of babies were fed a diverse diet (28%) and met the minimum acceptable diet criteria (23%) (11).

Nutritional status of <5 children

In Bangladesh, the low   birth weight rate declined from 36% (12) in 2005 to 20% in 2012-13 (13) and 23% in 2015 (14). The childhood stunting rate also decreased from 51% in 2004 to 41% in 2011 and further down to 36% in 2014 (14). Even though these drops are outstanding, the burden of malnutrition is still extremely high. Child undernutrition is associated not only with an increased risk of childhood mortality and poor cognition but also with an increased risk of obesity and NCDs (15), including high glucose concentrations, high blood pressure, higher susceptibility to gain central fat, and bad lipid profiles in adulthood (16).

Adolescent nutrition

Twenty-nine percent of Bangladeshi adolescent girls are short for their age (17). Two-thirds of adolescent girls in Bangladesh are married by 18 years of age, and one-third are married by the age of 15 years (17). Among adolescent   married women, 45% experienced motherhood by 18 years of age, and about one-third (31%) of these women were undernourished (BMI<18.5) (11). Mridha et al. also reported a high prevalence of anemia (28%) and vitamin A deficiency (32%) among adolescent pregnant women from

north-western Bangladesh (18). Evidence shows that malnutrition among young girls increases the risk of delivering babies with low birth weight who fail to flourish and become stunted. Female children themselves become young and undernourished mothers, and so the intergenerational cycle of undernutrition continues. Child marriage is associated with early pregnancy and childbearing and leads to low birth weight and poor nutritional status of new-born (19).

Undernutrition among women of reproductive age

Malnutrition initiates a vicious cycle, and it runs generation after generation. Only a healthy mother can deliver a healthy child. Therefore, the mother and child dyad should be considered together, and the first 1000 days of life are the crucial period for child growth and development. Coordinated maternal and child nutrition services need to be in place to achieve this window of opportunity.

The proportion of underweight among reproductive-aged women of Bangladesh has declined from 52% in 1996, but still, one in five women (19%) were underweight in 2014, but the prevalence of overweight is on the rise (11).

Nutritional status of adult male and female

Bangladesh has a double burden of malnutrition, meaning both under-nutrition and overnutrition   exist at the same time. The proportion of underweight among reproductive-aged women of Bangladesh has declined from 52% in 1996 to 19% in 2014, but the proportion of overweight has risen from 3% to 24% during the same period, displaying a higher prevalence of overweight than under-nutrition among this group (11). Victor et al.   indicated that overweight individuals are predisposed to various health problems, including cardiovascular disease, diabetes, and increased risk of pregnancy outcome.

NCDs account for more death in Bangladesh than communicable diseases (about 60% of all deaths), with cardiovascular and circulatory diseases responsible for 17% of deaths and cancers cause 24% of all death. However, 80% of cardiovascular problems and 40% of cancers can be prevented by tackling key risk factors, e.g., unhealthy diets, physical inactivity, and harmful tobacco and alcohol use (10). Bangladesh's health system is primarily focused on maternal and child health. Data are scarce on the nutritional status of the adult male. This surveillance has attempted to address this issue.

Geriatric Nutrition (male and female)

The epidemiological transition took place in Bangladesh, and the disease burden has been shifted from communicable to non-communicable disease. The life expectancy at birth has increased substantially (71.6% for both sexes as per SVRS, 2016) during the past decades. So the aging population is increasing. According to Health   Bulletin, 2017, people over 60 years constituted over 11% of the total population in 2011 and are estimated to constitute 14.4% in 2021 and 21.3% of the total population in 2031. Geriatric nutrition is one of the crucial components of geriatric health. However, Bangladesh lacks data to take the necessary policy and programmatic action. Accordingly, this surveillance will collect data from the geriatric population to assess their nutrition status and quality of life. We anticipate that this data will help develop a geriatric nutrition strategy, which is one of the activities stated in the latest program implementation plan (PIP) under the leadership of the National Nutrition Service.

Nutrition of slum dwellers

It is a neglected area, and sufficient attention is needed as population migration from rural to urban areas is increasing due to rapid urbanization. Child stunting rate is highest in a slum area, and half of the under-five children in slums were stunted, nearly one-third for non-slums and other urban areas. In addition, only one in every four children (25.9%) of age 6-23 months in slums is fed with proper IYCF practices, compared with 40.4% for non-slum children. Moreover, the teenage pregnancy rate is higher among slum women (20). So, it was important to collect data from the slum.

Structure of the FSNS-NNS report 2018-19

This report describes the food security and nutritional status of Bangladesh in 2018-19 based on the ongoing FSNSP surveillance. The indicators used in this survey corresponded with 2011, 2012, 2013, 2014, and 2015 FSNSP reports, along with several added indicators for the age groups as adolescent boys, adult males, and the elderly population. The report comprises ten main thematic areas: Objectives and Methods; Household Characteristics; Food Security; Water, Sanitation, and Hygiene; Nutritional Status of Children; Nutritional Status of Adolescent Girls; Nutritional Status of Adolescent Boys; Nutritional Status

of Adult Women (20-59 years); Nutritional Status of Adult Men (20-59 years); Nutritional Status of Elderly Population (60 years and above). The report presents national, rural, non-slum urban, and slum and divisional estimates for each of these thematic areas based on data collected from September 2018 to October 2019. For the first time in the history of FSNSP, the report includes specific information on the food security and nutrition status of adolescent boys, adult males, and the elderly population. This report will provide policymakers, planners, and other key stakeholders with relevant, statistically representative information that meets their needs for decision-making and policy formulation to improve the nutrition and health levels for the betterment of all people of Bangladesh.

CHAPTER 2: OBJECTIVES AND METHODS

Objectives

The overall objective of the proposed action was to institutionalize nutritional surveillance into a national framework with the support of the National Nutrition Services (NNS). The specific objectives of the surveillance were:

- ❖ To assess household socio-economic status, food security and water, sanitation and hygiene (WASH) status in rural, non-slum urban, and slum households of Bangladesh

- ❖ To assess dietary diversity, feeding practices, and nutritional status of the children aged under five years

- ❖ To assess dietary diversity, the burden of non-communicable diseases related risk factors and nutritional status of the adolescent boys and girls

- ❖ To assess dietary diversity, the burden of non-communicable diseases related risk factors, nutritional status of adult women and men

- ❖ To assess dietary diversity, the burden of non-communicable diseases and related risk factors, nutritional status of elderly people

Methods

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

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

Sampling design

The separate sampling design was used to select the study sites in rural, non-slum urban, and slum areas to provide a representative sample per division. Sampling was done separately for rural, non-slum urban, and slum areas. For the selection of rural areas, 2 districts were randomly selected In the first stage of the four-stage sampling. Afterward, two Upazillas were randomly selected from each district. At the second stage, we randomly selected 32 unions (02 unions from each of the selected Upazila). Each selected union was divided into segments with 250-400 households keeping the geographical demarcation of villages uninterrupted. From the listed segments, we randomly picked two, and those were our study clusters in rural areas. All household members of the cluster have been listed. The required number of participants was then randomly selected for data collection.

For the selection of the non-slum urban cluster, we used the Bangladesh Bureau of Statistics (BBS) 2011 census report. We randomly selected 16 wards (1-2 wards/division based on the proportion of the urban population in the division). We then identified the Mahallas in the ward. In case one mahalla has >500 households, we divide that mahalla into 2 or more segments without disrupting geographical boundaries. We randomly picked one from the listed mahalla/segments from the selected ward, and that was our study cluster in the urban area. All household members of the cluster were listed. The required number of participants was then randomly selected for data collection from the respective age groups.

We used the "Census of Slum Areas and Floating Population 2014" for the selection of slum areas. We randomly selected 10 slums from 08 divisions. We selected 1 slum from each division except for Dhaka and Chittagong division, from where we selected 02 slums from each. At the first stage, we identified slums having ≥ 300 households. In case one slum had >500 households, we divided that slum into segments. From the listed slum/segments, we randomly picked one slum/segment, and that was our study cluster. All members of the cluster were listed, and the required number of participants was then randomly selected for data collection.

Sample size calculation

The sample size was determined to obtain divisionally representative prevalence estimates for indicators of children, adolescents, adults, and geriatric malnutrition and household food consumption. From this

surveillance, our goals were to generate estimates of the nutritional status of children (<5 years), adolescent boys (10-19 years), adolescent girls (10-19 years), adult men (20-59 years old), adult women (20-59 years old) and elderly population (males and females of 60 years and above). We looked at the nutritional indicators relevant to each of these groups. Those indicators ranged from 4% to 98%. For the estimates of proportion in which clusters are the unit of randomization, the minimum required sample size is determined by the following formula:

$$n = DEF \times \{z_{\alpha/2}^2 (p)(1-p)\}/d^2$$

Where,   DEF = the design effect

p = apriori proportion of the relevant indicator

$z\alpha/2$= Value of the standard normal variate allowing 100xα% probability of type I error.

d = allowable margin of error

In most of the surveys, the value of α is taken as 5%, d is taken as 5%. Theoretically, an a priori   p=0.5 gave the largest sample size, since p(1-p) takes the highest value when p=0.5. However, the value of d=0.05 is not realistic when p ≤ 0.1. In these cases, we considered d=p/2. Since the lowest apriori proportion was 4% or 0.04, the value of "d" in this case was 2% or 0.02. Considering these assumptions, we needed 620 individuals in each group of population under study in each division (for p=0.5, d=0.05, DEF=1.61) and 600 individuals in each group of population under study in each division (for p=0.04, d=0.02, DEF=1.61). With a thought of 10 clusters in each division, there was a need for interviewing and taking the measurements of 62 0-5 years old children, 62 adolescent boys, 62 adolescent girls, 62 adult men (20-59 years old), 62 adult women (20-59 years old) and 62 elderly persons (>60 years) from each cluster. As per the census 2011, 10% of the people are 0-4 years old, 10% are adolescent boys, 10% are adolescent girls, 25% are adult men (20-59 years), 22% are adult women (20-49 years old), and 8% are above 60 years. Considering 4.4 members in each household, a 10% non-response rate, we took a cluster of 250 households to interview or measure at least 62 subjects from each group. As we wanted to generate estimates for the divisions, the whole country was divided into 8 strata depending on the administrative divisions. The division samples were derived from clusters from both rural and non-slum urban areas. The number of clusters for the rural and non-slum urban regions in each division is proportionate to the population living in rural and non-slum urban areas in the respective division. Tables 2.1, 2.2, and 2.3 below demonstrate the selected sites in rural, non-slum urban, and slum areas with some details.

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Table 2.1: Randomized rural sites

Name of the division	Proportion of urban population	Name of district	Name of randomized Upazila (02/Division) in the rural area	Name of randomized Union (02/Upazila) in the rural area	Name & HH of cluster (BBS 2011)	Number of household (Source UP)	Total number of segment having 250 HH	Randomized segments for selected cluster
Barishal	15%	Barishal	Wazirpur	Jalla	Bahirghat: 864	1275	5	5
					Kuralia: 1168	1250	5	1
				Bara Kotha	Dakshin Malikanda: 308	400	1	1
					Garia: 289	289	1	1
		Bhola	Lalmohan	Kalma	Char Lakshmi: 1697**	2050	8	6
					Kalma: 1650**	1852	7	1
				Ramganj	Uttar Ramaganj: 986	1000	4	2
					Dakshin Roychand: 503	500	2	2
Chittagong	21%	Chittagong	Rangunia	Betagi	Paschim Betagi: 412	404	1	1
					Dakshin Betagi: 338	337	1	1
				Silok	Naya Rasta: 448	449	1	1
					Natura Tila: 422	416	1	1
		Khagrachari	Mahalchhari	Kayangghat	Kayangghat: 1387	1405	6	1
					Ultachari: 457	490	1	1
				Mahalchhari	Chongrachari: 1017	1012	4	3
					Thali Para: 2109	2098	8	5
Dhaka	36%	Shariatpur	Gosairhat	Nalmuri	Ghata Khan: 368	449	1	1
					Panchkati: 923**	967	4	2
				Kodalpur	Dakshin Kodalpur: 1195	282	1	1
		Manikganj	Shivalaya	Teota	Narayan Teota: 288	267	1	1
				Shimulia	Paschim Dhakijora: 324	323	1	1
					Jamsa: 314	409	1	1
Khulna	19%	Jhenaidah	Shailokupa	Kancherkol	Khandakbaria: 520	520	2	2
					Uttar Kachua: 556	556	2	1
				Nityanandapur	Bagutia: 742	781	3	3
					Sekhra: 451	435	1	1
		Satkhira	Shyamnagar	Kashimari	Joynagar: 1113	1250	5	4
					Sankarkati: 529	500	2	1
				Ishwaripur	Banshipur: 1687	1690	7	3
					Gumantali: 958	952	4	2
Rangpur	13%	Dinajpur	Parbatipur	Rampur	Sarkar Para: 462	568	2	2
					Purba Hugli Para: 388	410	1	1
				Chandipur	Bara Haripur: 1037	828	3	1
					Dakshin Salandar: 882	679	3	3
					Jahanabad : 1171	972	4	2
		Thakurgoan	Haripur	Dangipara	Kandhal: 303	330	1	1
					Rahamatpur: 726	764	3	1
				Haripur	Jibanpur: 337	352	1	1
					Torra: 726	798	3	1
Rajshahi	19%	Bogra	Dhupchanchia	Gunahar	Panchusha: 257	275	1	1
					Paota: 338	350	1	1
		Sirajganj	Ullahpara	Durganagar	Bagalpur: 359	433	1	1
					Babla Para: 350	297	1	1
				Salanga	Banbaria: 918	945	4	1
Mymensingh	18%	Mymensingh	Gauripur	Achintapur	Khaliajuri: 638	741	3	2
					Mukhuria: 667	745	3	1
				Bokainnagar	Dariapur: 318	350	1	1

				Phulhar: 265	295	1	1
		Sherpur	Sreebardi	Kurikahania	Chithalia: 591	800	3	3
					Indilpur: 790	790	3	1
				Gosaipur	Matiakura: 1233	1233	5	2
					Sankar Ghosh: 551	600	2	2
Sylhet	14%	Sylhet	Gowainghat	Rustumpur	Bagaiya: 791	891	3	2
					Bagaiya Haor: 282**	330	1	1
				Lengura	Lengura: 565	565	2	2
					Niagul: 274	274	1	1
		Maulvibazar	Sreemangal	Kalighat	Khaichhara T.G. : 325**	325	1	1
					Bhurburia T.G. : 355**	355	1	1
					Kakiachhara T.G. : 378**	378	1	1
				Bhunabir	Alisarkul: 962	990	4	4
					Bhunabir: 614	650	2	1
Total		**16**	**16**	**32**	**64**			

**Clusters dropped due to administrative and financial reason

Table 2.2: Randomized non-slum urban sites*

Name of the division	The proportion of the urban population	Name and Number of randomized Ward (01/02/Division) in the urban area	Name and household number (HH) of cluster in the urban area (BBS 2011)	Numer of household (Source UP)	Total number of segment having 250 HH
Barishal	15%	Barishal (Ward No: 09)	Katpatti (Dakkhin): 433	600	1
			Rasulpur: 406	600	1
Chittagong	21%	Chittagong (Ward No: 37)	Ananda Bazar: 2377	2350	5
			Bandar Colony: 3481	3481	7
Dhaka	36%	Dhaka North (Ward No: 30)	Dhaka Uddhyan: 3541	3541	7
			Uttar Adabor: 4088	4088	8
		Dhaka South: Ward 38	Juginagar Road: 631	613	1
			Nabrendra Nath Basak Lane: 396	396	1
Khulna	19%	Khulna (Ward No: 28)	Dakshin Toot Para: 690	843	2
			Paschim toot para	1735	3
Rangpur	13%	Rangpur (Ward No: 17)	Pasharipara: 387	403	1
Rajshahi	19%	Rajshahi (Ward No: 09)	Dargah Para: 499	499	1
			Sheikh Para: 380	380	1
Mymensingh	18%	Mymensingh (Ward No: 05)	Golkibari: 375	375	1
			Shanki Para(North): 667	667	1
Sylhet	14%	Sylhet (Ward No: 06)	Choukidighi Purbo: 919	919	2
Total			**16**		

*Non-slum urban: Urban area excluding the slums

Table 2.3: Randomized slum sites

District Name	Area Name	Name of Slum	# Household	Proposed Segment
10-BARISAL DIVISION				
Barisal	Barisal Sadar	Rasulpur Basti	594	2
20-CHITTAGONG DIVISION				
Chittagong	Khulshi	Purba Poroj Railway Side	311	1
Cox'S Bazar	Cox's Bazar Sadar	Mohazer Para	398	1
30-DHAKA DIVISION				
Gazipur	Gazipur Sadar	Co-Ope. Bank Math Basti	900	3
Narayanganj	Narayanganj Sadar	Puratanijim Khanabasti	432	1
Mymensingh Division				
Mymensingh	Mymensingh Sadar	Bashbari Colony	400	1
40-KHULNA DIVISION				
Bagerhat	Mongla	Ratarati	443	1
50-RAJSHAHI DIVISION				
Sirajganj	Sirajganj Sadar	Putiabari Uttar	579	1
55-RANGPUR DIVISION				
Lalmonirhat	Lalmonirhat Sadar	Shahjahan Colony	590	2
60-SYLHET DIVISION				
Sylhet	Sylhet Sadar	Mohin Master Colony	313	1
Total		10		

Data Collection

Being started on October 06, 2018, data collection has been declared completed on October 31, 2019. Five data collection teams, each consisting of one project officer and 4-5 data collectors, shared responsibility for interviewing the participants and collecting anthropometric measurements. Project officers supervised the day-to-day activities of every team under the supervision of a Senior Field Coordinator responsible for managing the overall data collection process. The data collection teams spent approximately in every cluster to list the households and collect data on the selected participants. A Senior Field Coordinator visited each data collection team at random at least once a month to ensure adherence to the questionnaire protocols in the field.

A total of 25,371 households were listed from the 82 clusters (57 rural, 15 non-slum urban, and 10 slums) with 99,209 of all age groups. 7 initially selected clusters (2 in Barisal, 1 in Dhaka, and 4 Sylhet division) were dropped due to technical and financial constraints, and all of them were in the rural area. The distribution of the population according to the age groups is listed below in table 2.4.

Table 2.4: Distribution of listed household members by population groups and place of residence

Age group	Population summary			
	Rural	non-slum Urban	Slum	Total/Overall
Households	16,403 (64.7%)	5,726 (22.6%)	3,242 (12.8%)	25,371
Population	70,762 (71.3%)	23,207 (23.4%)	13,691 (13.8%)	99,209
Under-five children	6,891 (67.0%)	1,931 (18.8%)	1,460 (14.2%)	10,282
6-9 years old children*	6,426 (67.5%)	1,798 (18.9%)	1,296 (13.6%)	9,520
Adolescent girls	6,736 (64.0%)	2,318 (22.0%)	1,475 (14.0%)	10,529
Adolescent boys	6,654 (65.2%)	2,164 (21.2%)	1,393 (13.6%)	10,211
Adult Female	12,692 (63.4%)	4,683 (23.3%)	2,638 (13.2%)	20,013
Adult Male	17,717 (61.8%)	7,388 (25.8%)	3,546 (12.4%)	28,651
Elderly	7,341 (75.0%)	1,527 (15.6%)	914 (9.3%)	9,782

*This group was not included in the survey

Among the listed households, 17,323 households were randomly selected with the clusters with at least one participant from any of the targeted age groups. In selected households, a total of 5,033 under-five

Table 2.5: Distribution of enrolled respondents by age groups and place of residence

Age group	Population summary			
	Rural	Urban	Slum	Total/Overall
Households	11,790 (68.1%)	3,368 (19.4%)	2,165 (12.5%)	17,323
Clusters	57	15	10	82
Study population	21,104 (70.3%)	5,256 (17.5%)	3,645 (12.1%)	30,005
Under-five children	3,525 (70.0%)	887 (17.6%)	621 (12.3%)	5,033
Adolescent girls	3,490 (69.7%)	898 (17.9%)	622 (12.4%)	5,010
Adolescent boys	3,499 (69.9%)	889 (17.8%)	616 (12.3%)	5,004
Adult Female	3,565 (69.7%)	921 (18.0%)	626 (12.2%)	5,112
Adult Male	3,504 (70.8%)	840 (17.0%)	607 (12.3%)	4,951
Elderly	3,521 (71.9%)	821 (16.8%)	553 (11.3%)	4,895

Children, 5,004 adolescent boys, 5,010 adolescent girls, 5,112 adult women, 4,951 adult males, and 4,895 elderly people have been interviewed, which made the total number of participants enrolled in the survey

30,005. Not more than 1 study participant was selected in each population group within a selected household. The refusal rate was low, which was 3.5% for the under-five children, 5.5% for the adolescent boys, 9.2% for adolescent girls, 5.7% for adult males, and the elderlies was 1.6%. However, the refusal rate was highest for adolescent girls and lowest for elderly people.

Data collection tools

All data have been collected using a tablet computer (Samsung Galaxy Tab A7) in a customized SurveyCTO application and were uploaded to the server at the end of everyday data collection. Table 2.6 shows the types of data which we have been collecting in the survey.

Table 2.6: Types of data collected for the respective age groups

Type of respondents	Data collected using the interview	Data collected using measurement
Household head	Socio-economic status; remittance; food security, cooking oil, iodized salt, and water sanitation and hygiene practices	
0-5 years old children	Age, sex, infant and young child feeding, dietary diversity, morbidity, malnutrition (SAM, MAM)	Weight, height/length, MUAC
Adolescent boys	Age, dietary diversity, physical activity, mental health, smoke/smokeless tobacco consumption	Weight, height, body fat/water, waist circumference
Adolescent girls	Age, dietary diversity, reproductive history, menstrual hygiene, marital status, physical activity, smoke/smokeless tobacco consumption	Weight, height, body fat/water, waist circumference
Adult men	Age, dietary diversity, physical activity, smoke/smokeless tobacco consumption, H/O self-reported chronic disease	Weight, height, waist circumference, body fat/water, Blood Pressure
Adult women	Age, dietary diversity, reproductive history, menstruation/ menopause/ menstrual hygiene, smoke/smokeless tobacco consumption, H/O self-reported chronic disease, pregnancy, menopause	Weight, height, waist circumference, body fat/water, Blood Pressure
Elderly	Age, dietary diversity, physical activity, smoke/smokeless tobacco consumption, H/O self-reported chronic disease, nutritional status, Quality of life	Weight, height, waist circumference, Blood Pressure, Body fat/water

Anthropometric measurement

For each selected household, a portable electronic weighing scale (EB-522 for <5 children, and TANITA,

Model UM-070 for other age groups) was used to measure the weight of the eligible subjects. A locally made height board was utilized to measure the height. Recumbent length was measured for under-two children using a locally made length board. A MUAC tape was used to measure the MUAC of the children. Waist circumference for adult and elderly males and females was measured using the locally available measuring tapes. All anthropometric measurements have been performed based on WHO guidelines, as specified in the FANTA anthropometry manual (1).

Training and standardization

All recruited data collectors had previous experience of performing anthropometry. Data collectors received a 5-day training on conducting interviews and anthropometric measurements as well as on maintaining anthropometric instruments. They also attended the anthropometric measurement standardization sessions before starting data collecting activities. A field practicum was arranged to reinforce their newly acquired skills and knowledge.

Ethical considerations

The field coordinators have explained the motives and procedures of the study to the leaders of the selected districts, Upazila, union, and communities, to obtain community consent. At the beginning of each interview, the data collectors gave detailed information about the objective of the study. They assured the participants that their participation would be entirely voluntary and that respondents had the right to refuse to answer any questions and to discontinue the interview at any time, even after consenting to the study. Afterward, informed written consent was obtained from each respondent or their legal guardian.

Quality control

To verify the quality of data, quality control (QC) officers revisited a randomly selected sub-sample (around 5%) of interviewed households within 48 hours of the initial visit by the data collectors. Statisticians compared the surveillance data to the QC data and sent feedback to the field team for the discrepancies. If any, inconsistencies were reviewed by the principal investigator, project coordinator, training officers, and the field manager to identify possible reasons for the discrepancies and address those.

Data Management

Field Coordinators sent data at the end of the daily household visits and data collection. A senior statistician generated the schedules based on randomization and shared it with the respective project officers. Collected data were sent from field sites daily through the internet. A senior statistician checked the data regularly and generated a data query. In case of any discrepancies which need to be resolved, he shared data query files with the project officers through email. POs addressed the problems and got back to the senior statistician using a data query form. In addition to this, the interim analyses of data were performed time-to-time for cross-checking.

Statistical analysis

Data analysis was performed using Stata (Stata Corp, v13.0) software (2). Data have been described using proportions and means. Sampling weights have been assigned that took into account each household's and individual's probability of selection within a division and was used for estimating the prevalences. These weights have been constructed using the same sampling frame and process used for sample selection. All analyses and estimates were performed using the svy commands in Stata to take into account the complex sampling design.

Limitations

The limitations of the surveillance system mainly occurred due to sampling challenges at the field level. The data collectors faced higher refusal rates in wealthier non-slum urban areas and a few isolated rural communities. Besides, seven (07) selected clusters (two in Barishal, one in Dhaka, and four in Sylhet) were dropped from the survey due to administrative and financial constraints. All of the dropped clusters were in the rural area, which may affect the representativeness of the study population from the respective divisions, especially in Sylhet. However, three of those clusters were in the tea estate area of the Sylhet Division, and we didn't get access to the area despite several attempts from different levels. FSNS-NNS involved local government staff to ensure that the local communities understood the purpose of the project and that data collection staff were promptly notified if political considerations required that data collection be suspended in an area.

CHAPTER 3: HOUSEHOLD CHARACTERISTICS

Demographic information

The FSNS-NNS survey 2018-19 started in October 2018, and data collection ended in October 2019. Data were collected from 82 randomly selected clusters or communities (village /mahalla/slums), 57 of which were in rural areas, 15 clusters were in non-slum urban areas, and 10 clusters were in the slums. As we initially planned to collect data from 89 clusters, 7 clusters remained unfinished. Out of those 7 unfinished clusters, 3 were located inside the tea estate areas of Sylhet, where we could not manage access despite several attempts from different levels. Four clusters were dropped due to financial constraints. However, all these 7 incomplete clusters were in rural areas. For this report, we analyzed household listing data collected at the beginning of each cluster and survey data from 57 rural, 15 non-slum urban, 10 slum clusters.
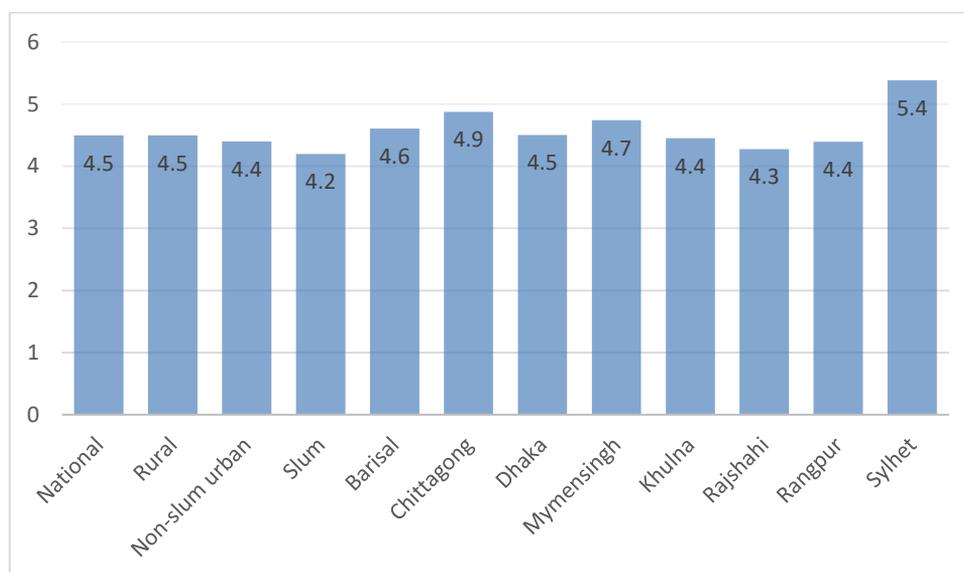
Figure 3.1: Average household size

Out of 25,371 listed households, a cumulative total of 17,323 households with at least one participant from at least one age group were randomly selected. In each cluster, ~80 individuals were randomly selected from each age group. In this way, data collectors have enrolled and interviewed 30,005 participants and among them 5,033 (16.8%) were under-five children, 5,010 (16.7%) were adolescent girls,

5,004 (16.7%) were adolescent boys, 5,112 (17.0%) were 20-59 years old females, 4,951 (16.5%) were 20-59 years old males and 4,895 (16.3%) were ≥ 60 years old elderly people. In the analyzed data, the average weighted household size was 4.5. The average household size was smaller (4.2) in slum areas compared to rural (4.5) and non-slum urban areas (4.4). The average household size is similar to that in the data from the Census 2011 and BDHS 2014 (1,2). Nationally, 40% of the enrolled households had at least one child aged under five years during the survey (Fig. 3.2). Slum areas had a higher proportion of households (43%) with under-five children compared to the rural areas (40%) and the non-slum urban areas (41%). Among the divisions, Sylhet had the highest percentage of households with at least one under-five children.
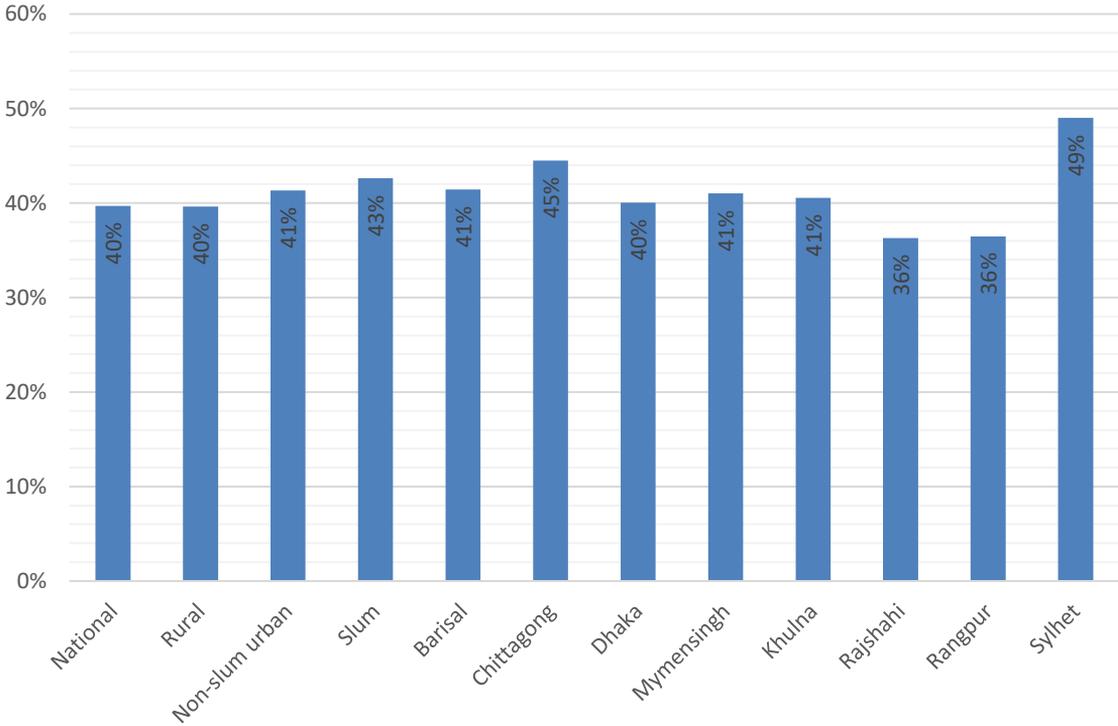
Figure 3.2: Households with under-five children

The average number of under-five children per household was highest in slum areas (0.48) and was equal for rural and non-slum urban areas (0.46) (Table 3.1). The average number of under-five children per household was highest in the Sylhet division and lowest in Rajshahi and Rangpur divisions.

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

Mean Number of Children per household	
National	0.46
Rural	0.46
Non-slum urban	0.46
Slum	0.48
Barisal	0.48
Chittagong	0.54
Dhaka	0.46
Mymensingh	0.47
Khulna	0.46
Rajshahi	0.41
Rangpur	0.41
Sylhet	0.68

Educational attainment

The educational attainment of the participants aged 20-59 years was categorized into six groups: 1) no formal education; 2) partial primary (1 to 4 years of schooling); 3) primary completed (5 years of schooling); 4) partial secondary (6 to 9 years of schooling); 5) Secondary school certificate or SSC (10 years of schooling); and 6) Post SSC (11 or more years of schooling). Nationally, more than 30% of the females aged 20-59 years had no formal education, while 6% went beyond the secondary school certificate (Figure 3.3). As expected, the proportion of females aged 20-59 years with no formal education was highest in the slum area (45%), 31% in rural areas, and only 21% in non-slum urban areas. The proportion of females of this age group who completed their education more than SSC was largest in non-slum urban areas (12%). In comparison, it was only 6% in rural and 4% in slum areas. Among the divisions, Mymensingh had the highest percentage of females aged 20-59 years with no formal education (44%). The highest percentage of adult females with education above SSC was in the Barisal division (12%) (Figure 3.3).
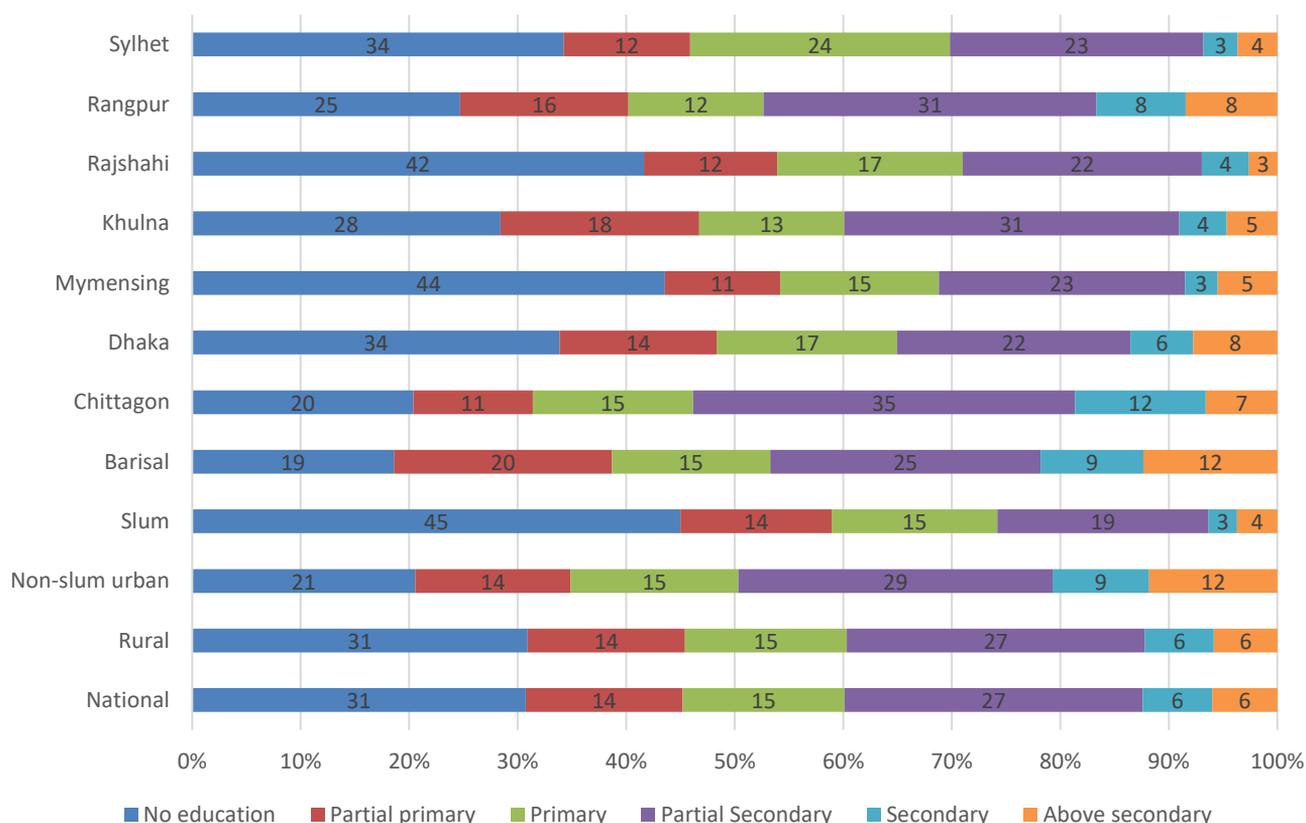
Figure 3.3: Educational attainment of females aged 20-59 years by area of residence (%)

At the national level, more than 30% of the males aged 20-59 years had no formal education, which was a little less than the females of the same age group (31%) (Figure 3.4). The percentage of males aged 20-59 years with no formal education was highest in the slum (32%) and lowest in non-slum urban areas (19%). While the highest percentage of males of this age group with no formal education in the Mymensingh division (45%), Barisal had the highest percentage of males who have completed education more than SSC. Adult males aged 20-59 years were twice more highly educated (more than SSC) than adult females of the same age group. Irrespective of gender, the Mymensingh division had the lowest literacy rate, and the Barisal division had the highest.
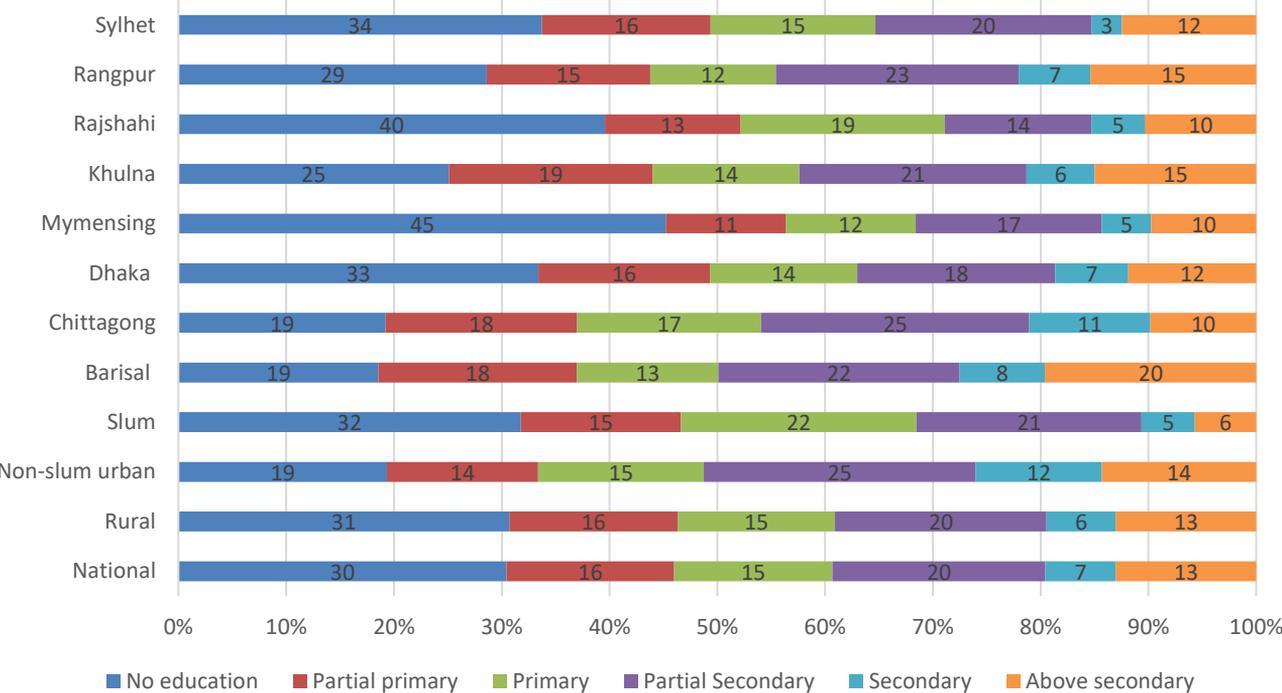
Figure 3.4: Educational attainment of males aged 20-59 years by area of residence (%)
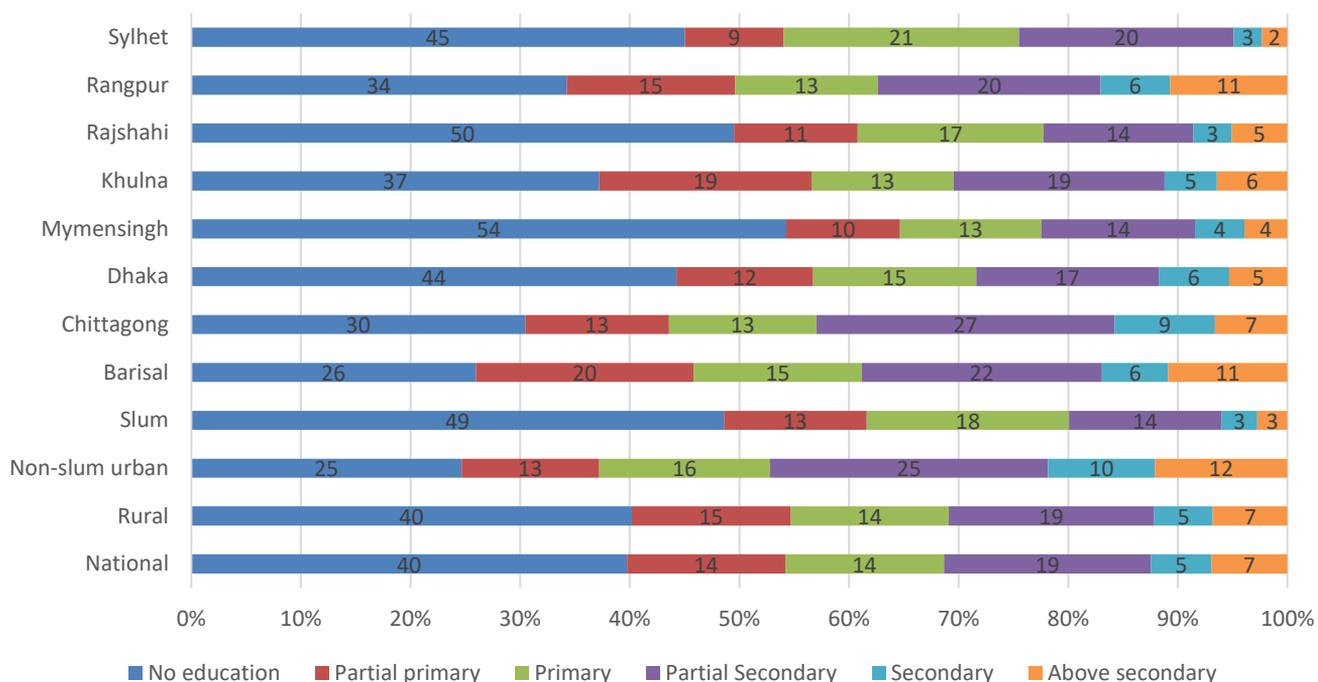
Figure 3.5 Educational attainments of household heads by area of residence

More than one-third of household heads (40%) were uneducated, and only 7% had completed education beyond SSC (Figure 3.5). Twenty-five percent of the household heads in non-slum urban areas had no formal education, while this was 40% in rural and 49% in slum areas. The percentage of household heads without formal education was highest in the Mymensingh division, while it was lowest in the Barisal division. While the highest number of household heads with education above SSC lived in Barisal and Rangpur division, Sylhet had the lowest proportion of household heads with education above SSC. Twenty-three percent of the household heads are female.

Household occupation and Wealth Index

The NNS survey 2018-19 assessed the average monthly income of the households by the principal income earner and other members of the households. For simplification of the NNS report, 20 categories of occupation were further grouped into ten occupation categories: 1) farmer (farming their leased, owned, controlled, or sharecropped land); 2) unskilled day labor (daily or contract wage labor that does not require training); 3) skilled day labor (labor 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 goods, including petty trading); 8) no-income; 9) homemaker and 9) others. The surveillance system also gathered socio-economic information on household structure, cooking, water and sanitation systems, asset ownership, and access to electricity (3,4,5).

Table 3.2 shows the distribution of the occupation of household heads by area of residence. Nationally, about 46% of the household heads' occupations reported in this NNS survey fell into the categories of farmers, unskilled labor, or business. Skilled labor was found to be the occupation in about 7% of the households, while involvement in unskilled labor was reported by 15% of household heads. As expected, the proportion of household heads in the farming and unskilled labor category was much higher in rural areas than non-slum urban areas. Business and salaried employment (combined) constituted the principal source of income for 46% of households in non-slum urban areas and 20% in rural areas and 31% in slum areas.

Table 3.2: Occupation of the household head by area of residence

Occupation	National	Rural	Non-slum urban	Slum	Barisal	Chittagong	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Farmer	16.6	17.2	0.2	0.4	15.9	5.7	20.0	35.2	25.2	9.2	15.9	8.5
Unskilled day labor	14.8	15.2	3.4	7.9	7.3	4.3	8.9	15.1	17.5	16.3	22.7	6.6
Skilled day labor	6.9	6.9	6.7	7.9	8.0	5.0	7.2	5.9	9.2	6.7	6.7	2.1
Transport	8.8	8.7	12.3	8.2	10.2	5.5	9.1	5.8	5.8	15.2	9.3	1.5
Fisherman	0.6	0.6	0.1	0.2	1.2	1.9	1.4	0.4	0.6	0.0	0.1	1.2
Salaried	6.6	6	26.3	14.4	6.5	8.2	11.9	4.9	6.1	4.2	8.7	2.5
Business	14.6	14.4	19.9	17.1	14.0	13.0	16.7	14.4	16.6	13.7	15.8	5.9
No income	5.1	5.1	5.2	4.4	4.2	9.4	5.5	6.3	2.1	5.4	4.5	5.6
Homemaker	19.6	19.5	20.7	30.9	24.3	43.8	16.7	10.0	12.7	12.5	13.9	61.9
Others	6.4	6.4	5.3	8.6	8.5	3.3	2.6	2.0	4.2	16.9	2.5	4.3

Based on household characteristics (e.g., cooking and water and sanitation systems) and the assets they possess, a composite wealth index was derived using the DHS method, which consists of area-specific indexes combined into a national model (6). The wealth index was then divided into five quintiles, each containing an equal population of household members. Figure 3.6 displays the wealth index of households by division and rural and non-slum urban areas. When the national cutoff was used, the Chittagong division had the lowest proportion of households in the poorest wealth quintile (11%), while Mymensingh and Barisal divisions had the highest proportion in the poorest group (43%). Chittagong had the highest proportion of the households in the wealthiest quintile (20%), followed closely by Rangpur (18%). Rural areas were much poorer than non-slum urban areas. In non-slum urban areas, 67% of households belonged to the wealthiest quintile, whereas, in rural areas, only 10% of households fell into this group, which is 20% for the slum areas. Nationally, 24% of the households were in the poorest quintile, while 12% of households were in the wealthiest quintile.
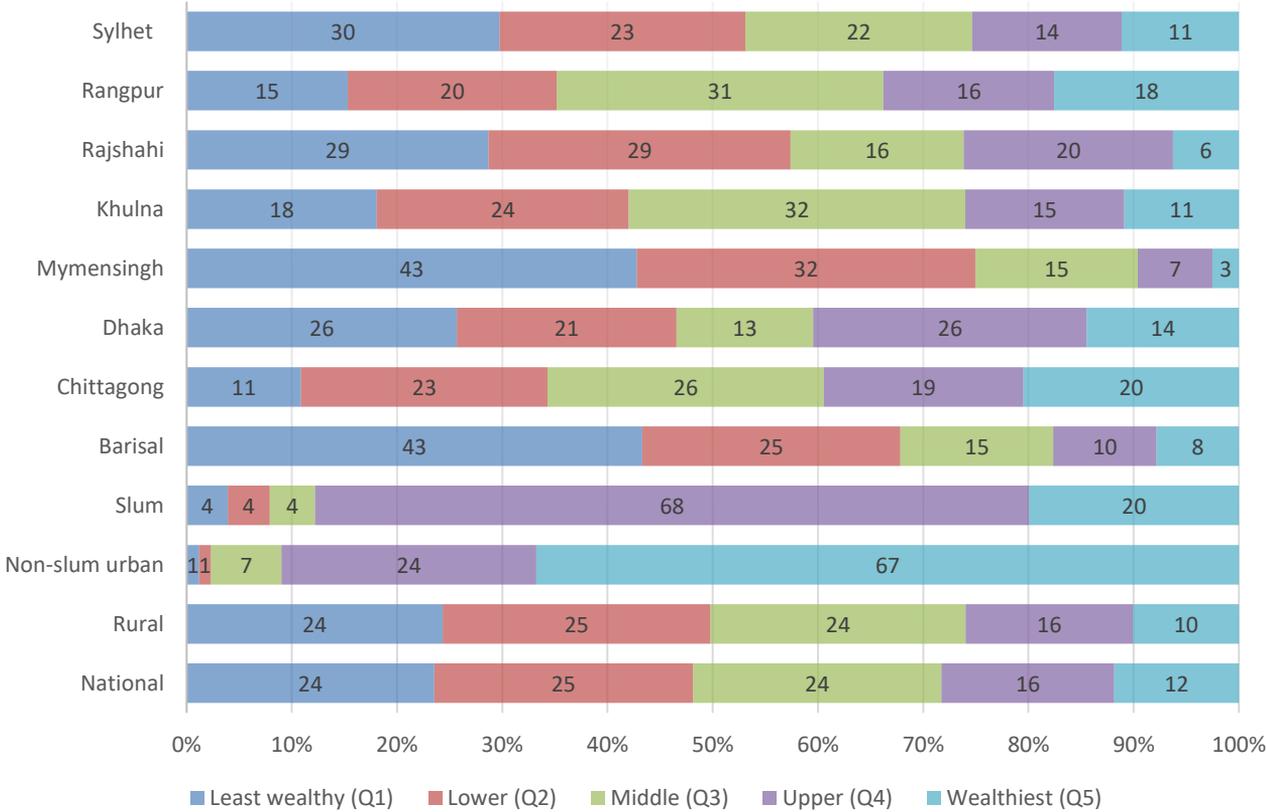
Figure 3.6: Proportion of households in each wealth quintile by area of residence

Remittance

Foreign remittances (money transferred by migrant workers to their home countries) play a pivotal role in financial flows to developing countries. A large portion of these remittances is allocated towards fulfilling the basic needs of family members and helping improve their quality of life (7). It was found that 14% of the households received remittances (both internal and external), which was the same   as the findings of the previous survey (14%). Figure 3.6 shows the distribution of remittances received by place of residence and divisions compared with the national percentage. The percentage of rural households with remittance was almost three times (14%) than that of non-slum urban (5%) and slum (5%) households. Chittagong division had the highest percentage of households (28%) receiving remittance, and Barisal had the second highest (2 On the other hand, Khulna has the lowest percentage of households with remittance (7%).
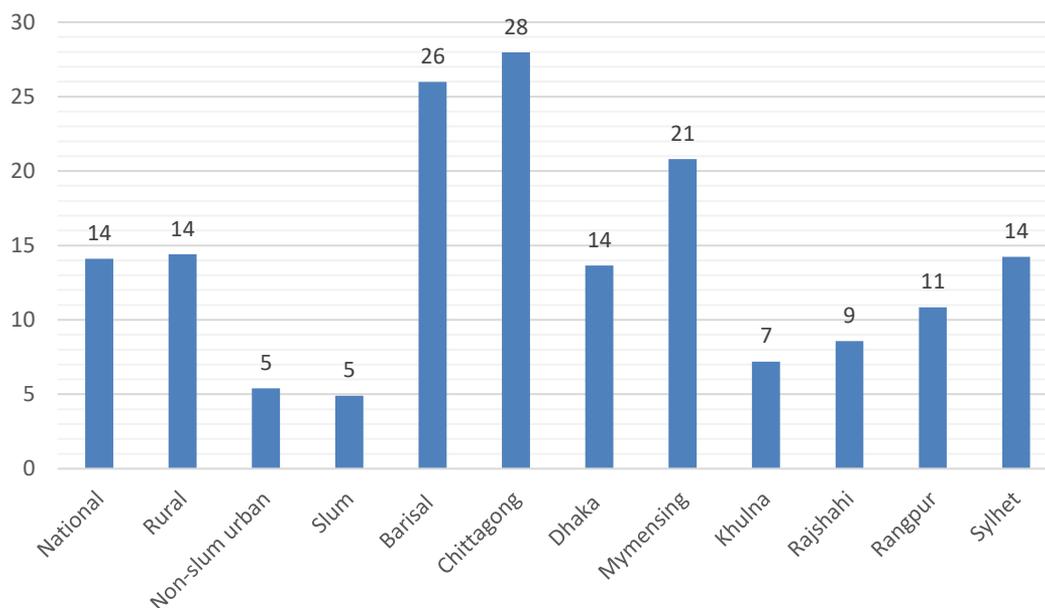
Figure 3.7: % of households with reported remittances

Consumption of micronutrient-rich fortified items

The surveillance system collects information from households on vitamin A, Vitamin D, and Vitamin E

fortified edible oil. Oil fortification is an effective and sustainable strategy to combat vitamin A deficiency and its negative health consequences such as night blindness or increased risk of illness and mortality from childhood infections, such as measles and diarrhea (2). According to FSNSP-NNS 2015 data, nationally, 23% of households were aware of vitamin A-fortified edible oil, and 21% of households reported consuming it regularly. About 21%, 34%, and 28% of the households in rural, non-slum-urban, and slum areas, respectively, consumed edible oil enriched with vitamin A. For both vitamin D and vitamin E, nationally, 12% of households use edible oil fortified with these two vitamins. Like vitamin A, consumption of these two vitamins was also found highest in non-slum urban areas compared to rural and slum areas (Fig. 3.7). Consumption of Vitamin A fortified oil was found unusually high in Chittagong and Sylhet divisions compared to other divisions.
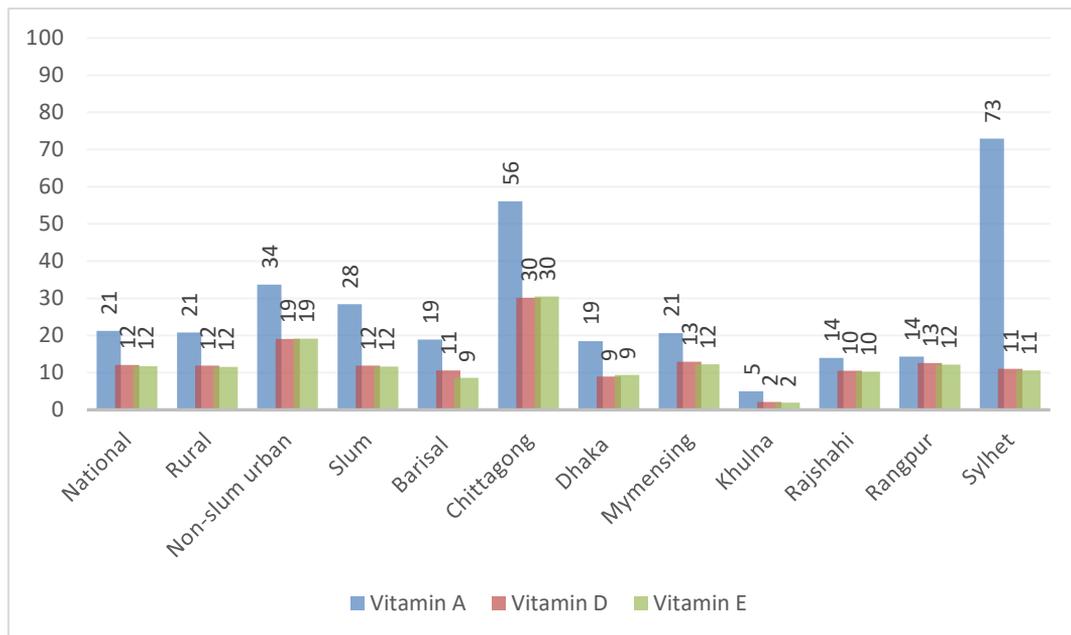
Figure 3.8: Households (%) consuming Vitamin A, D and E fortified edible oil by area of residence

CHAPTER 4: FOOD SECURITY

Food and nutrition security has evolved dramatically during the last decades in theory and practice. FSNS-NNS follows a conceptual framework of food and nutrition security (Figure 4.1) to organize and present the food security status in Bangladesh. Among the four dimensions (availability, accessibility, utilization, and stability) of food and nutrition security, the inclusion of utilization highlights that 'Nutrition security is broader than 'Food security.' According to this framework, food and nutrition security can be achieved when – 1) foods of sufficient quantity and appropriate quality care are available through domestic production or imports; 2) when individuals have access or have adequate resources for acquiring or purchasing appropriate foods for a nutritious diet; and 3) individuals can appropriately use the knowledge on essential nutrition, and maintain clean water and sanitation, to ensure maximum nutrient utilization. Food security is a complex development issue linked to health through malnutrition and dimensions that move from national to regional to household to individual.   Stability in each dimension is necessary to ensure that food and nutrition security is achieved (1, 2).

Cultural beliefs, religion, and traditional knowledge significantly affect food and nutrition security by shaping a community's diet, food choice, intra-household food distribution, child feeding practices, food preparation techniques, food processing, and preservation. For example, pregnancy and childbirth are characterized by numerous cultural or religious beliefs and practices that affect a mother's health and the survival and nutrition of her child. There is also a synergistic relationship between infection and under-nutrition, which may not merely be a result of insufficient food or poor dietary habits, but to poor sanitation and healthcare or inadequate absorption of nutrients (2, 3, 4).

Food and Nutrition Security

Availability	Accessibility	Utilization
(Domestic production, import capacity, food stocks, food aid)	(Poverty and income, markets, price, intra-household distribution)	(Water, sanitation and health, care and consumption, knowledge, cultural & religious belief)

Stability (over time)
(Climate and weather variability, political, economic, natural or social factors)

Figure 4.1: Relationship among components of food and nutrition security

FSNS-NNS estimates the prevalence of food insecurity in Bangladesh using internationally standardized questions to assess respondents' perceptions of household access to food. Following the above diagram, this section will focus on indicators that attempt to quantify gaps in food availability, access, and equitable utilization of food in Bangladesh, while analysis of nutrition security and its determinants will be taken up in subsequent chapters.

Food availability

The Government of Bangladesh (GoB) is working to increase the availability of diverse food supply through improved agricultural production and trade, and by according priority to food security and nutrition as important national goals (5). This commitment is evident in the Government's adoption of the comprehensive National Food Policy (NFP, 2006) and its Plan of Action (PoA, 2008-2015), the first Country Investment Plan for Food Security and Nutrition (CIP1, 2011-2015), The Second Country Investment Plan on Nutrition-Sensitive Food Systems (CIP2, 2016-2020) , the Seventh Five-Year Plan (7FYP), Vision 2021,

as well as global the Second International Conference on Nutrition (ICN2) Framework for Action, the United Nations (UN) Decade of Action on Nutrition and the Scaling-Up Nutrition (SUN) Movement, MDGs and SDGs (5, 6, 7).

In Bangladesh, overall agricultural productivity growth was observed over the last decade until 2015, and a slow-down was observed in the pace of growth during the period of 2015 – 2017 (8). According to the Monitoring reports 2019 of CIP2, the only crops which have not increased in production in the eleven years between 2007/08 and 2017/18 are bananas and pineapple, shown in Figure 4.2 (8-13). The GoB aims to improve the availability of animal source foods such as fish, egg, milk, and meat rich in quality proteins and essential micronutrients, contributing to dietary diversity and nutrient adequacy for good nutrition and health for all. Almost 60% of animal protein intake comes from fish in Bangladesh, and from 2007/08 to 2027/28, fish production is growing steadily, maintaining an average growth of 5.3% (8-14). Moreover, the country has achieved self-sufficiency in fish production in 2016/17 (14). The production of meat, milk, and eggs increased over time. However, it remains insufficient to cover domestic demand for milk and eggs (8). Between 2015/16 and 2016/17, milk, meat, and egg production were respectively increased by 27.6, 16.3, and 25.4 percentage points. Despite these achievements, domestic production is increasingly unable to meet consumer demand for a more diversified diet, with a particular shortfall in the production of pulses and oilseeds (8-13).
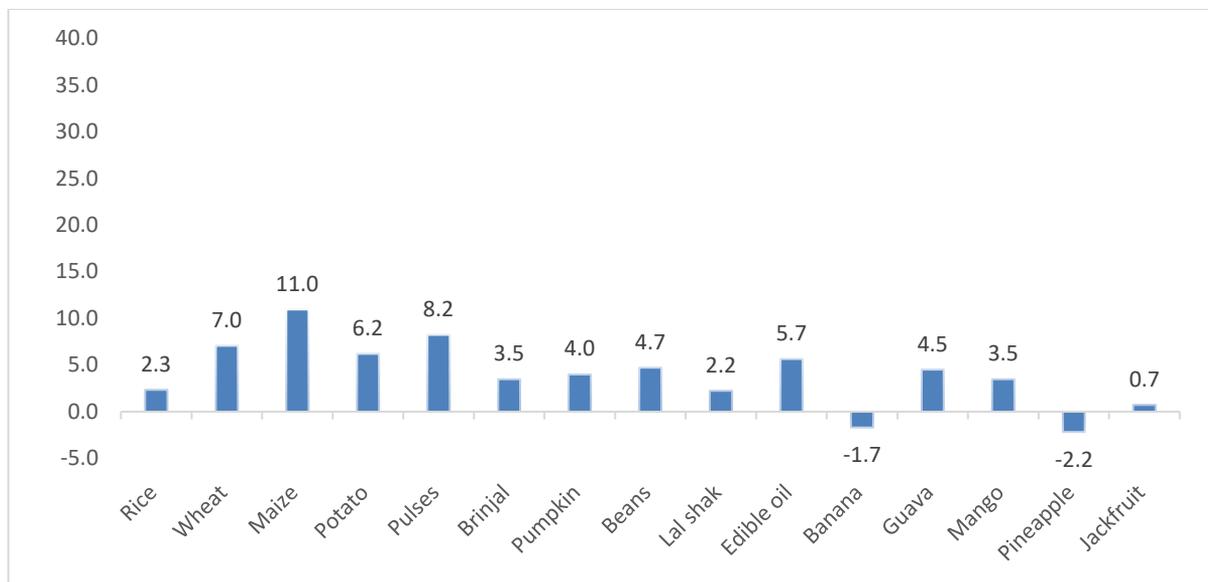
Figure 4.2: Annual growth rates (%) for selected crops (2007-2018)

The tropical and subtropical climate of Bangladesh favors the production of a variety of fruits and vegetables. However, due to inappropriate processing, preservative, and storage, a massive proportion of harvested produce is lost. It points to the need for national policy to reduce enormous post-harvest losses, maintain quality, and elevate fruit and vegetable supply availability throughout the country (6, 15). Furthermore, Bangladesh needs agricultural diversification towards non-cereal crops without compromising rice production as the population pressure is still a major concern. Agricultural diversification will benefit Bangladesh in several pathways including 1) ensuring better quality diets, 2) boosting farmers' incomes and value addition, 3) enabling the country's agricultural trade deficit by producing tropical fruits and vegetables instead of importing them (6, 8).

Accessibility

Household food access

FSNS-NNS measures food access at the household level. Household food access was assessed by examining the household's capability to obtain sufficient food to meet the needs of the members during the month before the interview. Food insecurity results in a typical range of responses independent of whether the episode of food insecurity is chronic or acute. Households usually adopt several coping strategies when individuals face or predict constraints in meeting household food needs, such as consuming only rice in

their meal or sacrificing or skipping meals by one or more family members. When a gap exists between a household's food needs and its ability to procure food, various approaches are employed, such as purchasing lower quality foods, consuming smaller amounts or fewer items   of food, or resorting to socially unsustainable behaviors such as borrowing money and food (16). A severe episode of food insecurity may result in reducing food intake. A range of consequences occurs due to food deficiency and hunger, from short-term weight loss or growth retardation among children. In FSNS-NNS, these indicators are measured by asking the household food manager whether specific behaviors occurred during the month before the interview.

Table 4.1 shows the average prevalence of selected behaviors in the month before the interview overall surveillance rounds. It indicates that the proportion of households with member(s) practicing the selected behaviors one or more times during the month-long recall period is low, and prevalence is slightly higher in the slum area. Less than one percent of households from both non-slum urban and rural areas reported practicing any food security-related behavior often (more than ten times) in the one month preceding the interview. However, 1.4% of slum dwellers said that they did not have money to buy food often. Households with members who had eaten insufficient meals once or twice during the month before the interview were 6.4%, the rate is slightly lower in non-slum urban areas compared to rural areas, 6.0%, and 7.1% respectively; the rate is slightly higher in slum area (7.1%). Similarly, 7.9% and 7.9% of households reported consuming only rice and or not having money to buy rice once or twice during the month before the interview. Only a few households reported skipped meals   (2.5%) or slept hungry (1.8%) once or twice during the month preceding the interview.

Table 4.1: Household behavior related to food insecurity

	National	Rural	Non-slum urban	Slum	Barisal	Chittagong	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Eating less												
Rarely (Once or twice)	6.4	6.4	6.0	7.1	1.5	7.6	5.1	6.7	4.0	7.9	7.8	7.5
Sometimes (Three or ten times)	3.6	3.7	2.9	5.0	1.0	2.0	1.4	3.1	4.1	4.2	5.6	1.8
Often (More than ten times)	0.3	0.3	0.2	0.1	0.1	0.0	0.1	0.4	0.2	0.5	0.3	0.1

Consuming only rice												
Rarely (Once or twice)	7.9	8.0	5.5	8.0	2.4	8.0	7.2	6.5	5.2	12.3	9.0	4.7
Sometimes (Three or ten times)	5.1	5.1	4.0	6.2	2.2	6.2	3.3	4.0	7.1	4.7	4.9	4.5
Often (More than ten times)	0.5	0.5	0.3	0.9	0.5	0.2	0.3	0.2	0.4	0.8	0.6	1.9
No money to buy food												
Rarely (Once or twice)	7.9	7.9	6.3	9.7	2.7	10.7	8.7	13.7	4.7	5.8	10.0	8.4
Sometimes (Three or ten times)	3.5	3.5	3.9	7.8	0.5	3.3	3.1	7.5	2.3	3.0	5.1	1.5
Often (More than ten times)	0.3	0.3	0.4	1.4	0.1	0.2	0.3	1.1	0.1	0.5	0.1	0.0
Skip meal												
Rarely (Once or twice)	2.5	2.5	2.2	2.8	0.6	2.9	0.7	1.2	1.9	3.6	3.4	3.1
Sometimes (Three or ten times)	0.7	0.7	0.6	1.0	0.2	0.5	0.3	0.5	0.5	1.2	1.0	0.7
Often (More than ten times)	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Slept hungrily												
Rarely (Once or twice)	1.8	1.8	1.2	1.5	0.7	1.7	1.5	1.2	1.4	2.1	2.6	0.8
Sometimes (Three or ten times)	0.4	0.4	0.4	0.3	0.1	0.2	0.1	0.7	0.4	0.2	0.6	0.5
Often (More than ten times)	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.2	0.1	0.0

Figure 4.3 shows the proportion of household reliance on socially unacceptable or unsustainable means to obtain food. Taking loans (18.6%) and borrowing foods (13.6%) remain the most common means for coping with hunger or shortage of food. Nationally one-third of the households had to adopt untenable means to ensure food for their family in the month before the interview, while the rate is higher in rural (34.7%) than in the non-slum urban areas (23.5%). Although only a few households reported mild   forms of food insecurity (once or twice during the previous month), one-third of households reported adopting unsustainable means of food acquisition.
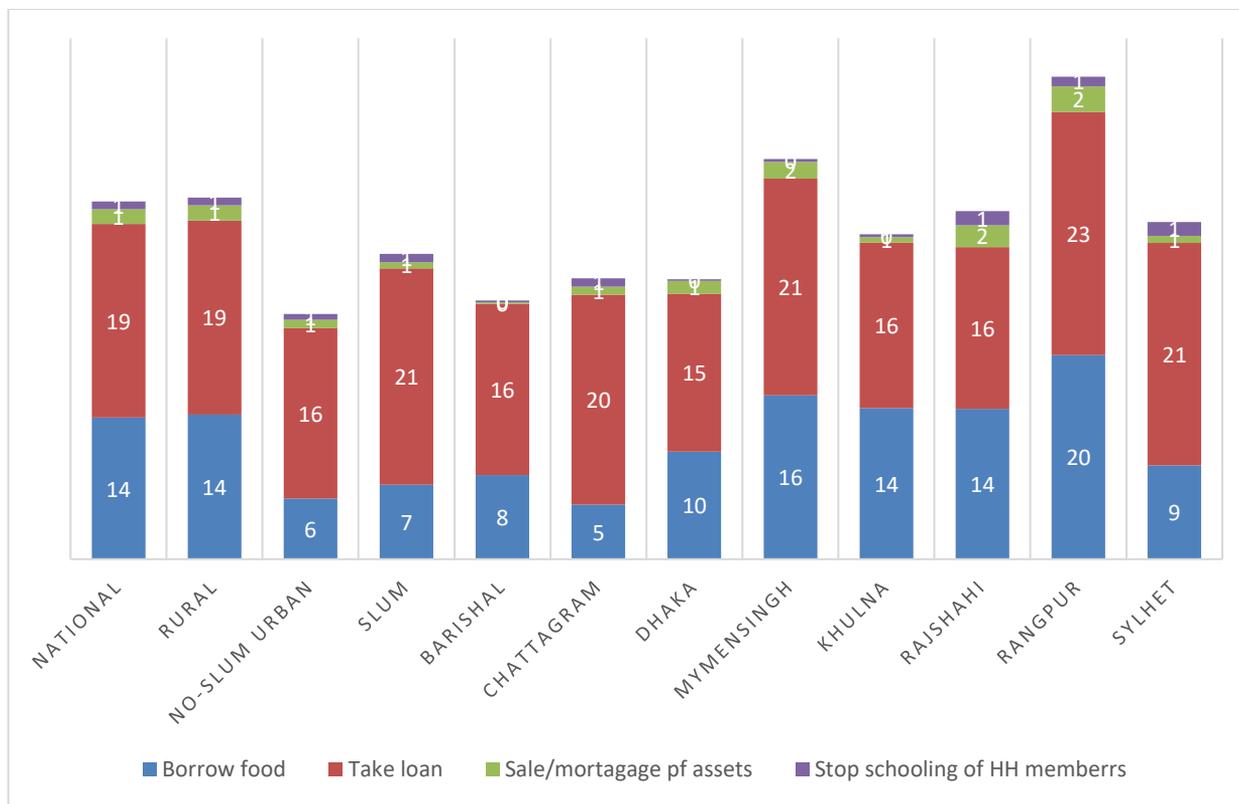
Figure 4.3: Household adopting unsustainable means to obtain food

Household food insecurity access scale (HFIAS)

The indicators related to food security presented in table 4.1 and table 4.2 are combined to create an internationally standardized composite index, the Household Food Insecurity Access Scale (HFIAS), developed by the Food and Nutrition Technical Assistance Project (FANTA). The results of this scale are not comparable across cultures. However, they can measure changes in the level of food insecurity within a culture over time (17, 18). Figure 4.4 shows the distribution of households by food security status. Nationally 59.0% of the households were food secure. However, the percentage of food-secure households is higher in the non-slum urban areas (64.8%), while the rate is lower in the slum area (50.4%), as expected. The proportion of households with severe food insecurity decreased to 12% nationally from 20% in 2015 (FSNSP 2014). Nearly one-fifth (18.9%) of the slum households were severely food insecure. The severe food insecurity rate was highest in Mymensingh (22.4%), followed by Rangpur (15.6%), and was lowest in Barisal (3.4%) division.
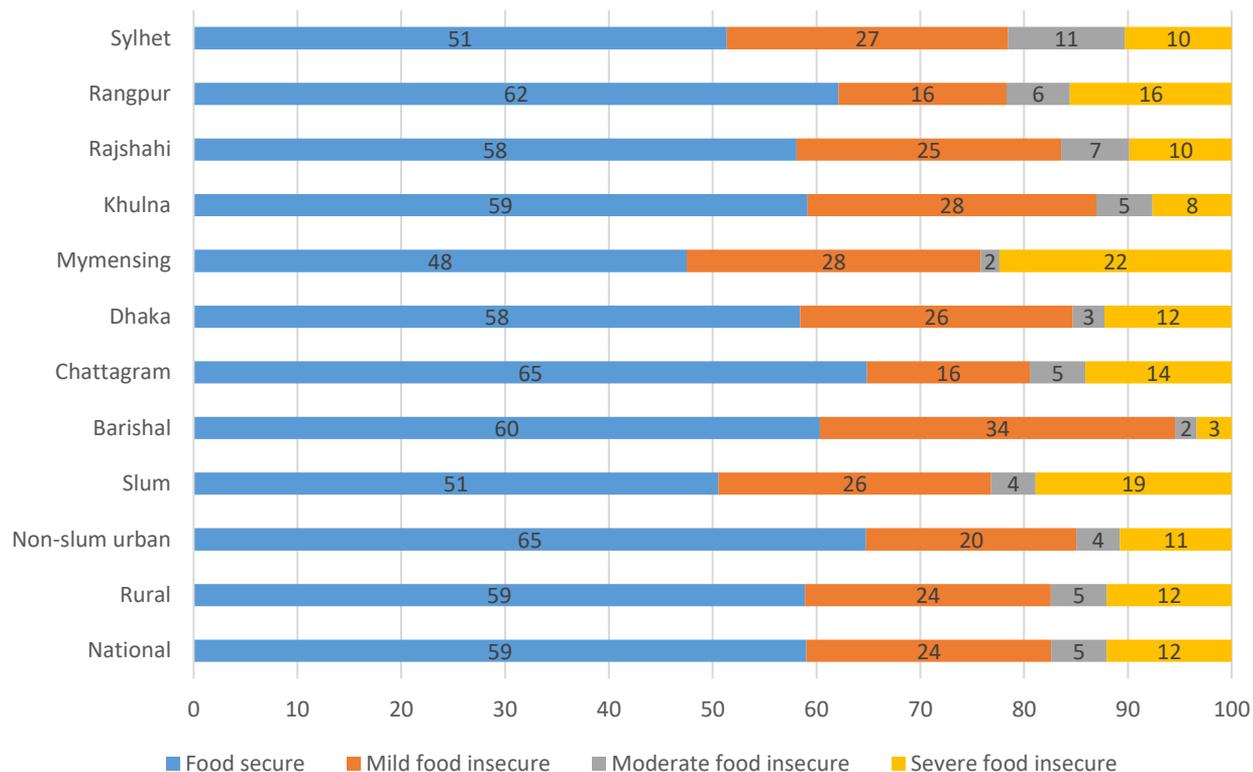
Figure 4.3: Household food security status according to HFIAS

Households receiving benefits from any social safety net program

However, it is possible to separate groups that are more vulnerable to food insecurity by recording if households had received benefits from any government social safety net program in the past six months. Safety nets include income transfers for those chronically unable to work because of age or handicaps and those temporarily affected by natural disasters or economic depression. These transfers can be without conditions, such as the freedom fighters' allowance, or conditional, such as cash for work or cash for the education program. The government has taken these safety net programs as an essential component of national anti-poverty strategies (19, 20). Around one-third of the households in Bangladesh reported receiving benefits from social safety net programs, while about one-fifth are enrolled under the cash

for the education program, but the rate is much lower in the non-slum urban areas (5.6%) (Table 4.2).

Table 4.2: Households receiving benefits from any social safety net program

Types of social safety net program	National	Rural	Non-slum urban	Slum	Barishal	Chattagram	Dhaka	Mymensing	Khulna	Rajshahi	Rangpur	Sylhet
None	70.7	65.0	86.7	76.7	58.4	76.5	79.7	68.5	62.5	74.6	68.5	73.4
Cash for education	17.6	21.8	5.6	14.0	26.9	12.5	11.7	19.7	22.2	13.7	20.4	17.1
Freedom fighter allowance	0.6	0.5	1.0	0.2	0.8	0.6	0.4	1.2	0.3	0.2	0.6	0.4
Old age allowances	8.3	9.3	4.5	8.1	12.5	8.9	6.8	6.9	7.4	9.2	7.2	8.2
Vulnerable group development	0.8	1.2	0.0	0.1	0.7	0.4	0.5	0.2	1.2	1.2	1.8	0.2
Widow allowances	1.3	1.7	0.3	0.7	1.2	1.5	0.8	2.1	1.3	1.0	1.3	0.9
Vulnerable group feeding	1.2	1.7	0.0	0.0	0.6	0.2	0.2	0.0	7.4	0.1	0.3	0.1
Others benefits	2.8	3.0	3.2	1.3	4.5	1.2	1.5	4.2	3.7	2.1	3.8	1.5

CHAPTER 5: WATER, SANITATION, AND HYGIENE

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

Drinking water and sanitation facilities

Based on the WHO/UNICEF Joint Monitoring Programme guidelines for water supply and sanitation, two principal indicators of improved and unimproved water supply were divided into four sub-groups (5):
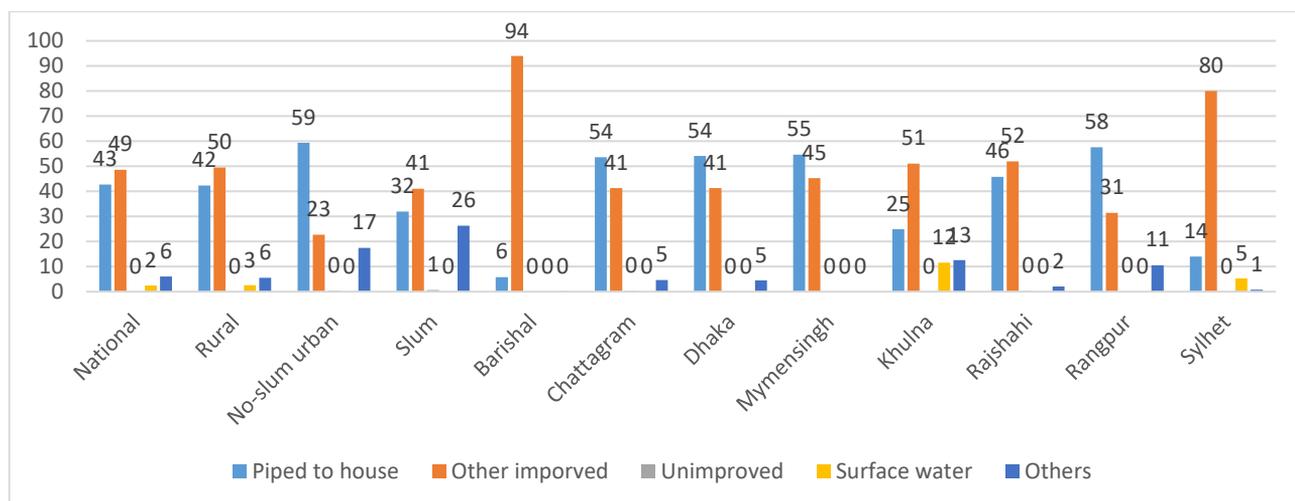
Figure 5.1: Sources of drinking water and type of latrine

improved sources[1], other improved sources[2], unimproved sources[3] , and surface water. Nationally, the proportion of households dependent on piped water and another improved water source was 43% and 49%, respectively. The proportion of households dependent on piped water was more in the non-slum urban areas (59%) and less in the slum area (32%). However, the proportion of households dependent on other improved sources of water was higher in the rural areas (50%) and lowered in the non-slum urban areas (23%) (**Figure. 5.1**).
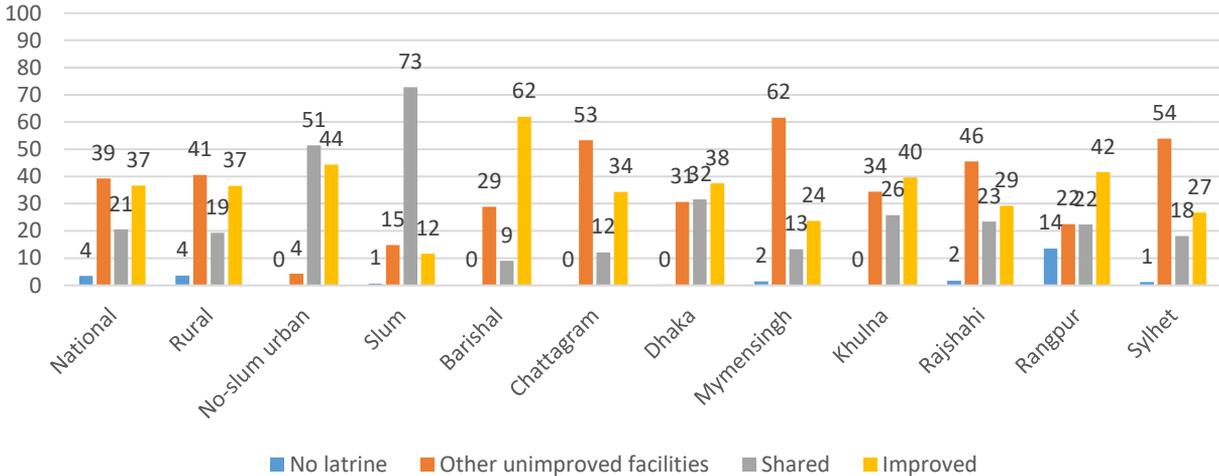
Figure 5.2: Types of latrines used by the households

In terms of sanitation indicators, four-subgroups are identified: no latrine (open defecation), other unimproved facilities that do not ensure hygiene, shared facilities that are shared by two or more households and thereby not sanitary, and lastly, improved household facilities, which include flush toilets, water-sealed toilets, and closed pit toilets. The proportion of households with access to improved latrines was 37% at the national level, although households' proportion without access to any latrine was 4% at the national level (**Figure 5.2**).

Table 5.1 shows that the overall 91.4% of households had access to improved drinking water at the national level, with higher access reported in rural households and lower access in slum households.

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[1] Improved sources means piped water to dwelling, pipe to yard/plot and household tube well

[2] other improved sources means public tap, shared tube well, protected dug well and rain water

[3] unimproved sources means unprotected dug well, water tanker and spring

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

Improved drinking water and toilet facilities	National	Rural	No-slum urban	Slum	Barishal	Chattagram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Access to improved drinking water (%)	91.4	91.8	82.0	73.1	99.9	95.0	95.4	99.9	75.9	97.8	89.1	93.9
Access to improved toilet facility (%)	36.6	36.5	44.3	11.7	61.9	34.4	37.5	23.7	39.7	29.3	41.6	26.7

Nationally, 36.6% of the households had access to improved toilet facilities. Access was more in non-slum urban households (44.3%) and less in rural households (11.7%). In Barisal and Mymensingh division, 99.7% of households had access to improved drinking water. On the other hand, access to improved toilet facilities was highest (61.9%) in the Barisal division. We did not consider arsenic in our questionnaire and analysis.

Handwashing behavior

Bangladesh has made considerable progress in ensuring safe drinking water and improved toilet facilities for its citizens. However, other healthy environment components are still lagging, such as handwashing practices (4). Beginning in 2012, FSNSP has integrated handwashing indicators drawing from modules contained in the Maternal Child Health Integrated Programme/project (MCHIP) (5), supplemented by
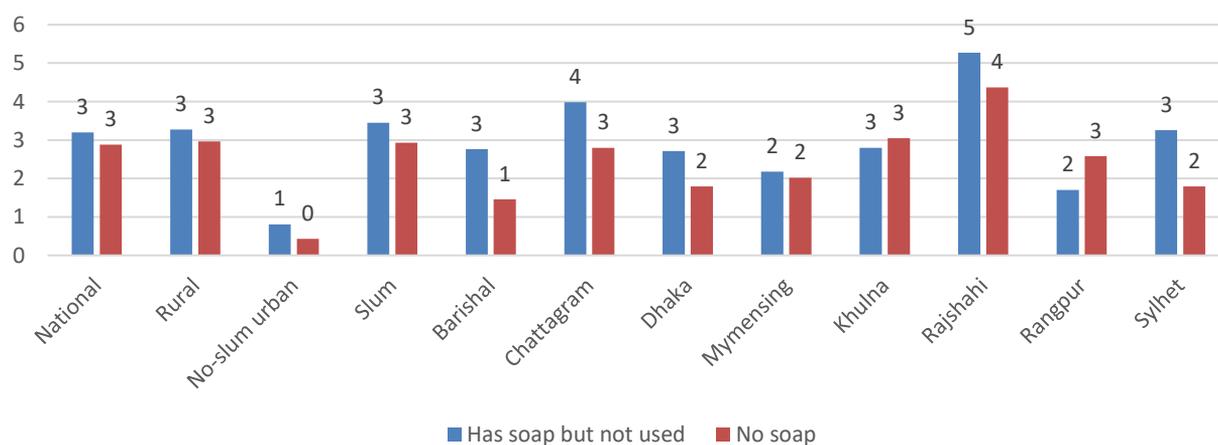
Figure 5.3: Distribution of households with soap by division

indicators shown to be effective at predicting diarrhea episodes in Bangladesh (6). Since 2013, these

indicators have been collected for all households (not just households with children under five), thus permitting a more comprehensive look at households' handwashing behavior.

Nationally, 3% of households did not have access to soap; rural and slum households had less access to soap than non-slum urban households. Moreover, 3% of households had soap but could not use it, and this pattern is more common in rural and slum areas (3%) than in the non-slum urban areas (1%) (**Fig. 5.3**).
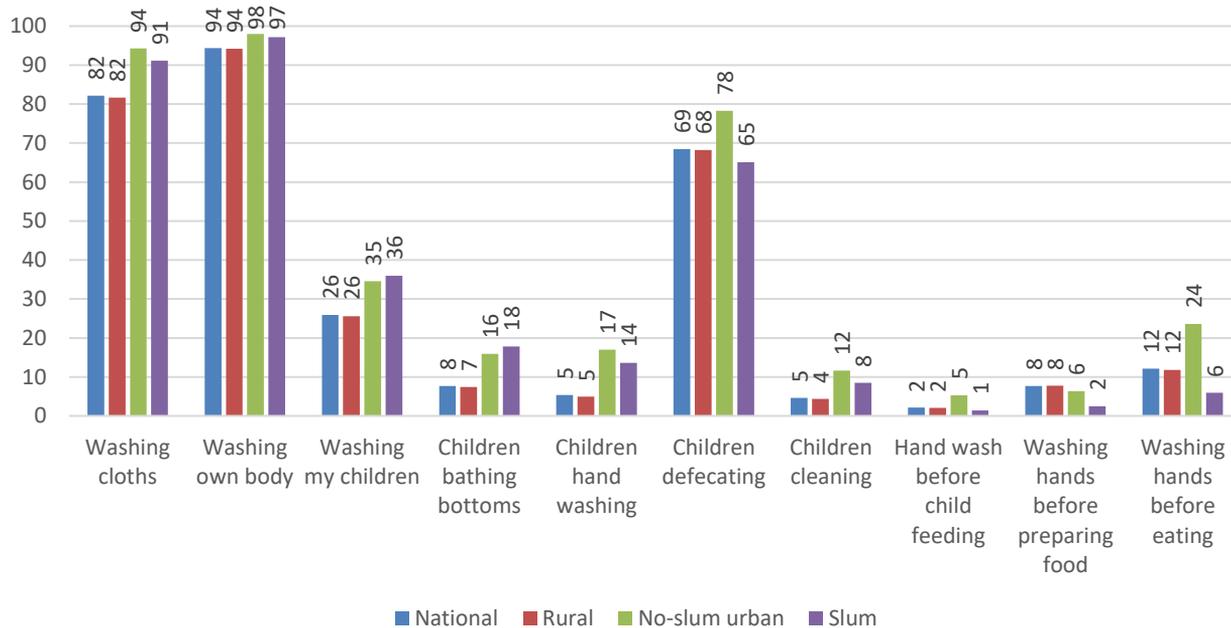
Figure 5.4: Use of soap for household and sanitation purposes

Nationally, 8% of households used soap before preparing food, and 12% used soap before eating. The proportion of households washing hands before preparing food is more in rural areas (8%) and less in the slum area (2%). On the other hand, the proportion of households washing hands before eating was higher in the non-slum urban area and lowered in the slum area (**Figure 5.4**)

Sanitation and hygiene in households with children

Previous studies reported that lack of inappropriate hand washing before child feeding could increase the risk of infection, poor appetite, and ultimately malnutrition and death (7). Research also suggests that

one-third of diarrhoeal disease episodes can be reduced by promoting handwashing through education and/or the provision of washing goods (7). Therefore, efforts to motivate people around handwashing through behavior change communication (BCC) are critical (8). As under-five children frequently put their hands into their mouths , proper handwashing practices among children can also prevent the transmission of diarrhoeal diseases (9).
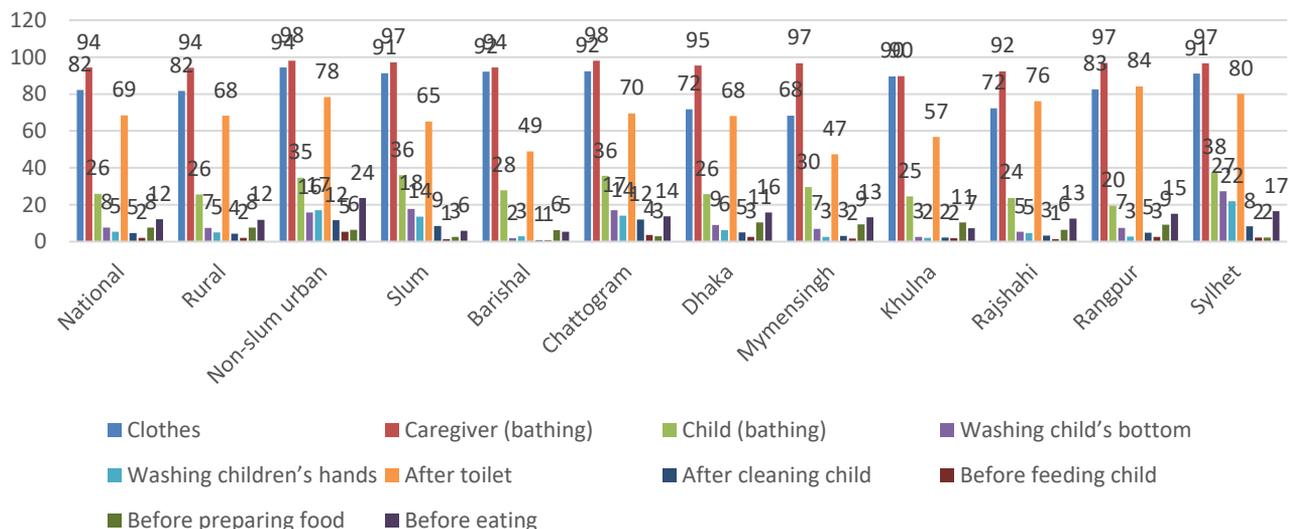
Figure 5.5: Proportion of caregivers by the times when soap was used

Nationally, 94% of the caregivers used soap for bathing, and this proportion was higher in non-slum urban areas (98%) than rural (94%) and slum areas (97%). Compared to the participants from other divisions, a higher proportion of caregivers from the Chattogram division (98%) and a lower proportion from the Mymensingh division (68%) used soap for bathing. After using the toilet, only 69% of our study participants reported that they used soap to wash their hands. Non-slum urban caregivers (78%) used soap more than rural (68%) and slum caregivers (65%). The use of soap after the toilet was most prevalent among caregivers from the Mymensingh division. However, the use of soap for washing hands was less common before eating (12%), before preparing food (8%), and after cleaning the child (5%) **(Figure 5.5)**.

CHAPTER 6: NUTRITION STATUS of CHILDREN

Lack of comprehensive child care and protection, poor feeding practices, and limited resources are critical determinants of child malnutrition, as UNICEF describes (Fig. 6.1). Globally, around 6.9 million children die every year before reaching their fifth birthday. Two-thirds of them (4.4 million) die due to conditions that could be prevented or treated with access to affordable and straightforward measures (1). According to the Lancet Maternal and Child Nutrition Series, in middle-income countries, under-nutrition is the cause of 3.1 million child deaths annually, which is 45% of all child deaths (2). But unfortunately, death is the tip of the iceberg. To effectively address this crisis, it is essential to identify the causes of under-nutrition and the most vulnerable populations (3).
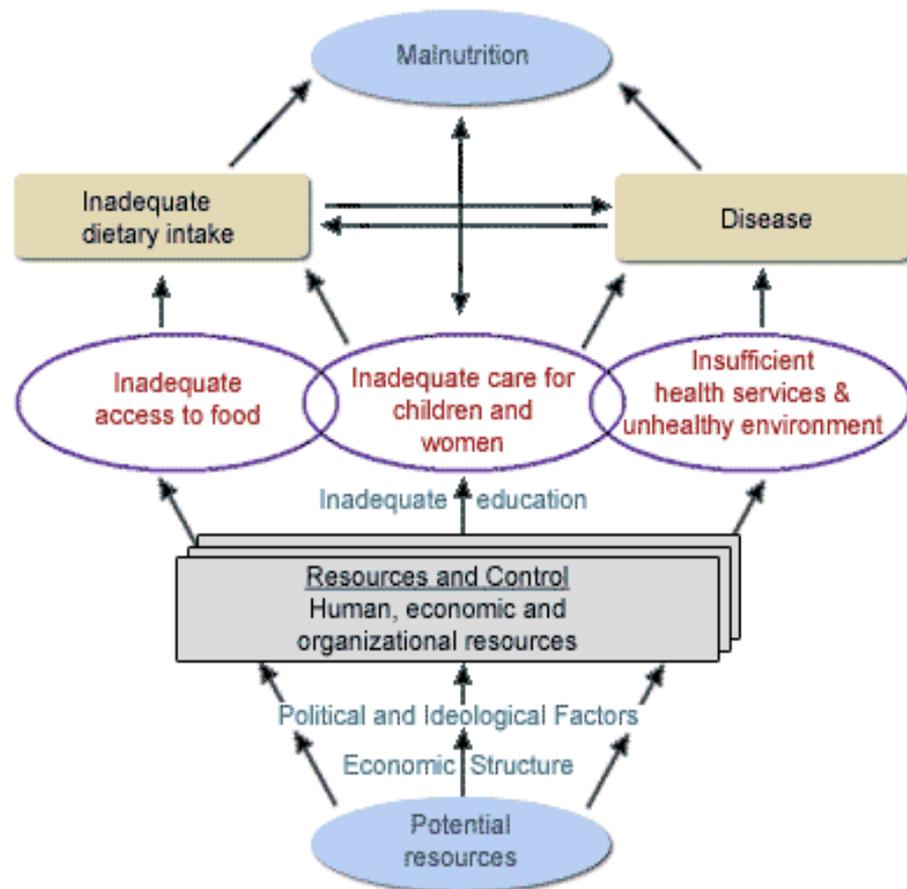
Figure 6.1: UNICEF conceptual framework of child under-nutrition

The effects of malnutrition are long-term and trap generations of individuals and communities in a vicious circle of poverty. Nutritional improvement is, therefore, essential in efforts to eradicate poverty and accelerate the economic growth of low and middle-income countries. It has been estimated that the economic cost of malnutrition ranges from 2 to 3% of the GDP of any country (4). The most damaging effects of malnutrition occur during pregnancy and early childhood from conception to two years of age, i.e., the first 1000 days. During this vulnerable period, malnutrition can weaken a child's immune system and increase the risk of infectious diseases. Besides, delayed motor and cognitive development, which figure among the long-term effects of malnutrition, may result in significant lifetime losses in terms of health and productivity (5).

Even if a child's health and diet improve later in life, damage done during this period is primarily irreversible (6,7). Therefore, increasing the quality and adequate coverage of nutrition-specific interventions through investment in delivery systems and more effective targeting of vulnerable and marginalized groups are necessary to address the malnutrition problem (7). This report has described some of the causal factors of child under-nutrition, including hygienic practices, sanitation, household food insecurity, and inadequate care practices for pregnant mothers, women, and under-five children. This chapter discusses the prevalence and distribution of child malnutrition in Bangladesh in 2018-19. To estimate the nutritional status of children, FSNS-NNS records the height/length, weight, and MUAC measurements of all children of sampled households. In 2018-19, FSNS-NNS measured over 2,966 children across the country. Child nutritional status is calculated by comparing multiple measures from Bangladeshi children with those of a reference population of children from both developing and developed countries experiencing recommended feeding and care conditions (8,9).

WHO recommended indicators are used to measure nutritional imbalance resulting in under-nutrition. The percentage of children with a low height/length for age (stunting) reveals the cumulative effects of under-nutrition and infections since and even before birth. Therefore, this measure can be interpreted as an indication of poor environmental conditions or long-term retardation of a child's growth potential. The percentage of children who have low weight-for-age (underweight reflects wasting (i.e., low weight-for-height/length), acute weight loss, stunting, or both. As such, underweight is more challenging to interpret

as it does not distinguish between children who are stunted or wasted but may include children who are only mildly undernourished based on both of these indicators (9,10). Acute under-nutrition is estimated using the circumference of a child's upper arm or a measure of weight for height compared against a reference population or a static international standard.

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

To classify the percentage of obesity in children, which denotes a high ratio between their weight and length, BMI scores by age are compared with a WHO reference population.[4] Children are classified as moderately overweight if their measurements indicate that they are between +2 SD and +3 SD from the mean of the reference population. Children who are above +3 SD are classified as severely overweight (10). Figure 6.2 depicts these indicators.
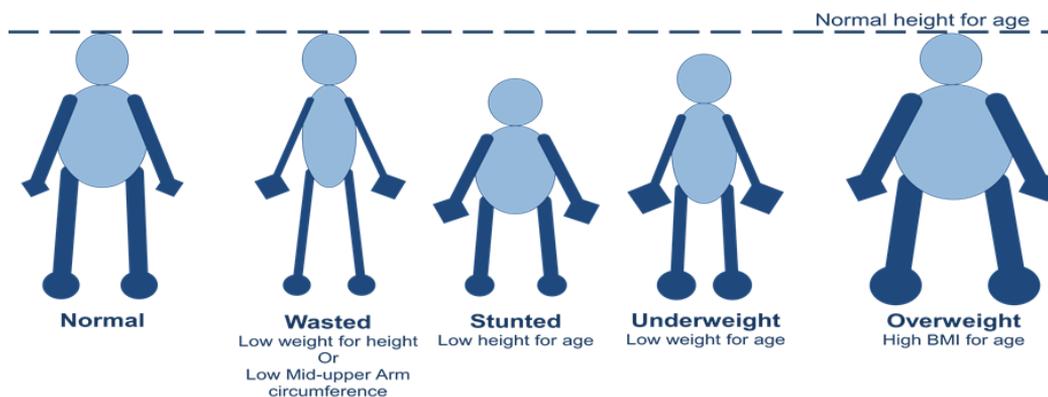
Figure 6.2: Indicators of childhood malnutrition

Children grow with slightly different trajectories, even among well-fed children (11,12). Therefore, nutritional status measures are expressed in population terms and only have limited value in assessing malnutrition in an individual child. Even in a healthy, well-nourished population, approximately 2% of

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[4] BMI for age is the recommended indicator for determining childhood overweight and obesity according to the WHO (26,8).

children would naturally be short enough to be classified as stunted, light enough to be considered underweight, or thin enough to be considered wasted.

During the last two decades, Bangladesh has achieved substantial reductions in levels of child under-nutrition. Since FSNSP 2010, an incremental reduction in child stunting has occurred from 45% in FSNSP 2010 to 35% in FSNS-NNS 2015, which is less than the WHO cut-off for very high prevalence (9). Stunting further declined to 28% in the current year after a stagnation between 2013 and 2015. In addition, the level of underweight declined to 25% after several years of static level from 2010. However, levels of wasting remained comparatively static during this period.
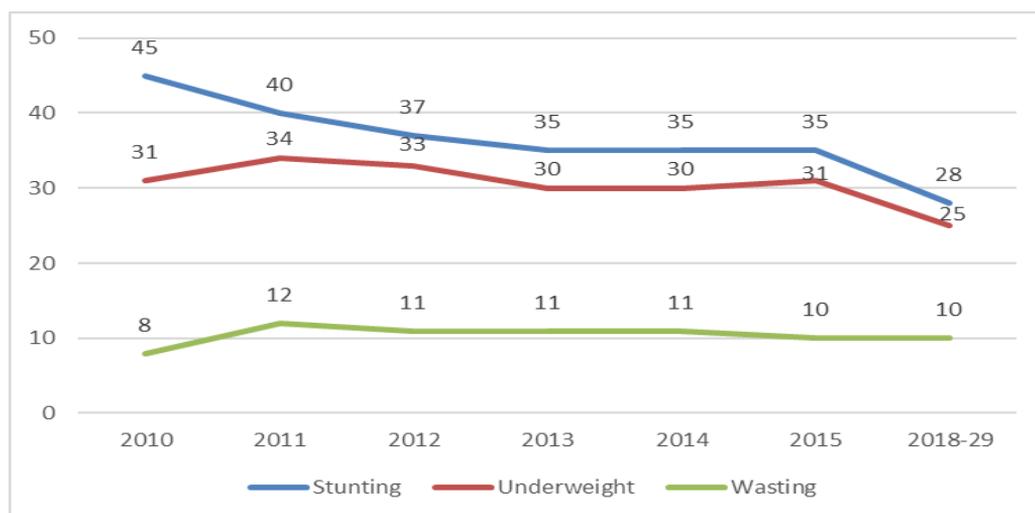
Figure 6.3: Trends in the prevalence of child undernutrition (0 to 59 months)[5]

Parental characteristics of the children

Nearly one-fourth (24.9%) of fathers had no formal education compared to only tenth mothers who had no formal education. Most of the mothers (92.7%) were not involved with any income-earning activities. One-fifth   of the fathers were unskilled labor (20.4%).

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[5] Estimated proportion for different nutritional indicators of Bangladeshi children between the years of FSNSP 2010 to FSNSP 2015 are obtained from the previous reports of FSNSP (20,21,22,23,24,25)

Table 6.1: Characteristics of the parents of the children by area of residence

Mother's education	National	Rural	Non-slum urban	Slum	Barishal	Chattagram	Dhaka	Mymensing	Khulna	Rajshahi	Rangpur	Sylhet
Mother's education												
No formal education	11.6	11.5	11.6	29.8	6.2	7.1	17.8	18.4	7.4	16.7	7.2	24.1
Partial primary	10.8	10.8	11.0	13.3	10.1	7.2	15.2	12.4	10.9	14.3	9.4	7.7
Complete primary	17.7	17.6	18.4	26.2	13.5	14.4	21.4	16.6	15.3	25.2	13.6	25.6
Partial secondary	41.4	41.7	35.9	21.4	39.5	48.8	33.4	35.5	51.4	32.5	43.0	31.6
Complete SSC	8.9	8.8	11.6	5.6	12.3	11.7	5.5	7.0	8.5	7.0	10.6	5.3
HSC or more	9.7	9.6	11.5	3.8	18.5	10.7	6.7	10.1	6.5	4.2	16.2	5.8
Mother's profession												
Farmer	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.4	0.0	0.3	0.0	0.0
Unskilled day labor	0.3	0.3	0.1	1.6	0.0	0.1	0.1	0.1	1.1	0.2	0.0	0.2
Skilled day labor	0.3	0.3	0.8	2.8	0.0	0.2	0.5	1.1	0.0	0.5	0.3	0.0
Salaried	3.1	2.9	8.4	11.2	4.0	1.3	5.6	7.4	1.7	1.9	4.7	1.4
Business	0.3	0.3	0.6	1.6	0.0	0.0	1.2	0.4	0.6	0.4	0.3	0.0
No income	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.1
Not involved with income earning	92.7	93.0	86.5	75.1	95.0	97.7	90.2	85.8	95.5	86.6	94.1	95.5
Others	3.1	3.1	3.5	7.7	0.9	0.6	2.3	5.0	1.1	9.9	0.7	2.8
Father's education												
No formal education	24.9	25.2	15.8	34.8	10.6	16.3	30.8	35.3	21.5	29.9	23.9	40.3
Partial primary	15.7	15.8	11.0	13.7	13.5	13.9	10.3	9.6	23.5	12.4	17.2	17.5
Complete primary	18.2	18.2	16.9	18.4	17.4	15.4	22.0	20.0	15.7	29.6	10.1	17.0
Partial secondary	23.1	22.8	31.0	25.0	29.3	32.7	19.4	20.2	21.1	16.6	26.7	14.6
Complete SSC	7.8	7.8	10.6	4.1	12.7	12.9	7.0	7.2	7.5	4.2	7.7	3.4
HSC or more	10.3	10.2	14.7	4.2	16.6	8.8	10.5	7.7	10.6	7.3	14.4	7.2
Father's profession												
Farmer	9.5	0.0	9.8	0.0	8.8	1.6	11.0	20.3	14.6	4.2	10.6	9.6

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Unskilled day labor	20.4	4.6	21.0	15.1	10.3	12.5	9.5	19.6	28.7	14.0	27.5	35.3
Skilled day labor	13.7	12.3	13.7	17.4	16.4	11.0	13.7	8.7	20.8	14.4	11.4	8.1
Transport	13.5	19.2	13.3	19.6	14.3	11.5	17.2	9.4	8.5	21.4	14.0	10.0
Fisherman	0.8	0.4	0.8	0.0	1.3	2.2	1.0	0.0	0.5	0.0	0.2	2.3
Salaried	17.7	37.0	17.1	19.4	24.9	31.6	24.9	22.9	11.5	8.4	15.0	15.5
Business	17.0	22.2	16.8	23.6	18.4	20.3	17.9	17.9	13.2	16.3	18.4	15.3
No income	0.6	1.3	0.5	3.0	0.6	0.8	0.3	0.1	0.0	0.8	1.0	0.8
Others	6.9	3.0	7.1	1.9	5.1	8.6	4.6	1.1	2.3	20.6	2.0	3.1

Dietary practice of Newborn and young children (0-23 months)

Appropriate feeding practices during infancy are crucial for maintaining proper nutrition, development, and growth of the children. In developing countries, inappropriate dietary practices have profound effects on the survival of infants and children (1–3). The WHO and United Nations International Children's Emergency Fund (UNICEF) acknowledged the impact of infant and young child feeding (IYCF) practices on the nutritional status of under two children and developed a set of indicators to assess child feeding practices. The strategy recommends initiation of breastfeeding within one hour after birth, exclusive breastfeeding for the first 6 months, which should continue up to 2 years of age with timely, adequate, and safe complementary feeding practice, no pre-lacteal feeding, no bottle feeding, and maintaining minimum dietary diversity.

Figure 6.4 illustrates the prevalence of WHO-recommended IYCF core indicators. Ninety-two percent   of the children aged 0-23 months were initiated breastfed within 1 hour after birth, and the proportion was almost equal among the rural, urban, and slum areas. The prevalence of exclusive breastfeeding was 56% for infants aged 0-5 months, with the lowest rate at the slum areas (49%). During the survey period, 57% of the mothers reported that they have continued breastfeeding of the children up to one year, and the rate was higher in the slum areas than at the national level (61%). Four out of five (80%) children were introduced to solid   , semi-solid, or soft foods at 6-8 months of age at the national level, and the highest proportion was observed in slum areas (88%). At the national level, approximately 55% of the mothers maintained   minimum dietary diversity, 47% of children received minimum meal frequency, and only

28% received a minimum   acceptable diet. Consumption of iron and iron-rich food was 53%. Regional variation exists for all the indicators.
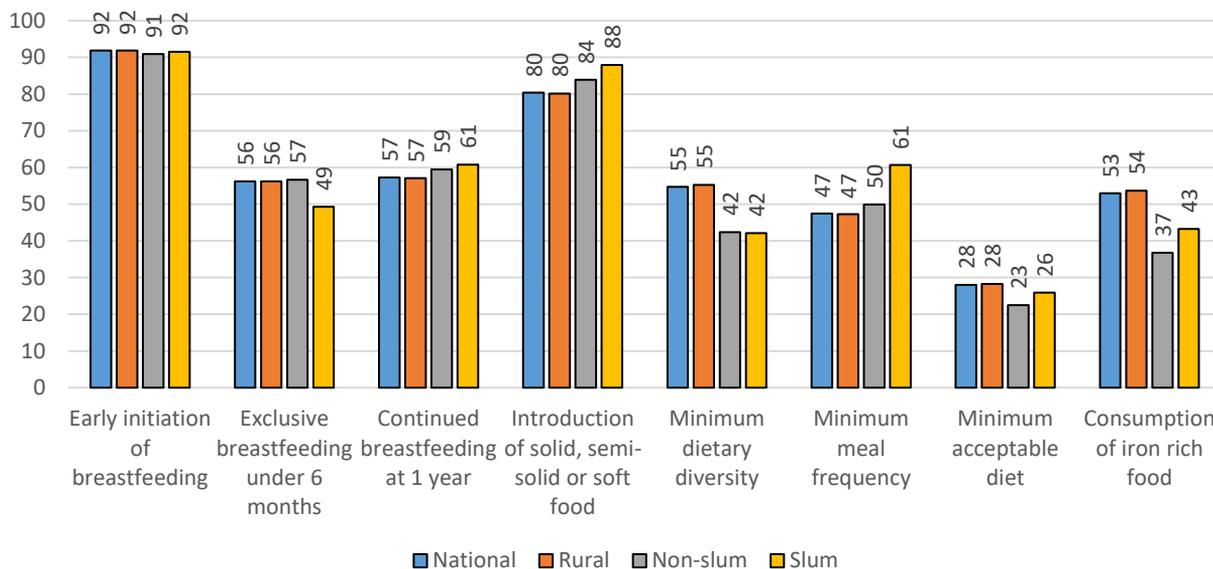
Figure 6.4: Prevalence of WHO-recommended infant and young child feeding practice

Dietary diversity of the children

From   the age of 6 months, breastfeeding is not adequate to meet all the nutritional requirements for the growing child. Therefore, consumption of adequate and diversified food is mandatory. Dietary diversity as an indicator of micronutrient adequacy may increase the nutrient density of the complementary foods, promoting optimal child growth and development (4). On the other hand, receiving an inadequate diversified diet may lead to undernutrition and predispose children to infections and several illnesses (5).

Figure 6.5 shows the proportion of children consumed by different   food groups in the previous day before the survey. The most commonly consumed food was starchy staples (98%) at the national level, as well as in all the regions and divisions. Starchy staples were followed by nuts and seeds (61%) and eggs (59%). A smaller proportion of children were reported to have consumed food items including meats, fish or poultry (39%), dairy products (36%), pulses (32%), fruits (25%), dark green leafy vegetables (31%), other

vegetables (25%), and fruits and vegetables riched in vitamin A (11%) at the national level. The magnitude of consumption of different food groups also varies among the regions and divisions. Our analysis found the majority (58%) of the children did not meet the recommended dietary diversity of more than 5 food groups at the national level (Figure 6.6), which was highest in the slum areas (71%). At the divisional level, the Sylhet division had the highest proportion (81%). The Rajshahi division had the lowest proportion (41%) of children with dietary diversity.
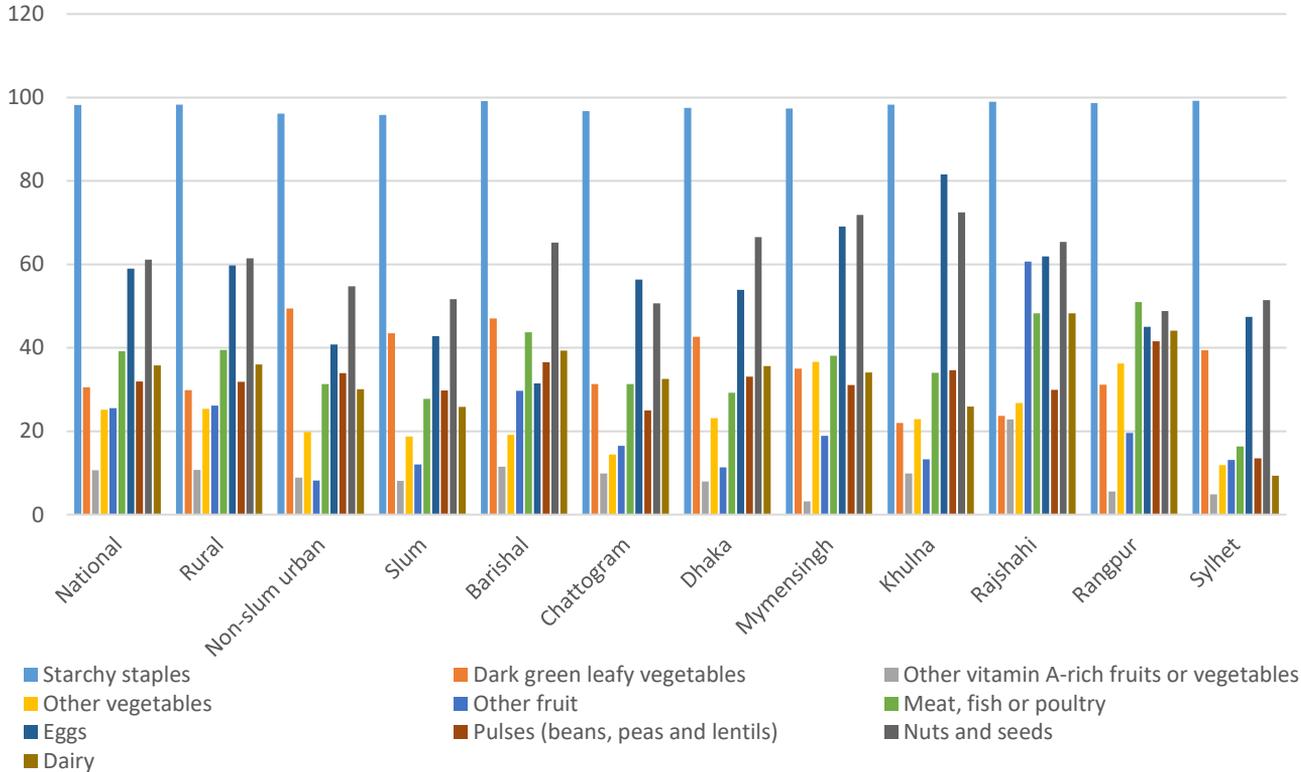
Figure 6.5: Dietary practice of the children

less than 5   5 or more
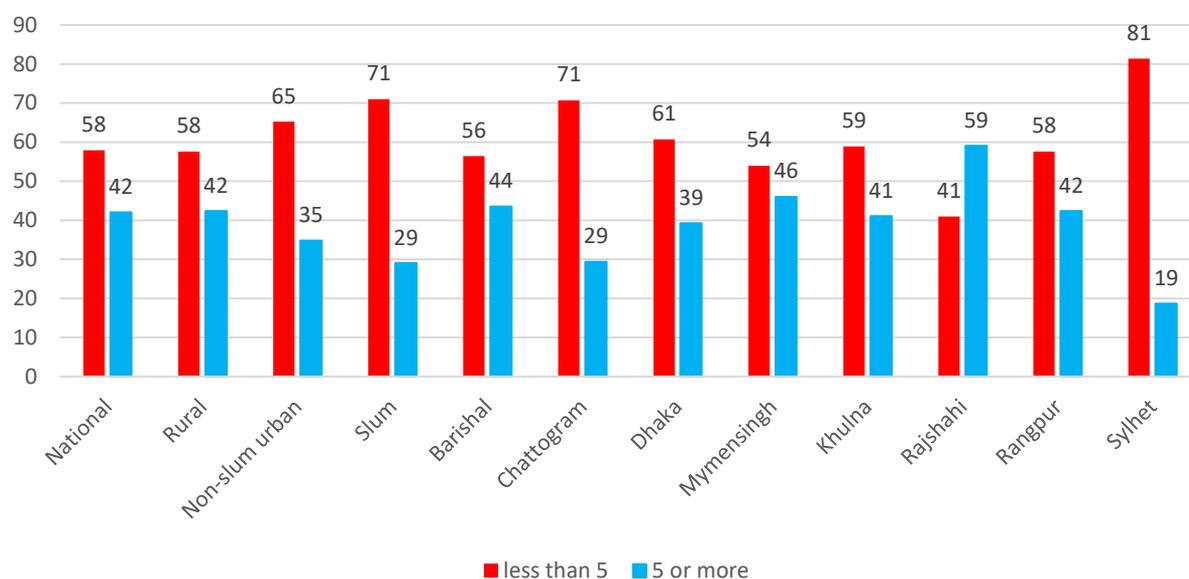
Figure 6.6: Dietary diversity of the children

Acute childhood under-nutrition

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

The prevalence of acute undernutrition was lower in non-slum urban areas (15%) compared to rural areas (25%) and slum areas (28%). The prevalence of acute under-nutrition rate was low in Dhaka (18%) and Rangpur (21%) division and high in Mymensingh (32%). The rate is highest in Sylhet, where 40% of children

were suffering from acute under-nutrition.

Figure 6.7: Acute child (0-59 months) under-nutrition (weight-for-age or underweight) by residence
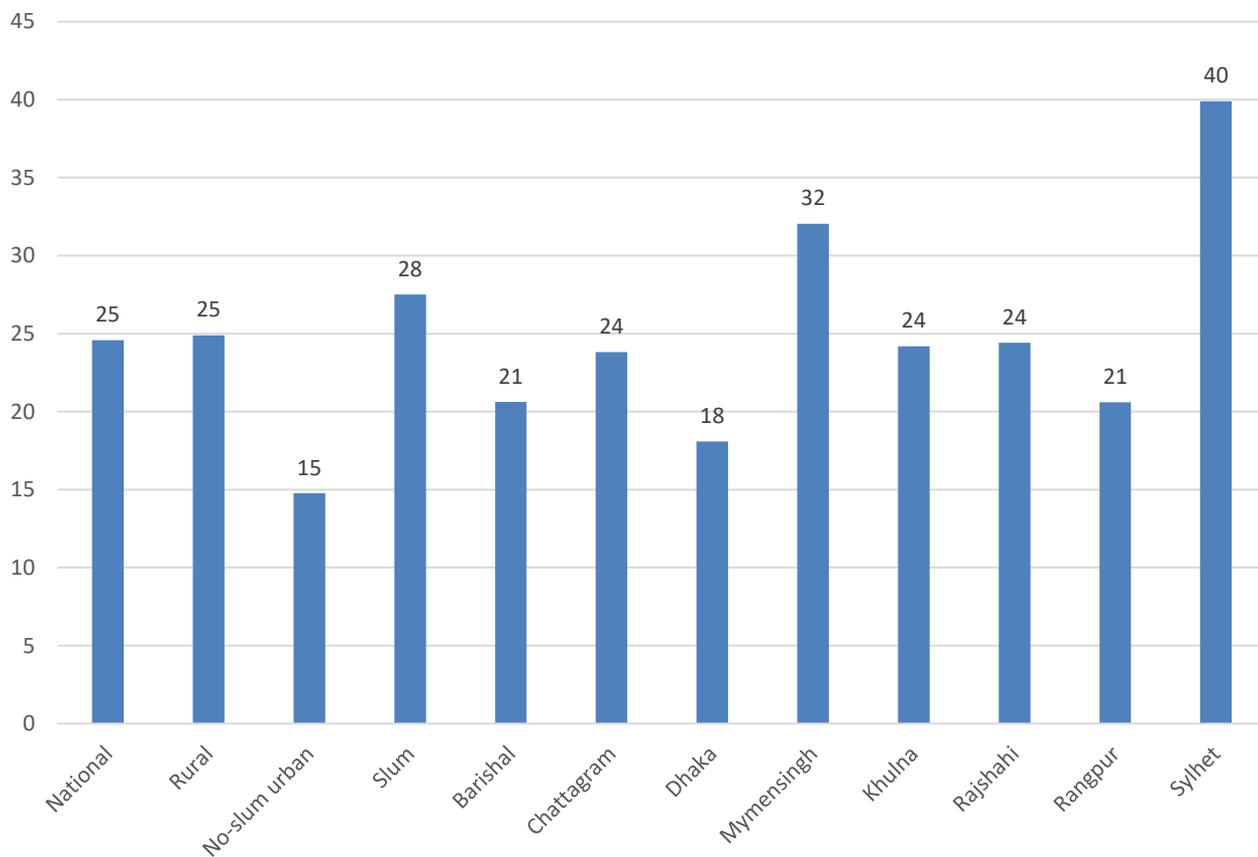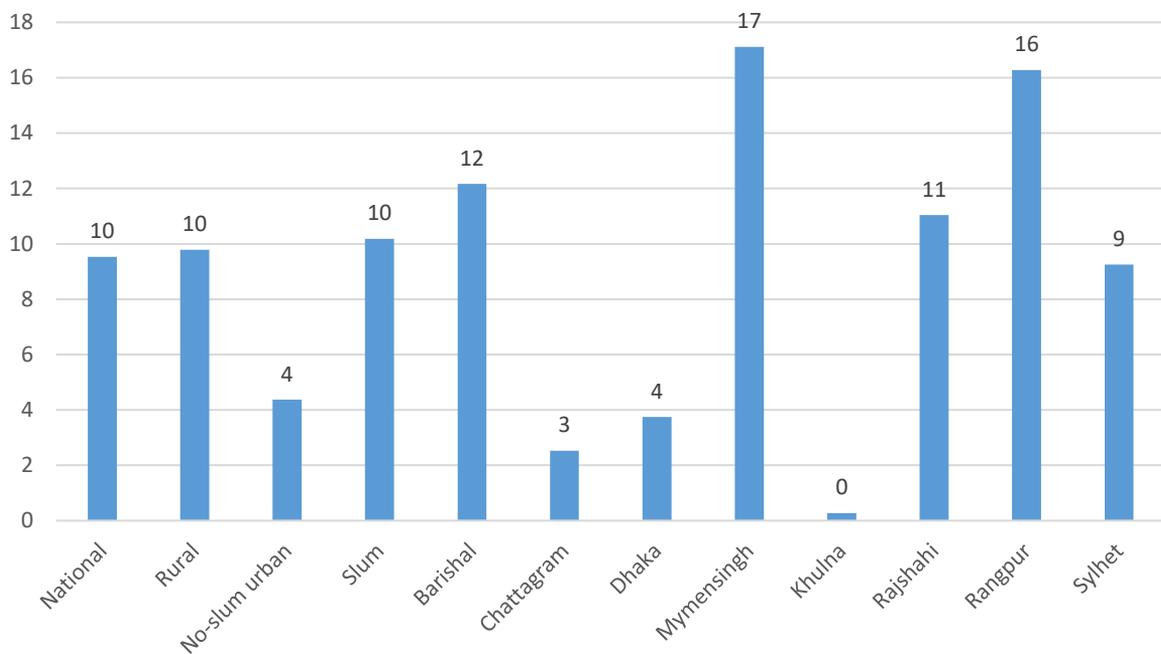
Figure 6.8: Acute child (0-59 months) wasting (weight-for-height) by residence

There has been   an improvement in child nutritional status since FSNSP 2011 (Figure 6.7), particularly regarding stunting. The following comparative graph (Figure 6.9) presents the levels of stunting, underweight, and wasting among children aged under 5 nationally and across the divisions.
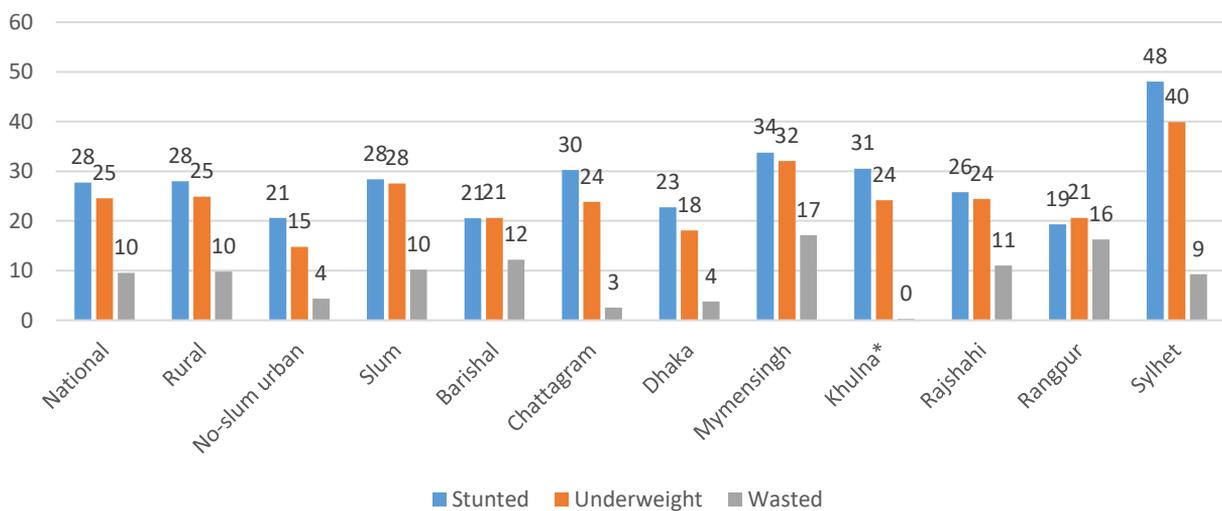
Figure 6.9: Percentage of stunting, underweight and wasting nationally and across the divisions

*Prevalence of wasting in Khulna was 0.3%

Chronic childhood under-nutrition

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

The prevalence of stunting or chronic undernutrition was lower in non-slum urban areas (21%) compared to rural areas (28%) and slum areas (28%). The stunting rate was low in Rangpur and Barisal (19% and 21%) and high in Chittagong and Mymensingh (30% and 34%). The proportion was highest in Sylhet, where almost half of the children suffer from chronic under-nutrition (48%).
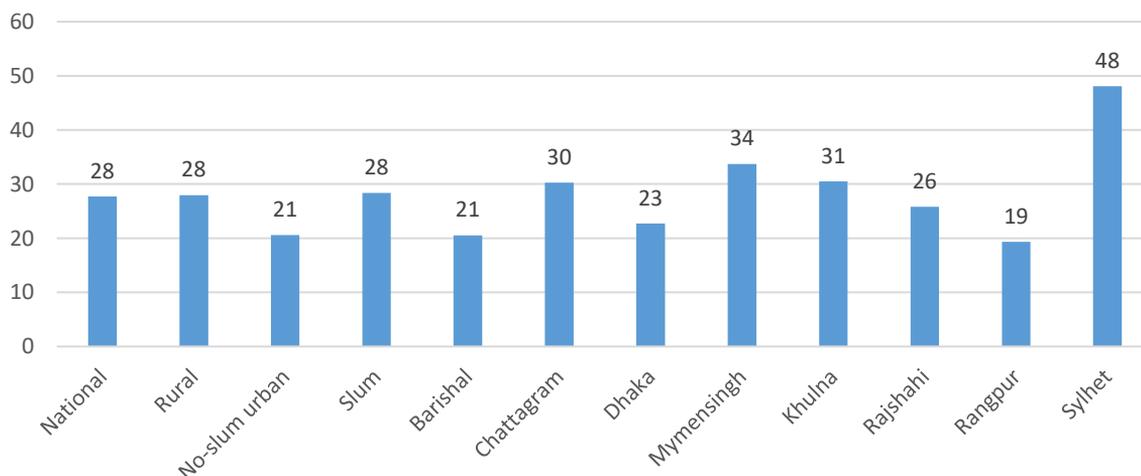
Figure 6.10: Chronic child undernutrition (stunting) by area of residence (Height for age)

Common childhood illness (0-5 years)

Globally, under 5 mortality rates declined by 59% from 1990 to 2019, and in Bangladesh, it was 79%. (6). Despite the tremendous achievement of reducing under 5 mortality rates of 30.8 per 1000 live births in

2019, nearly 90,000 children died in 2019 before reaching their fifth birthday in Bangladesh (7). The majority of these deaths are attributable to various infectious diseases. Acute diarrheal diseases and acute respiratory infections with their associated symptoms such as fever, cough, difficulty in breathing are the most common childhood illnesses.

Figure 6.11 shows the prevalence of common childhood illness among 0-5 years old children in the previous 2 weeks preceding the survey. Cough and/or runny nose was the most reported illness throughout the country. The national-level prevalence of cough or runny nose was 89%, followed by fever (70%), difficulty in breathing (14%), and diarrhea (13%). Cough and/or runny nose was most prevalent in the slum areas (91%) compared to rural and urban areas and in the Khulna division (93%). Diarrhea was most common in the rural areas (13%) and in the Barisal (15%) and Dhaka division (15%).
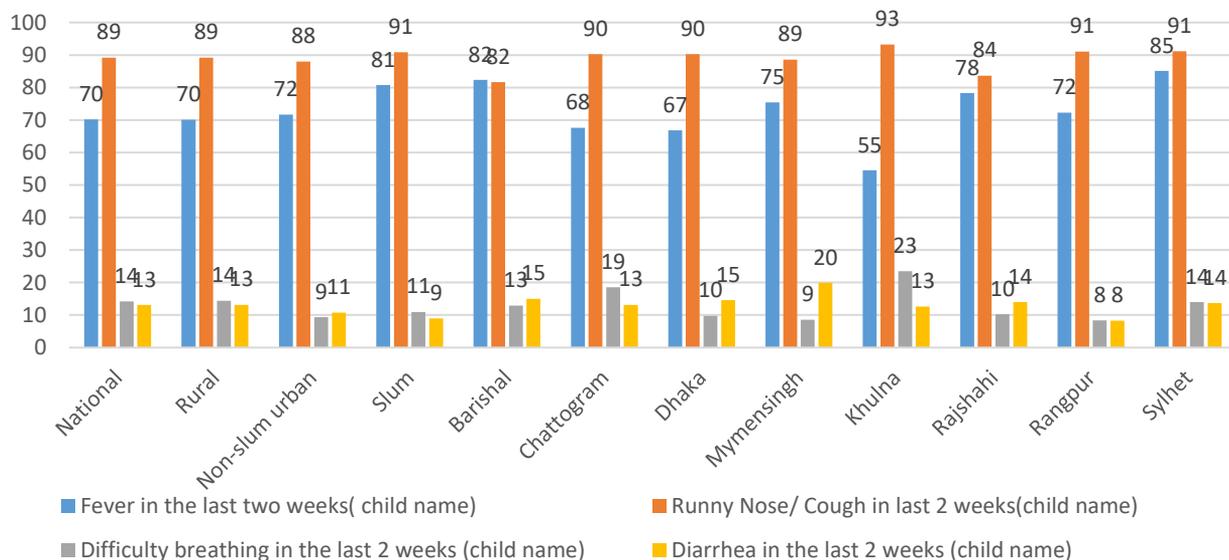
Figure 6.11: prevalence of the common childhood illness (0-5 years)

Receipt of vitamin A capsule in the last six months

More than 70% of the children in both non-slum urban are rural areas received vitamin A capsules during the past six months. The rate was higher in Chittagong (83%) and lowest in the Dhaka division (53%) (Figure 6.12).
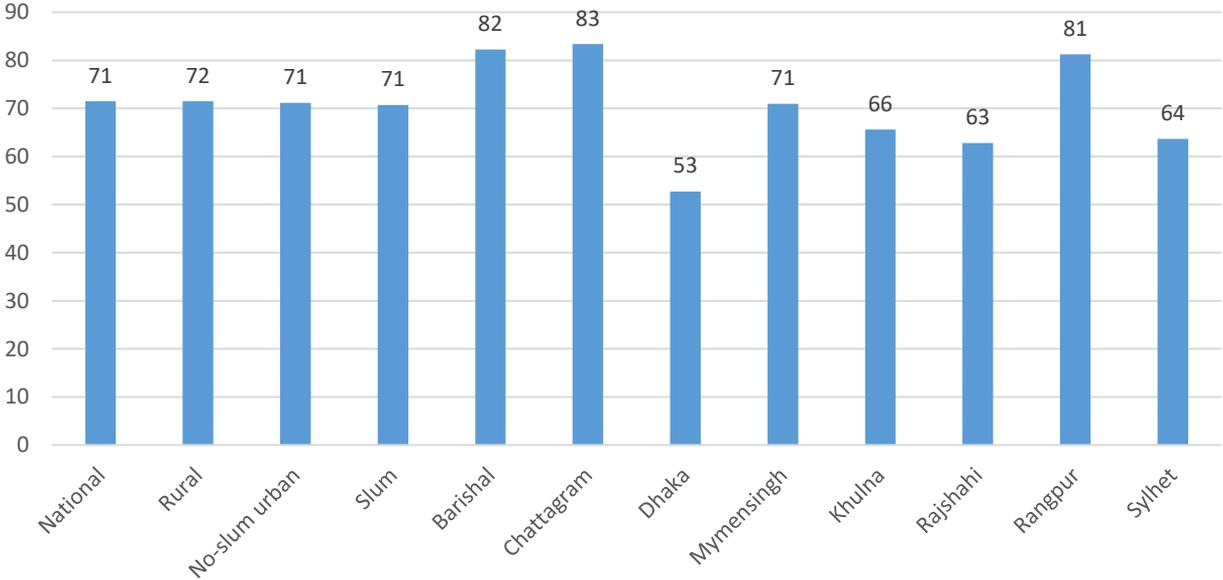
Figure 6.12: Receipt of vitamin A capsule for six months preceding the interview (0-59 months)

CHAPTER 7: NUTRITION STATUS OF ADOLESCENT GIRLS

Twenty-nine percent of Bangladeshi adolescent girls are short for their age; two-thirds of adolescent girls in Bangladesh are married by 18 years of age, and one-third are married by 15 years of age (1). Among adolescent married women, 45% experienced motherhood by 18 years of age, although about one-third (31%) of these women were undernourished (BMI<18.5) (2). Mridha et al. also reported a high prevalence of anemia (28%) and vitamin A deficiency (32%) among adolescent pregnant women from north-western Bangladesh (3). Evidence shows that malnutrition among young girls increases the risk of delivering low birth weight babies who fail to flourish and become stunted. Female children themselves become young and undernourished mothers, and so the intergenerational cycle of undernutrition continues. Child marriage is associated with early pregnancy and childbearing and leads to low birth weight and a newborn's poor nutritional status (4).

Characteristics of adolescent girls

The FSNSP round 2018-2019 collected data on age, socio-demographic characteristics, dietary diversity, physical activity, tobacco consumption, and measured weight and height for both boys and girls and collected information on menstrual hygiene and marital status from the girls only. A total of 4,761 adolescent girls (10-19 years) were included in the 2018-2019 round of the FSNSP survey. Table 7.1 displays the background information of the participants. Among adolescent girls, 57.4% belonged to the 10-14 years age group, and only 11.3% were married. The proportion was higher in slum areas (16.3%) than rural (11.3%) and non-slum urban areas (11.0%). For education, more than half of respondents (51.0%) had partially completed secondary education, and this proportion was higher among respondents living in rural areas (51.4%) than respondents living in non-slum urban areas (45.5%) and slum areas (30.5%). The majority of the adolescent girls reported that they were students (84.2%) and Muslim by faith (88.6%). In the case of mothers of adolescent girls, 37.5% had no education, and this proportion was much higher in slum areas (57.7%) compared to rural (37.7%) and non-slum urban areas (28.1%). However, in the case of fathers of adolescent girls, 46.1% had no education, and this proportion was higher in slum areas (slum: 55.1% vs. rural: 46.7% vs. non-slum urban: 29.9%). Almost 27% of girls were suffering from depression, and more girls from rural areas (27.1%) were suffering from depression than girls from non-slum urban areas (25.2%) and slum areas (13.7%).

Table 7.1: **Characteristics of adolescent girls by area of residence**

	National	Rural	No-slum urban	Slum	Barishal	Chattagram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Number of adolescent girls	4808	3339	877	592	458	707	626	672	636	645	651	413
Age in years (mean ± sd)	14.4± 2.5	14.4± 2.5	15.0± 2.6	14.8± 2.6	14.7± 2.3	14.3± 2.5	14.6± 2.7	14.4± 2.5	14.4± 2.5	14.3± 2.5	14.3± 2.5	14.9± 2.5
Profession												
Farmer	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Unskilled day labor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Salaried	0.5	0.0	11.7	8.5	0.0	1.3	4.3	0.1	0.0	0.0	0.0	0.0
Business	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0
No income	1.7	1.6	4.5	9.1	0.6	3.6	3.3	3.3	0.3	1.1	0.0	5.9
Homemaker	11.9	11.9	11.8	20.6	9.9	7.7	14.9	12.9	18.1	10.5	10.4	13.3
Student	84.4	85.1	70.8	61.0	89.0	86.6	77.3	82.8	79.6	84.9	89.5	79.1
Others	1.3	1.4	1.1	0.7	0.5	0.3	0.1	1.0	2.0	3.6	0.0	1.7
Marital status												
Never married	88.3	88.4	87.8	82.8	89.9	93.9	87.0	87.6	82.5	88.4	87.8	94.0
Currently married	11.3	11.3	12.2	16.7	9.8	6.1	12.9	12.4	15.8	11.6	12.2	5.6
Separated/divorced/ widowed	0.4	0.4	0.0	0.5	0.3	0.0	0.1	0.1	1.7	0.0	0.0	0.4
Education												
No education	0.6	0.5	2.4	4.8	0.4	0.4	1.7	1.9	0.3	0.4	0.4	0.8
Primary incomplete	22.7	22.5	24.2	36.3	10.9	23.6	27.2	21.2	20.7	26.3	23.2	23.1
Primary complete	14.7	14.8	11.3	18.3	14.5	13.5	15.7	15.4	13.3	19.2	11.2	15.8
Secondary incomplete	51.4	51.7	45.7	30.4	60.3	53.8	42.7	48.5	58.9	43.3	51.8	53.6
SSC	8.0	7.8	12.4	9.4	11.9	7.5	9.1	10.9	5.2	6.8	10.0	3.8
HSC or more	2.6	2.6	4.1	0.8	2.0	1.1	3.6	2.1	1.7	4.1	3.4	2.9

Dietary Diversity

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We collected dietary diversity data from the adolescent girls by asking the question, "Yesterday during the day or night, did you consume the following food items?". Then we grouped all the food items into 10 major food groups and defined having dietary diversity if someone consumed 5 or more than 5 food groups out of these 10 food groups. Figure 7.1 below demonstrated the data on the dietary diversity of the adolescent girls aged 10-19 years of the survey. More than half (55%) of the adolescents consumed inadequately diversified diets at the national level. However, the proportion was higher in the slum area; 66 % of adolescent girls consumed an inadequately diversified diet. A higher proportion of adolescent girls from the Sylhet division (75%) consumed an inadequately diversified diet compared to about one-third of girls from the Rajshahi division diversified diet (**Figure 7.1**).
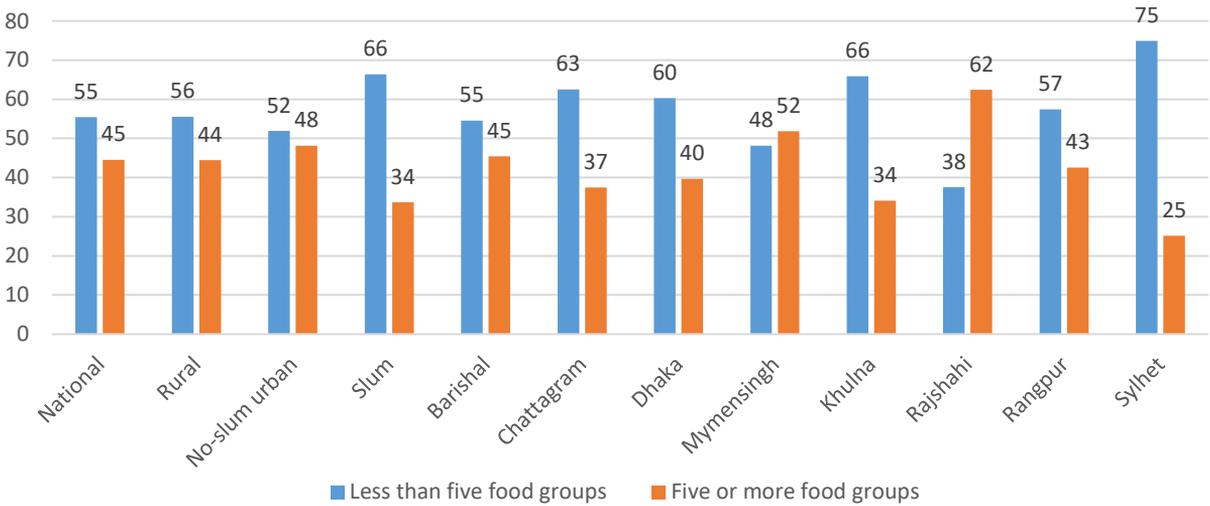
Figure 7.1: Adolescent girls with dietary diversity status by area of residence

Table 7.2 below showed the data on each of the 10 food groups consumed by the adolescent girls by place of residence and division. We found that almost 100% of the adolescent girl respondents, irrespective of residence and division, consumed starchy staples in the previous day and night (24 hours) of the interview day. About 1 out of 3 respondents consumed dark green leafy vegetables, and 1 out of 4 reported consumption of pulses (beans, peas, and lentils) in the previous   day and night. While about 75% of the adolescent girls in our survey reported consuming eggs in the previous   day and night, only 45% reported consuming meat, fish, or poultry in the same period. While consumption of meat, fish or poultry, and eggs

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are highest among the adolescent girls of rural areas compared to the non-slum urban or slums areas, adolescent girls living in non-slum urban areas reported the highest consumption of pulses, nuts, or seeds, and dairies.

Table 7.2: Consumption of 10 food groups in 7-day dietary recall by adolescent girls (10-19 years)

Food groups	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Starchy staples	99.9	99.9	99.7	99.8	100.0	99.7	100.0	100.0	99.9	100.0	100.0	100.0
Dark green leafy vegetables	34.6	34.0	49.3	43.4	48.6	32.1	48.5	29.2	28.6	34.3	32.7	46.6
Other vitamin A-rich fruits or vegetables	9.3	9.4	8.2	9.9	12.3	9.3	9.0	3.2	5.4	16.7	7.8	7.3
Other vegetables	30.4	30.6	22.7	30.0	24.2	21.1	24.3	43.5	27.8	36.4	35.0	16.4
Other fruit	26.6	27.2	11.3	17.2	34.3	15.2	11.0	21.0	11.1	63.2	18.2	18.4
Meat, fish or poultry	45.3	45.4	43.4	37.5	62.8	37.9	34.5	49.3	31.5	56.1	52.8	25.8
Eggs	74.7	75.1	64.3	56.2	45.2	83.0	66.6	81.5	92.2	82.7	58.1	54.0
Pulses (beans, peas and lentils)	27.4	27.2	35.4	19.6	32.0	20.0	28.7	26.0	25.2	24.3	41.3	12.6
Nuts and seeds	69.0	69.0	71.3	62.7	69.7	65.0	74.7	80.6	78.1	71.1	55.7	61.6
Dairy	24.6	24.5	29.0	11.7	14.3	33.1	18.1	20.2	13.8	31.2	32.8	9.2

Process food consumption

Consumption of processed   food such as savory crispy or fried snacks (SCFS), sugary snacks (SS), and sugar-sweetened beverages (SSB) are associated with an increased prevalence of obesity and noncommunicable diseases (NCD). In this survey, adolescent girls were interviewed for the 7-days recall on intake of these 3 types of processed food where the intake of savory crispy or fried snacks (SCFS), sweet snacks (SS), and sugar-sweetened beverages (SSB) intake were measured by asking questions about each item with example. For example, to collect data about the weekly frequency of SCFS, the question was, "in the last seven days, how many days did you eat savory crispy or fried snacks like chips, singara, samosa, etcetera?". In Table 7.3 below, the frequency of consuming savory crispy or fried snacks (SCFS) among adolescent girls is reported. Savory crispy or fried snacks (SCFS) included spicy or salty snacks (but not sweet), including commonly consumed snacks prepared at home for consumption between meals or during traveling, e.g., pakoras, samosas, singara. Besides, it also included commercially prepared foods

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bought from restaurants or grocery stores, such as chips, chanachur, deep fat fried pulses. According to the current survey, 4.9% of the adolescent girls consumed SCFS 7 times or more in 7 days before the interview day, with an additional 9.4% of the girls who consumed such snacks 4-6 times in the same recall period. Consumption of SCFS 7 times or more per week is highest (15.0%) among the girls who lived in non-slum urban areas compared to their rural or slum counterparts (4.5% and 11.7%, respectively). From the 8 divisions, consumption of SCFS 7 times or more per week is highest (7.6%) in the Barishal division and lowest (0.6%) in the Sylhet division.

Table 7.3: Consumption of Savory Crispy or fried Snacks (SCFS) among adolescent girls

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	43.8	44.2	33.6	32.8	26.1	31.4	42.2	58.9	43.0	46.2	47.6	59.2
1-3 times	41.9	42.0	38.5	39.2	48.3	41.8	45.3	35.0	44.4	44.7	39.2	32.0
4-6 times	9.4	9.3	12.9	16.4	18.0	19.5	7.1	4.1	9.0	3.8	8.2	8.2
7 or more times	4.9	4.5	15.0	11.7	7.6	7.3	5.4	2.0	3.6	5.4	5.1	0.6

Table 7.4 demonstrates the frequency of consumption of Sweet Snacks (SS) among adolescent girls. Sugary snacks include traditional milk-based sweetmeats of South Asia and snacks and desserts prepared with added sugar like halwa or sugar-containing snacks purchased from restaurants, or grocery stores, such as biscuits, cakes, chocolate, candy. According to the data collected in the survey, 24.8% of the adolescent girls consumed sweet snacks at least 7 times in the week   before the interview day. It was highest among the girls living in the rural areas compared to the urban areas. Among the divisions, adolescent girls living in the Chattagram division consumed SS in the highest frequencies, and girls of the Rajshahi division consumed such snacks in the lowest frequencies.

Table 7.4: Consumption of Sweet Snacks (SS) among adolescent girls

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	17.2	17.0	20.6	22.8	14.8	9.4	15.8	24.1	14.8	27.0	13.9	14.4

1-3 times	38.3	38.3	38.9	28.4	33.3	18.7	39.7	41.0	35.9	47.1	49.4	29.3
4-6 times	19.8	19.8	18.6	24.7	32.0	16.9	19.7	15.6	28.8	11.3	17.6	30.8
7 or more times	24.8	24.9	21.9	24.1	19.9	55.0	24.8	19.3	20.5	14.7	19.1	25.5

Table 7.5 demonstrates the frequency of consumption of Sugar-Sweetened beverages (SSB) among adolescent girls. Sugar-sweetened beverages (SSB) are defined as beverages that contain added sugars in line with the definition provided by the Center for Diseases Control and Prevention (CDC), USA. According to the data collected in this survey, 20.7% of the adolescent girls consumed SSB at least 7 times in the week before the interview day, with the highest percentage (44.9%) among the adolescent girls living in non-slum urban areas. Among the divisions, the highest consumption of sugar-sweetened beverages (SSB) was reported by the adolescent girls of the Chattogram division (85.1%), with the lowest consumption reported by girls of the Khulna division.

Table 7.5: Consumption of Sugar-Sweetened Beverage (SSB) among adolescent girls

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	57.8	58.7	34.4	43.8	49.1	9.9	67.8	80.1	89.2	67.7	56.1	18.8
1-3 times	18.0	18.1	15.6	18.1	31.0	3.5	19.1	15.9	8.8	26.8	25.9	15.4
4-6 times	3.5	3.4	5.2	3.7	6.1	1.5	4.2	2.3	0.9	3.3	5.5	9.9
7 or more times	20.7	19.7	44.9	34.4	13.9	85.1	8.9	1.7	1.2	2.2	12.6	55.9

Nutritional status of adolescent girls

Malnutrition in adolescence poses multiple risks in growth, morbidity, cognitive development, educational attainment, reproductive health, and adult productivity (5). Children are much more likely to be born with low birth weight (LBW) and to remain malnourished throughout their lives if their mothers are malnourished during adolescence and/or before and during pregnancy (6). As girls and boys are still growing in adolescence, their nutritional status must be examined considering the normal growth pattern for their age in a well-nourished population. The nutritional status of adolescent girls was assessed by using two measurements, height (using a locally made stadiometer) and weight (using the Tanita weighing scale) to calculate body mass index (BMI).

BMI indicates the thinness or obesity of an individual {BMI=Weight (kilograms)/Height2 (meters)} and is used to represent the nutritional status of adolescent girls and boys. By normalizing individuals' weights against their heights, nutritional status indicators based on BMI are useful in detecting acute malnutrition (7). BMI measures are also used to estimate the proportion of the overweight or obese population and thereby at higher risk for non-communicable disease (8). Like the system used for malnutrition, to estimate the level of overweight and obesity in a population, different cut-offs are employed for adolescent girls. As an international classification system, the adolescent measure more closely aligns with the international cut-offs for obesity in the highest age groups instead of the Asian cut-offs or at-risk values (9). Because of these differences, and similar to undernutrition estimates, the adult measure of overweight and obesity contains a more significant share of the population.
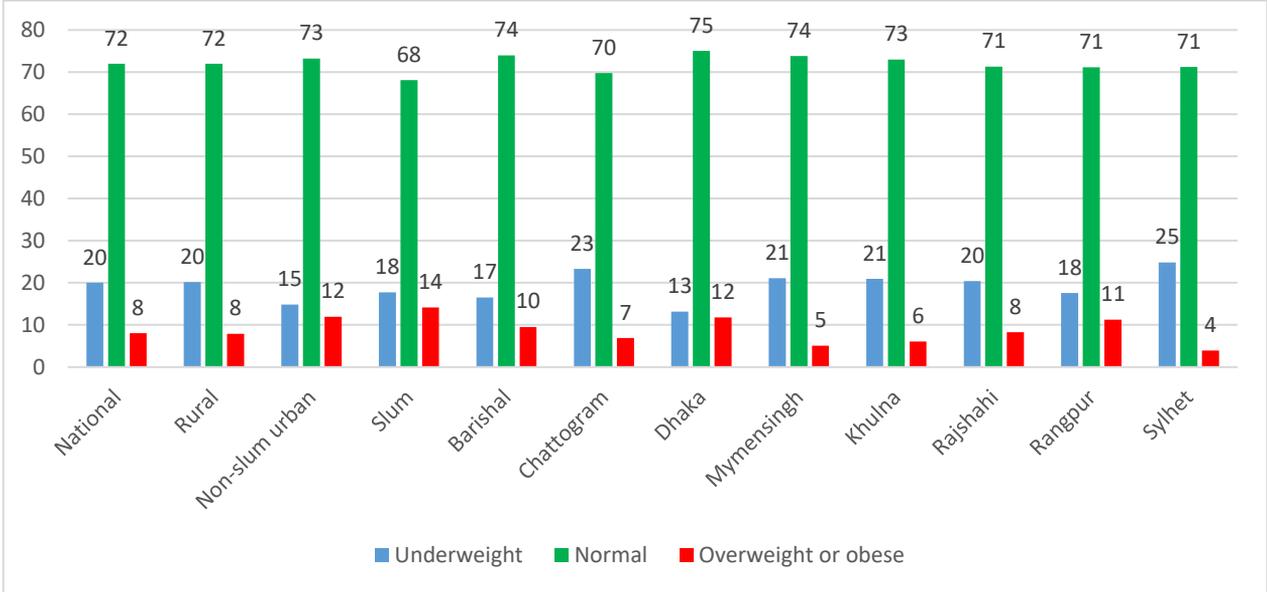
Figure 7.2: Prevalence of underweight, normal, and overweight/obesity among adolescent girls by area of residence

BMI comprises data from two measurements (height and weight). We used the Asian cut-off of BMI to categorize underweight, normal, overweight, and obesity (9). Nationally 20% of girls were underweight. The prevalence of underweight adolescents was lowest in non-slum urban areas (15%).

Reproductive health of adolescent girls

Among the enrolled adolescent girls, 71% had onset of menstruation, and the mean age of onset of menstruation was 12.5 (±1.0) years. During menstruation, 57% of girls used old cloth, and 37% of adolescent girls used sanitary napkins. The rest of the girls used new cloth (5%) or other materials (1%) **(Figure 7.3)**. The use of sanitary napkins during menstruation was much higher (49%) in non-slum urban areas than in the rural areas (37%) and slum areas (33%).
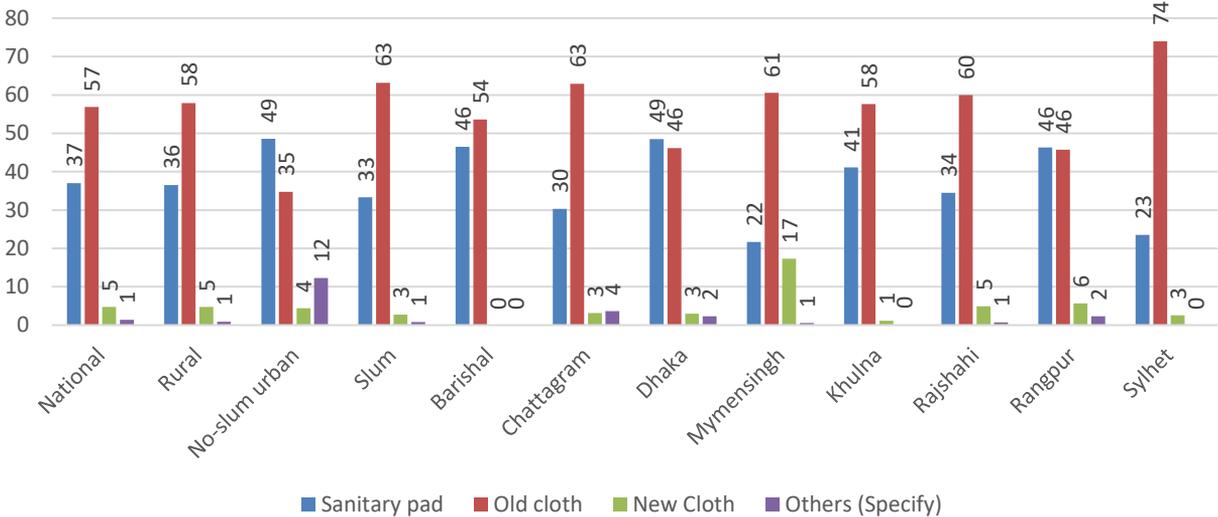
Figure 7.3: Materials used by adolescent girls during menstruation by area of residence

Out of 4,808 adolescent girls enrolled, 11.3% were currently married, 76 (1.4%) reported pregnancy during the interview, 164 (3.3%) reported that they had a child born in the last 24 months preceding the interview. For the adolescent mothers who have delivered a child in the last 24 months, 43% received at least 4 antenatal care visits   , and the rate was higher in non-slum urban areas (55%) than in rural (42%) and slum areas (29%).
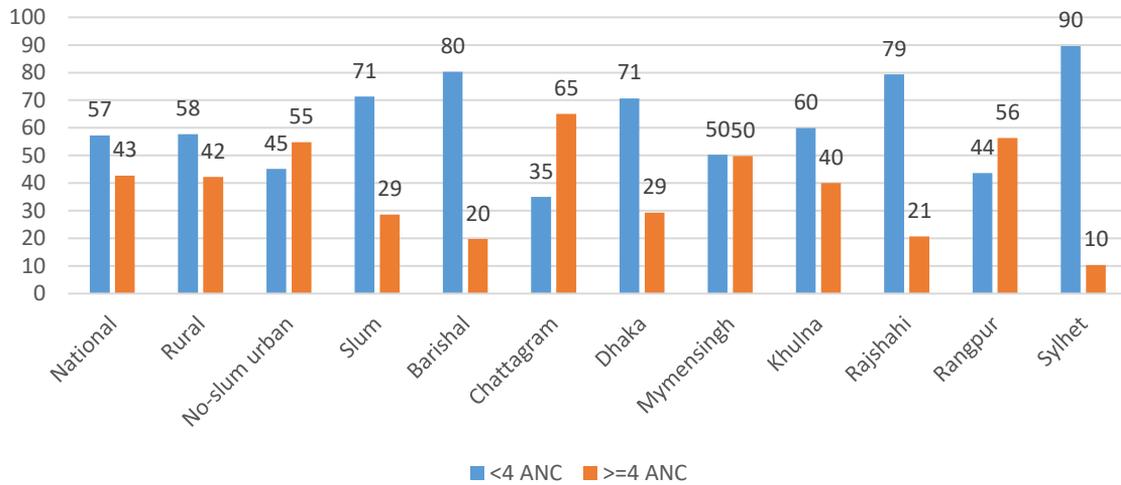
Figure 7.4: Married adolescent girls receiving ANC during last pregnancy by area of residence

Nationally, 75% of pregnant adolescent girls received Iron and Folic acid (IFA) tablets, and 65% consumed calcium tablets during their most recent pregnancy (n=164). The mean intake of IFA tablets was 113.5±77.9, and the mean intake of calcium tablets was 94.9±72.3 during the entire pregnancy period among pregnant adolescent girls (data not shown in the figure). As expected, the proportion of pregnant adolescent girls receiving IFA tablets was not higher in the non-slum urban areas than in rural or slum areas.
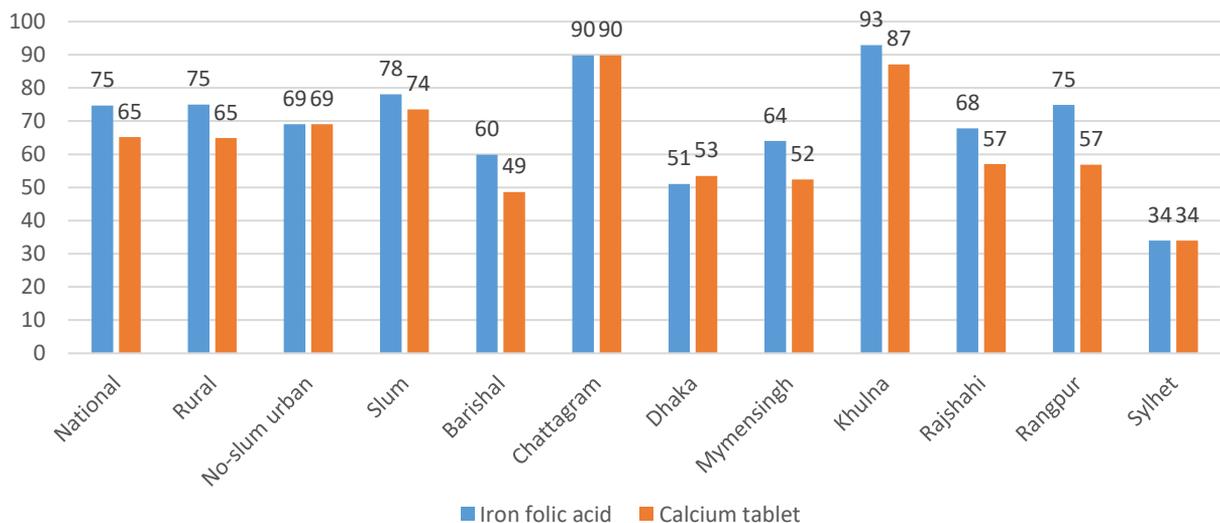
Figure 7.5: Married adolescent girls received iron-folic acid and calcium tablets during the last pregnancy

Behavioral risk factors

Table 7.6 demonstrates the status of fruits and vegetable consumption among adolescent girls in Bangladesh. FSNSP 2018-2019 study revealed that 94.3% of adolescent girls did not consume adequate fruits and vegetables   nationally. This prevalence was higher in slum areas than rural and urban areas (rural: 93.8% vs. urban: 94.3% vs. slum: 98.2%). Among the eight administrative divisions, inadequate fruits and vegetable consumption was highest in the Rajshahi division (98.8%) and was lowest in the Mymensingh division (80.0%). Almost all of the adolescent girls were a non-smoker. However, a small proportion of girls were smokeless tobacco users (0.4%), and they were more prevalent in slum areas (rural: 0.4% vs. non-slum urban: 1.4% vs. slum: 2.8%). Almost half of the respondents did not perform adequate physical activity, and this proportion was higher in respondents living in non-slum urban areas (77.6%) compared to respondents living in rural (49.0%) and slum areas (35.2%). The prevalence of physical inactivity was highest in the Barishal division (64.0%) and lowest in the Sylhet division (28.7%).

Table 7.6: Prevalence of behavioral risk factors of NCDs among adolescent girls (10-19 years)

Risk factors	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Smoking*	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Smokeless tobacco*	0.4	0.4	1.4	2.0	0.4	0.1	1.0	0.7	0.2	0.5	0.2	1.7
Physical inactivity**	50.3	49.4	77.7	35.9	63.8	43.7	51.4	33.8	45.7	62.4	55.6	29.0
Inadequate Fruits and vegetable consumption***	94.3	94.3	93.8	98.4	96.4	97.3	93.5	79.7	90.8	98.8	96.7	95.8

* Current smoker/current user of smokeless tobacco; **<150 minutes of moderate to vigorous activity per week; *** <5 servings of fruits and vegetables per day

CHAPTER 8: NUTRITION STATUS OF ADOLESCENTS BOYS

Adolescents are individuals whose ages are between 10 and 19 years old (WHO, 1995). Over one-fifth of the Bangladeshi population is adolescents. Adolescent nutrition is essential for proper growth and development; inadequate diets during this critical period lead to stunted growth and cognitive development (Story, 1992). However, adolescent nutrition remains a neglected area, and very little nationally representative data is available about the adolescent boys' nutritional status as most previous surveys did not collect data from this group. For the first time, data from adolescent boys were collected in the "State of Food Security and Nutrition in Bangladesh 2018-19."

Characteristics of adolescent boys

The FSNSP round 2018-2019 collected data on age, socio-demographic characteristics, dietary diversity, physical activity, tobacco consumption, and measured weight and height for adolescent boys. A total of 4,761 adolescent boys (10-19 years) were included in the 2018-2019 round of the FSNSP survey. Table 8.1 displays the background information of the participants. Among adolescent   boys, 58.4% belonged to the 10-14 years age group, and only 1.0% were married. The proportion was higher in rural areas (1.0%) than non-slum urban areas (0.1%) and slum areas (0.6%). For education, 41.5% of the boys had partially completed secondary education, and this proportion was higher among boys living in non-slum urban areas (43.9%) than respondents living in rural areas (41.5%) and slum areas (25.9%). The majority of the adolescent boys reported that they were students (84.0%) and Muslim by faith (87.9%). In the case   of mothers of adolescent boys, 38.6% had no education, and this proportion was much higher in slum areas (57.1%) compared to rural (39.0%) and non-slum urban areas (26.6%). However, in the case   of fathers of adolescent boys, 44.6% had no education, and this proportion was higher in slum areas (slum: 59.2% vs. rural: 45.2% vs. non-slum urban: 26.6%). Almost 22% of boys reported that they were suffering from depression, and more boys from rural areas (22.3%) were suffering from depression than boys from non-slum urban (15.2%) and slum areas (15.5%).

Table 8.1: Characteristics of adolescent boys by area of residence

	National	Rural	No-slum urban	Slum	Barishal	Chattagram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Number of adolescent boys	4761	3338	849	574	574	709	597	670	629	653	642	413
Age in years (mean ± sd)	14.3± 2.5	14.3± 2.5	14.5± 2.6	14.4± 2.6	14.4± 2.6	14.3± 2.5	14.4± 2.6	14.4± 2.4	14.1± 2.5	14.3± 2.5	14.2± 2.5	14.4± 2.5
Profession												
Farmer	0.6	0.6	0.0	0.5	0.0	0.6	1.3	0.7	0.5	0.3	0.5	3.0
Unskilled day labor	4.5	4.5	3.4	4.8	2.9	3.5	2.7	2.1	5.8	3.9	7.0	6.0
Skilled day labor	1.5	1.5	0.6	2.8	0.5	2.6	0.8	2.6	0.7	1.3	1.1	1.3
Transport	1.1	1.1	0.6	2.5	2.0	0.4	0.9	1.5	0.3	2.0	0.3	2.6
Fisherman	0.2	0.2	0.0	0.1	0.0	0.5	1.3	0.0	0.1	0.0	0.0	0.5
Salaried job	1.4	1.1	11.1	8.1	0.5	3.5	3.8	0.9	1.3	0.9	0.6	0.4
Business	1.1	1.1	1.9	4.6	0.2	2.8	2.1	0.3	0.2	0.6	1.7	0.2
No income	1.9	1.8	3.2	7.4	0.5	4.7	2.7	1.3	1.3	0.6	1.5	3.1
Student	84.5	84.8	78.7	69.1	92.0	78.2	84.4	90.7	88.6	80.6	86.3	79.6
Others	3.3	3.4	0.5	0.2	1.5	3.3	0.0	0.0	1.2	9.9	1.1	3.2
Marital status												
Never married	99.1	99.0	99.9	99.4	99.3	99.9	98.8	99.0	99.0	98.9	98.4	99.7
Currently married	0.9	1.0	0.1	0.6	0.7	0.1	1.2	1.0	1.0	1.1	1.6	0.3
Education												
no education	3.1	3.1	2.9	7.4	1.3	3.8	3.3	2.2	2.3	5.6	1.1	3.1
partial primary	30.7	30.8	26.0	51.6	23.6	31.7	38.4	24.6	31.0	29.8	33.0	36.2
complete primary	14.6	14.6	13.2	12.1	11.3	13.4	12.0	14.7	11.2	21.4	11.8	17.3
partial secondary	42.1	42.1	44.1	26.0	47.5	44.1	38.3	48.1	47.4	31.7	45.0	37.1
complete SSC	8.0	8.0	10.4	2.7	15.5	5.8	5.7	10.2	6.9	9.9	6.8	4.3
HSC or more	1.5	1.4	3.4	0.3	0.8	1.2	2.4	0.1	1.2	1.7	2.3	2.1

Dietary Diversity

We collected dietary diversity data from the adolescent boys by asking the question, "Yesterday during the day or night, did you consume the following food items?". Then we grouped all the food items into 10

major food groups and defined having dietary diversity if someone consumed 5 or more than 5 food groups out of these 10 food groups. Figure 8.1 below demonstrated the data on the dietary diversity of the adolescent boys aged 10-19 years of the survey. We found that more than half of the adolescent boys (51%) consumed inadequately diversified diets at the national level, the proportion was higher in the slum area (61%). Three fourth (75%) of the adolescent boys from Sylhet consumed an inadequately diversified diet. The corresponding figure for Rajshahi was 32% (Figure 8.1).
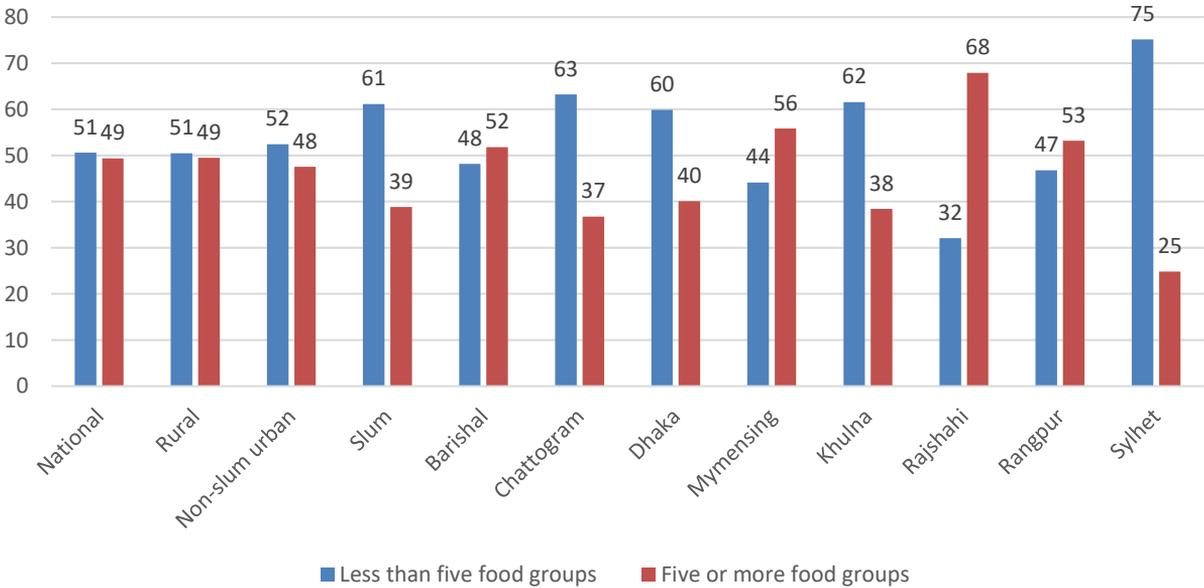
Figure 8.1: Dietary diversity of adolescent boys by area of residence

Table 8.2 below showed the data on each of the 10 food groups consumed by the adolescent boys by place of residence and division. We found that 100% of the adolescent boys, irrespective of residence and division, consumed starchy staples in the previous day and night (24 hours) of the interview day. About 2 out of 5 respondents consumed dark green leafy vegetables, and 1 out of 4 reported consumption of pulses (beans, peas, and lentils) in the previous   day and night. While about 74% of the adolescent boys in our survey reported consuming eggs in the previous   day and night, only 44% reported consuming meat, fish, or poultry in the same period. While consumption of most protein-rich foods such as meat, fish or poultry, pulses, dairies, nuts, or seeds is highest among the adolescent boys of non-slum urban areas compared to the rural or slums areas, adolescent boys living in rural areas reported the highest

consumption of eggs.

Table 8.2: Consumption of 10 food groups in 7-day dietary recall by adolescent boys (10-19 years)

Food groups	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Starchy staples	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Dark green leafy vegetables	37.6	37.1	51.8	44.3	52.1	35.3	51.1	35.5	28.5	33.4	42.5	48.0
Other vitamin A-rich fruits or vegetables	12.9	13.1	7.3	8.2	10.3	11.2	6.9	2.8	10.5	28.1	8.2	8.5
Other vegetables	29.8	29.9	25.8	28.6	26.2	21.1	29.0	43.1	24.3	29.8	40.1	15.0
Other fruit	28.0	28.6	12.7	17.9	33.9	11.7	7.1	22.2	9.5	68.3	22.2	17.2
Meat, fish or poultry	43.5	43.4	45.6	35.2	56.6	33.6	34.8	55.7	32.7	55.9	44.6	19.5
Eggs	74.4	74.8	62.7	65.9	50.4	72.5	69.0	82.4	94.5	80.7	61.1	52.5
Pulses (beans, peas and lentils)	29.3	29.1	37.4	25.6	34.2	19.8	26.1	28.1	28.1	25.1	47.3	15.4
Nuts and seeds	70.7	70.6	74.0	65.7	73.8	58.3	77.9	84.3	80.9	76.2	56.2	65.9
Dairy	28.1	28.1	30.8	11.3	23.6	32.9	18.5	21.2	17.1	36.1	37.1	11.0

Process food consumption

Consumption of processed   food such as savory crispy or fried snacks (SCFS), sugary snacks (SS), and sugar-sweetened beverages (SSB) are associated with an increased prevalence of obesity and noncommunicable diseases (NCD). In this survey, adolescent boys were interviewed for the 7-days recall on intake of these 3 types of processed food where the intake of savory crispy or fried snacks (SCFS), sweet snacks (SS), and sugar-sweetened beverages (SSB) intake were measured by asking questions about each item with example. For example, to collect data about the weekly frequency of SCFS, the question was, "in the last seven days, how many days did you eat savory crispy or fried snacks like chips, singara, samosa, etcetera?".

In Table 8.3 below, the frequency of consuming savory crispy or fried snacks (SCFS) is reported. Savory crispy or fried snacks (SCFS) included snacks that are spicy or salty (but not sweet), including commonly consumed snacks prepared at home for consumption between meals or during traveling, e.g., pakoras, samosas, singara. Besides, it also included commercially prepared foods bought from restaurants or grocery stores, such as chips, chanachur, deep fat fried pulses. According to the current survey, 11.6% of

the adolescent boys consumed SCFS 7 times or more in 7 days before the interview day, with an additional 15.5% of the boys who consumed such snacks 4-6 times in the same   recall period. Consumption of SCFS 7 times or more per week is highest (27.8%) among the boys who lived in non-slum urban areas compared to their rural or slum counterparts (11.0% and 16.1%, respectively). From the 8 divisions, consumption of SCFS 7 times or more per week is highest (20.3%) in the Barishal division and lowest (2.9%) in the Sylhet division.

Table 8.3: Consumption of Savory Crispy or fried Snacks (SCFS) among adolescent boys

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	29.1	29.6	17.5	18.5	13.6	16.0	30.9	34.6	21.9	39.4	33.7	41.7
1-3 times	43.8	44.0	36.2	48.9	42.5	37.5	49.2	46.0	47.1	45.6	42.2	42.0
4-6 times	15.5	15.4	18.5	16.5	23.6	28.6	10.7	13.5	16.0	7.5	13.2	13.4
7 or more times	11.6	11.0	27.8	16.1	20.3	18.0	9.2	5.9	15.0	7.5	10.9	2.9

Table 8.4 demonstrates the frequency of consumption of Sweet Snacks (SS) among adolescent boys. Sugary snacks include traditional milk-based sweetmeats of South Asia and also snacks and desserts prepared with added sugar like halwa or sugar-containing snacks purchased from restaurants, or grocery stores, such as biscuits, cakes, chocolate, candy. According to the data collected in the survey, 28.9% of the adolescent boys consumed sweet snacks at least 7 times in the week before the interview day, and it was highest among the boys living in the rural areas compared to the urban areas. Among the divisions, adolescent boys living in the Chattagram division consumed SS in the highest frequencies compared to the boys living in other divisions. On the other hand, boys of the Rajshahi division consumed such snacks in the lowest frequencies.

Table 8.4: Consumption of Sweet Snacks (SS) among adolescent boys

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	13.9	13.5	22.7	16.4	7.6	10.1	16.8	17.0	6.0	22.0	15.2	10.0

1-3 times	36.3	36.4	34.7	31.7	30.7	19.2	35.6	41.1	33.7	49.8	39.5	28.2
4-6 times	21.0	21.0	20.1	26.7	32.2	20.3	25.4	24.5	25.9	12.2	18.5	28.1
7 or more times	28.9	29.1	22.4	25.2	29.5	50.4	22.3	17.4	34.4	16.1	26.8	33.6

Table 8.5 demonstrates the frequency of consumption of Sugar-Sweetened beverages (SSB) among adolescent boys. Sugar-sweetened beverages (SSB) are defined as beverages that contain added sugars in line with the definition provided by the Center for Diseases Control and Prevention (CDC), USA. According to the data collected in this survey, 25.6% of the adolescent boys consumed SSB at least 7 times in the week before the interview day, with the highest percentage (57.3%) among the adolescent boys living in non-slum urban areas. Among the divisions, the highest consumption of sugar-sweetened beverages (SSB) was reported by the adolescent boys of the Chattogram division (86.1%), with the lowest consumption reported by boys of the Khulna division.

Table 8.5: Consumption of Sugar-Sweetened Beverage (SSB) among adolescent boys

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	43.8	44.6	21.3	34.3	21.7	6.8	55.0	63.7	66.7	52.0	44.3	22.6
1-3 times	24.3	24.6	14.4	23.4	35.3	5.0	23.8	23.6	22.3	34.3	31.7	10.6
4-6 times	6.3	6.3	7.0	8.8	17.7	2.1	5.5	4.0	4.1	6.2	8.6	11.7
7 or more times	25.6	24.5	57.3	33.6	25.3	86.1	15.8	8.7	6.9	7.6	15.5	55.1

Nutritional status of adolescent boys

Malnutrition in adolescence poses multiple risks in growth, morbidity, cognitive development, educational attainment, reproductive health, and adult productivity (5). Children are much more likely to be born with low birth weight (LBW) and to remain malnourished throughout their lives if their mothers are malnourished during adolescence and/or before and during pregnancy (6). As girls and boys are still growing in adolescence, their nutritional status must be examined considering the normal growth pattern for their age in a well-nourished population. The nutritional status of adolescent girls and boys was assessed by using two measurements, height (using a locally made stadiometer) and weight (using the Tanita weighing scale) to calculate body mass index (BMI).

BMI indicates the thinness or obesity of an individual {BMI=Weight (kilograms)/Height2 (meters)} and is used to represent the nutritional status of adolescent girls and boys. By normalizing individuals' weights against their heights, nutritional status indicators based on BMI are useful in detecting acute malnutrition (7). BMI measures are also used to estimate the proportion of the overweight or obese population and thereby at higher risk for non-communicable disease (8). Like the system used for malnutrition, to estimate the level of overweight and obesity in a population, different cut-offs are employed for adolescent girls. As an international classification system, the adolescent measure more closely aligns with the international cut-offs for obesity in the highest age groups instead of the Asian cut-offs or at-risk values (9). Because of these differences, and similar to undernutrition estimates, the adult measure of overweight and obesity contains a greater share of the population.
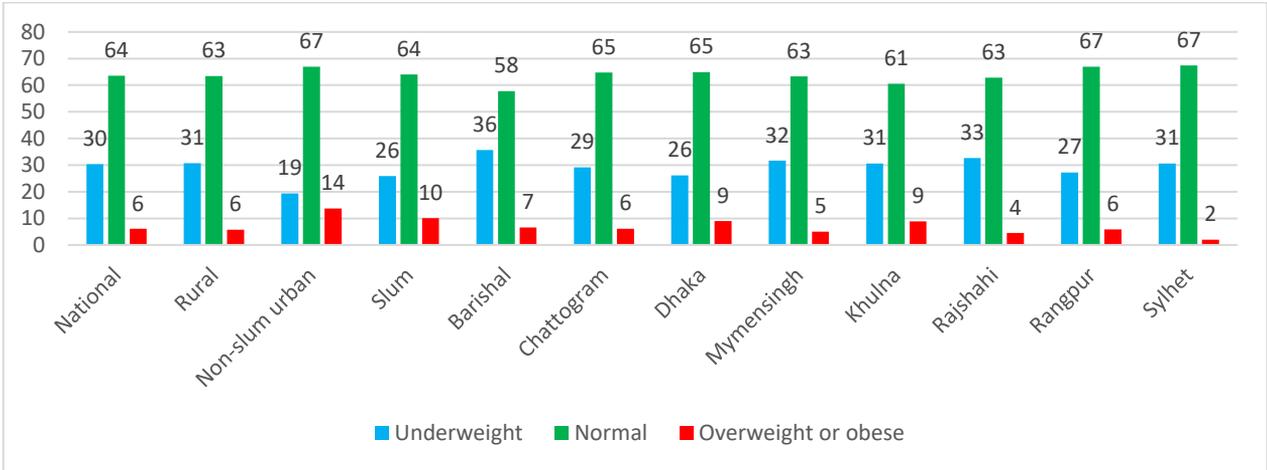
Figure 8.2: Prevalence of underweight, normal, and overweight/obesity among adolescent boys by area of residence

BMI comprises data from two measurements (height and weight). We used the Asian cut-off of BMI to categorize underweight, normal, overweight, and obesity (9). Nationally, 30% of boys were underweight, and the prevalence was lowest in non-slum urban areas (19%). On the other hand, the prevalence of overweight and obesity was higher among boys from non-slum urban areas than the boys from slum or rural areas.

Behavioral risk factors

Table 8.6 demonstrates the status of fruits and vegetable consumption among adolescent boys in Bangladesh. FSNSP 2018-2019 study revealed that nationally, 90.7% of adolescent boys did not consume adequate fruits and vegetables   . This prevalence was higher in slum areas than rural and urban areas (rural: 90.5% vs. urban: 96.0% vs. slum: 96.6%). In addition, about 3.4% of the adolescent boys were smokers, and the prevalence was higher in slum areas (5.8%) than rural (3.4%) and non-slum urban areas (3.5%). However, a small proportion of boys were smokeless tobacco users (1.6%), and they were more prevalent in rural areas (rural: 1.6% vs. non-slum urban: 0.4% vs. slum: 0.3%). In the case of physical activity, 29.0% of the respondents did not perform adequate physical activity, and the proportion was higher in respondents living in non-slum urban areas (64.1%) compared to respondents living in rural (27.8%) and slum areas (33.6%).

Table 8.6: Prevalence of behavioral risk factors of NCDs among adolescent boys (10-19 years)

Risk factors	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Smoking*	3.4	3.4	3.5	5.8	3.5	1.8	3.2	2.4	2.4	3.7	6.7	0.5
Smokeless tobacco*	1.6	1.6	0.4	0.3	1.1	0.4	1.1	0.8	0.3	1.3	4.4	3.3
Physical inactivity**	29.0	27.8	64.1	33.6	33.8	25.8	41.9	17.2	25.8	40.4	27.7	9.9
Inadequate Fruits and vegetable consumption***	90.7	90.5	96.0	96.6	97.2	96.8	92.6	68.8	80.9	98.1	94.5	93.8

* Current smoker/current user of smokeless tobacco; **<150 minutes of moderate to vigorous activity per week; *** <5 servings of fruits and vegetables per day

CHAPTER 9: NUTRITION STATUS of ADULT WOMEN (20-59 YEARS)

In Bangladesh, in addition to extreme poverty, unemployment, and natural disasters, women confront additional challenges related to gender norms and power dynamics that further increase their vulnerability to food and nutrition insecurity relative to men. In Bangladeshi society, it is customary for women to eat last and less, irrespective of their workload. In some cases, women's nutritional

requirements are not sufficiently prioritized, especially during pregnancy and after delivery (1). FSNS-NNS assesses the nutrition security of adults through the inclusion of one woman per household sampled. Women's nutritional status offers a window into the bigger household, as they are often the first to feel the effects of food shortage and tend to receive lower levels of care and resources compared to male members of the household (2).

Nutrition plays a crucial role in the maintenance of women's health over their life span but is even more critical during periods of growth, pregnancy, and lactation. Adequate nutrition in early life - particularly during the 1,000 days between a woman's pregnancy and her child's second birthday - has enormous benefits throughout the life cycle and across generations. This period provides a 'window of opportunity' to prevent irreversible nutritional loss (3). To capture the health and nutritional situation of Bangladeshi women of reproductive age, FSNS-NNS collects data on their dietary habits and measures their height, weight, and MUAC. In 2018-19, over 5,112 women aged 20-59 years were interviewed and measured throughout the country. This report provides nationwide estimates of nutritional status and dietary patterns.

Data have been collected on their age, dietary diversity, reproductive history, menstruation history and habit, smoking and smokeless tobacco consumption, self-reported chronic disease, pregnancy, menopause, and measured their height, weight, waist circumference, and MUAC. Table 9.1 displays the socio-demographic characteristics of this population group. Among the adult men, 90.4% were currently married, 30.5% were illiterate, and 90.3% were homemakers. The level of education and professional categories varied among the adult men by areas of residence.

Table 9.1: Characteristics of adult women by area of residence

Chararcteris-tics	National	Urban	Rural	Slum	Barisal	Chittagong	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Age (mean±SD)	36.5 ±10.8	38.4 ±8.3	36.9 ±6.9	36.8 ±8.9	38.8 ±8.3	37.4 ±7.3	37.9 ±8.6	40.0 ±8.6	39.0 ±7.7	38.7 ±8.7	37.1 ±8.3	38.2 ±9.0
Marital status												
Never married	3.2	3.0	7.5	1.1	0.8	2.0	4.3	4.4	4.0	3.2	2.7	5.6
Currently married	90.4	90.6	85.6	91.4	94.1	90.2	90.2	87.1	89.7	93.4	89.6	84.3
Separated	0.9	0.9	0.9	1.4	0.2	0.6	0.3	0.8	2.6	0.3	0.8	0.9
Divorced	0.8	0.8	0.3	1.1	0.0	1.7	0.3	0.5	0.6	0.4	1.2	1.4
Widowed	4.7	4.7	5.7	5.1	4.9	5.7	4.9	7.2	3.1	2.7	5.7	7.9
Educational level												
No education	30.5	30.7	20.6	44.9	17.2	20.6	35.1	41.9	29.4	40.2	26.1	33.6
Partial primary	13.6	13.6	14.4	12.3	18.9	10.2	13.0	10.8	17.3	11.7	14.8	10.6
Complete primary	14.3	14.3	14.1	14.2	13.4	12.9	16.4	14.2	12.9	16.6	12.3	22.0
Partial secondary	27.6	27.7	28.1	20.1	26.5	36.8	21.3	23.2	29.1	23.6	28.7	23.9
Complete SSC	6.8	6.8	8.9	3.7	10.0	13.2	5.5	4.1	4.8	4.0	8.3	3.7
Above SSC	7.2	7.0	13.8	4.9	14.0	6.3	8.7	5.8	6.5	4.0	9.9	6.2
Occupation												
Farmer	0.3	0.3	0.0	0.1	0.0	0.2	0.0	0.9	0.1	0.3	0.5	0.4
Unskilled day labor	1.2	1.3	0.1	2.6	0.2	0.3	0.3	0.1	2.9	0.6	2.2	0.2
Skilled day labor	0.4	0.3	0.4	2.2	0.0	0.3	0.6	0.0	0.1	1.0	0.3	0.0
Salaried	1.4	1.1	10.3	12.1	1.5	1.8	5.3	1.1	0.7	0.2	2.3	0.7
Business	0.3	0.2	1.3	2.9	0.0	0.3	1.4	0.4	0.2	0.1	0.3	0.0
No income	0.5	0.5	1.9	0.1	0.0	1.6	0.7	1.8	0.2	0.1	0.1	0.4
Homemaker	90.3	90.8	78.3	65.2	96.3	92.7	85.7	88.7	91.3	86.7	91.2	89.7
Others	5.6	5.5	7.7	14.7	2.0	2.8	6.1	7.0	4.5	10.9	3.2	8.7

Dietary assessment

Measures of dietary diversity provide a means of documenting food purchases at the household level and capturing the quality of diet in terms of macro and micronutrient content and the number of different food groups consumed. Furthermore, the dietary assessment makes it possible to examine food security at the household and intra-household levels (4). Dietary diversity was assessed by interviewing selected women aged 20-59 years about the food items they consumed during the day before the interview. Food items were classified into 10 different pre-coded food groups containing different nutrients, including those with high micronutrient content, such as dark green leafy vegetables, and those with poor nutrient content but denote increased household purchasing power such as soft drinks (5,4).

The proportion of women aged 20-59 years who ate any items from the 24 food types by division are shown in Figure 1. A composite measure of dietary diversity is derived by clustering the 19 food types listed in the questionnaire into a ten-item scale to measure Minimum Dietary Diversity – Women (MDD-W), a proxy indicator of global use in assessing the micronutrient adequacy of women's diets. MDD-W was developed to ascertain the quality of a woman's diet in light of her nutritional needs and validated for women in Bangladesh (4, 5). The ten items are starchy staple foods, beans and peas, nuts and seeds, dairy, flesh foods, eggs, vitamin A-rich dark green leafy vegetables, and other vitamin A-rich vegetables and fruits.

Dietary diversity

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

We collected dietary diversity data asking the question, "Yesterday during the day or night, did you

consume the following food items?". Then we grouped all the food items into 10 major food groups and defined having dietary diversity if someone consumed 5 or more than 5 food groups out of these 10 food groups. Figure 9.1 below demonstrated the data on the dietary diversity of the adult women aged 20-59 years of the survey. We found that at the national level, the majority (55%) of the women consumed inadequately diversified diets. It is an improvement from the previously reported proportion where two-thirds (66%) of women consumed inadequately diversified foods in 2015. However, nearly two-thirds (63%) of the women from slum areas consumed inadequately diversified diets. Most of the women from Sylhet (73%) consumed an inadequately diversified diet, and the proportion was lowest in Rajshahi (39%). Table 9.2 below describes the consumption of major   food items grouped into 10 food groups among Bangladeshi adult women.
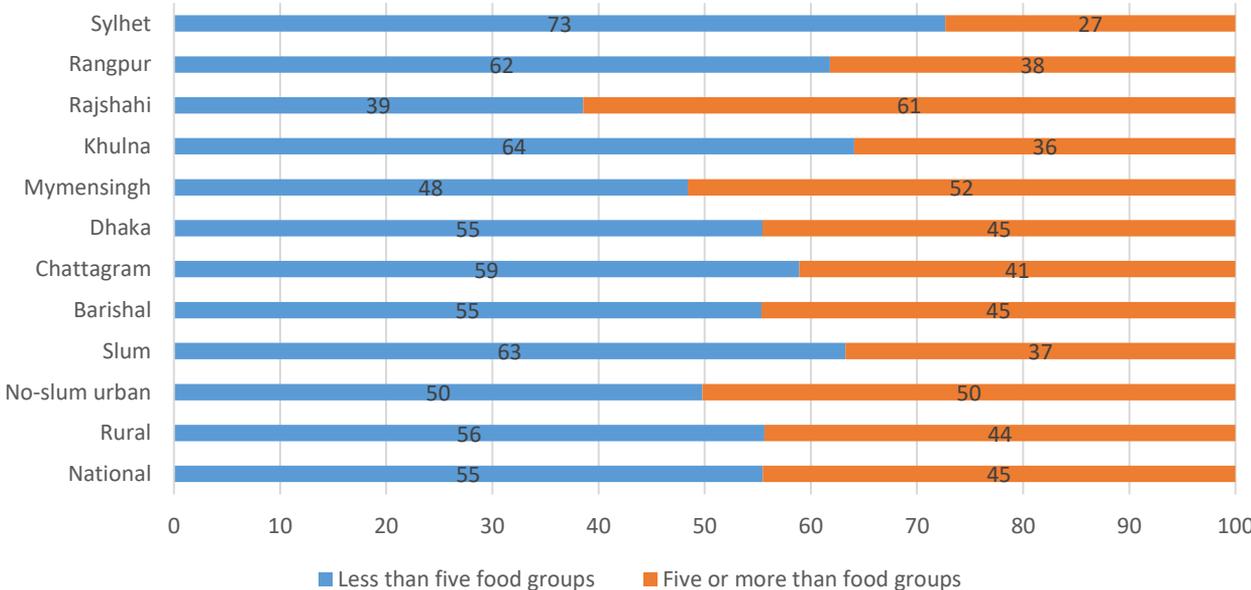
Figure 9.1: Dietary diversity of adult women (20 – 59 years)

Table 9.2 below showed the data on each of the 10 food groups consumed by the adult women by place of residence and division. We found that 100% of the adult female respondents, irrespective of residence and division, consumed starchy staples in the previous day and night (24 hours) of the interview day. About

2 out of 5 respondents consumed dark green leafy vegetables, and 1 out of 5 reported consumption of pulses (beans, peas, and lentils) in the previous   day and night. While about 76% of the adult female respondents in our survey reported consuming eggs in the previous   day and night, only 37% reported consuming meat, fish, or poultry in the same period. While consuming most protein-rich foods such as meat, fish or poultry, pulses, dairies, nuts, or seeds is highest among adult females of non-slum urban areas compared to the rural or slums areas, adult females living in rural areas reported the highest consumption of eggs.

Table 9.2: Consumption of 10 food groups in a 7-day dietary recall by adult men (20-59 years)

Food groups	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Starchy staples	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	100.0	100.0	100.0
Dark green leafy vegetables	37.2	36.6	54.4	43.5	47.7	42.8	54.5	32.0	27.4	39.5	32.4	46.9
Other vitamin A-rich fruits or vegetables	6.9	7.1	3.5	7.4	8.7	4.0	5.5	0.6	6.1	15.5	4.3	3.8
Other vegetables	33.8	33.8	33.6	38.3	27.9	25.8	39.1	47.8	30.9	37.4	34.6	25.8
Other fruit	24.9	25.4	11.9	19.6	31.0	14.2	9.9	19.3	11.8	59.9	15.0	20.7
Meat, fish or poultry	36.7	36.5	42.2	33.8	47.3	37.2	35.4	48.6	21.9	47.2	34.3	21.6
Eggs	76.1	76.4	68.4	65.2	58.6	78.2	77.9	81.4	93.6	82.7	58.7	51.6
Pulses (beans, peas and lentils)	20.7	20.4	26.8	24.2	17.9	11.4	20.7	14.7	21.5	20.2	32.3	11.2
Nuts and seeds	69.3	69.2	71.8	66.2	69.8	64.4	79.3	83.2	77.3	70.5	55.5	65.1
Dairy	25.9	25.9	28.0	13.3	20.0	31.1	17.7	25.3	13.6	33.4	33.3	12.2

Process food consumption

Consumption of processed   food such as savory crispy or fried snacks (SCFS), sugary snacks (SS), and sugar-sweetened beverages (SSB) are associated with an increased prevalence of obesity and noncommunicable diseases (NCD). In this survey, adult women aged 20-59 years were interviewed for the 7-days recall on intake of these 3 types of processed food where the intake of savory crispy or fried snacks (SCFS), sweet snacks (SS), and sugar-sweetened beverages (SSB) intake were measured by asking questions about each item with example. For example, to collect data about the weekly frequency of SCFS, the question was, "in the last seven days, how many days did you eat savory crispy or fried snacks like

chips, singara, samosa, etcetera?".

In Table 9.3 below, the frequency of consuming savory crispy or fried snacks (SCFS) is reported. Savory crispy or fried snacks (SCFS) included spicy or salty snacks (but not sweet), including commonly consumed snacks prepared at home for consumption between meals or during traveling, e.g., pakoras, samosas, singara. Besides, it also included commercially prepared foods bought from restaurants or grocery stores, such as chips, chanachur, deep fat fried pulses. According to the current survey, 2.0% of the adult women aged 20-59 years consumed SCFS 7 times or more in 7 days before the interview day, with an additional 2.8% of the adult women who consumed such snacks 4-6 times in the same   recall period. Consumption of SCFS 7 times or more per week is highest (7.0%) among the adult women who lived in non-slum urban areas compared to their rural or slum counterparts (1.8% and 3.8%, respectively). From the 8 divisions, consumption of SCFS 7 times or more per week is highest (7.2%) among the adult women of Barishal division and lowest (0.2%) in the Mymensingh and Sylhet division.

Table 9.3: Consumption of Savory Crispy or fried Snacks (SCFS) among adult women

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	70.5	71.1	56.0	51.6	51.6	50.3	72.8	75.9	65.1	83.4	79.0	75.4
1-3 times	24.7	24.5	28.3	38.6	37.3	37.8	23.8	23.1	29.5	14.7	18.5	20.5
4-6 times	2.8	2.6	8.8	6.0	3.9	7.2	2.4	0.7	4.0	1.4	0.6	3.9
7 or more times	2.0	1.8	7.0	3.8	7.2	4.7	1.0	0.2	1.4	0.5	1.9	0.2

Table 9.4 demonstrates the frequency of consumption of Sweet Snacks (SS) among adult women. Sugary snacks include traditional milk-based sweetmeats of South Asia and snacks and desserts prepared with added sugar like halwa or sugar-containing snacks purchased from restaurants, or grocery stores, such as biscuits, cakes, chocolate, candy. According to the data collected in the survey, 14.6% of the adult women consumed sweet snacks at least 7 times in the week   before the interview day. It was highest among the adult women living in the slum areas compared to rural and non-slum urban areas. Among the divisions, adult women living in the Chattagram division consumed SS in the highest frequencies compared to the

adult women living in other divisions, and adult women of the Rajshahi division consumed such snacks in the lowest frequencies.

Table 9.4: Consumption of Sweet Snacks (SS) among adult women

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	41.3	41.5	36.9	37.2	30.7	16.8	38.7	50.4	29.2	62.1	53.2	22.1
1-3 times	32.7	32.9	28.3	23.6	41.2	19.8	32.5	29.7	49.6	30.0	28.7	24.6
4-6 times	11.4	11.4	13.3	15.2	15.7	17.5	14.6	11.3	14.3	3.4	8.3	21.7
7 or more times	14.6	14.3	21.5	24.0	12.4	45.9	14.2	8.6	6.9	4.5	9.8	31.6

Table 9.5 demonstrates the frequency of consumption of Sugar-Sweetened   beverages (SSB) among adult women. Sugar-sweetened beverages (SSB) are defined as beverages that contain added sugars in line with the definition provided by the Center for Diseases Control and Prevention (CDC), USA. According to the data collected in this survey, 22.7% of the adult women consumed SSB at least 7 times in the week before the interview day, with the highest percentage (58.9%) among the adult women living in non-slum urban areas. Among the divisions, the highest consumption of sugar-sweetened   beverages (SSB) was reported by the adult women of the Chattogram division (86.0%), with the lowest consumption reported by adult women of the Khulna division (2.9%).

Table 9. 5: Consumption of Sugar-Sweetened Beverage (SSB) among adult women

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	64.8	66.3	28.2	38.5	47.9	11.0	64.5	82.0	92.7	83.7	65.4	14.2
1-3 times	10.1	10.1	9.3	8.8	21.9	1.7	12.8	11.9	4.0	13.0	13.6	8.9
4-6 times	2.5	2.5	3.6	5.6	7.7	1.4	5.0	1.7	0.4	1.0	3.6	8.9
7 or more times	22.7	21.2	58.9	47.2	22.5	86.0	17.7	4.4	2.9	2.4	17.5	68.1

Nutritional status of women

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Malnutrition in women of reproductive age poses multiple risks in terms of growth, morbidity, cognitive development, educational attainment, reproductive health, and adult productivity (6). Children are much more likely to be born with low birth weight (LBW) and to remain malnourished throughout their lives if their mothers are malnourished during adolescence and/or before and during pregnancy (7). The nutritional status of women was assessed by using two measurements, height and body mass index (BMI).

Body mass of non-pregnant women

BMI indicates the thinness or obesity of an individual {BMI=Weight (kilograms)/Height^2 (meters)} and is used to represent the nutritional status of non-pregnant women. By normalizing the weights of individuals against their heights, nutritional status indicators based on BMI are useful in detecting acute malnutrition but cannot be applied to pregnant women or those who have recently given birth (8).[6] For adult women aged 20 to 59, nutritional status is calculated through the use of BMI cut-offs (Asian). For adult women aged 19 to 49, Asian cut-off values are applied, which correspond to the point at which women have a higher propensity for illness and reduced work capacity (8). BMI measures are also used to estimate the proportion of the overweight or obese population and thereby at higher risk for non-communicable disease (9). Women are classified based on the BMI score at which an increased risk of non-communicable diseases has been observed (9).

Table 9.6: Classification of malnutrition based on BMI for women and adolescent girls

Population	*Rationale*	*Category*	*Definition*
Adult women (20 to 59 years of age)	Identifying the proportion of the reproductive age population with an increased risk of communicable illness and decreased energy levels	Severely thin	BMI of less than 16
		Moderately thin	BMI less than 17 but higher than or equal to 16
		Mildly thin	BMI less than 18.5 but higher than or equal to 17
		Chronically energy deficient (CED)	BMI of less than 18.5
	Identifying the proportion of the reproductive age population with an increased risk of non-communicable disease	Increased risk for Asian populations	BMI greater than 23 but less than 27.5
		Overweight (International cut-off)	BMI greater than 25 but less than 30
		High risk for Asian populations	BMI greater than or equal to 27.5
		Obesity (International cut-off)	BMI higher than or equal to 30

[6] 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.

According to BMI, based on Asian cut-off values, 40% of women fell into the normal category (Figure 9.2). The proportion of over-nourished women (49%) was more than the proportion of undernourished women (11%). The rate of underweight was lower than the previous round of the survey (16%). In the non-slum urban areas, only about one fourth (24%) of the women fell into the normal category, and nearly 70% were overnourished. In non-slum urban areas, the proportions of obese women (32%) were substantially higher than in rural areas (13%) and slum areas (22%).
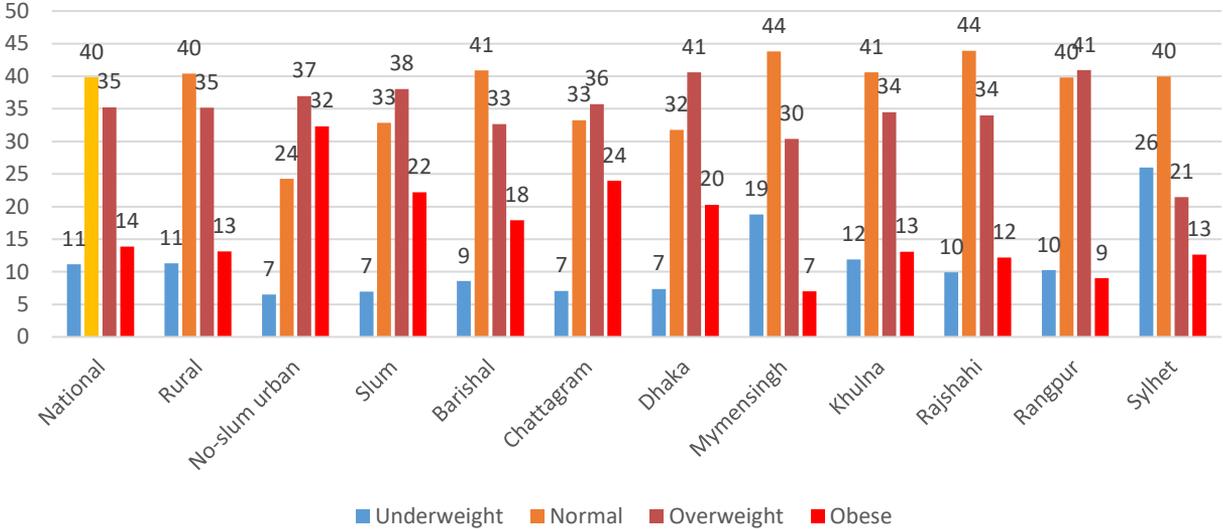
Figure 9.2: Nutritional status of adult women (20-59Y)

Maternal nutrition

Optimal pregnancy outcomes occur when women are well-nourished and healthy throughout their life cycle and receive special care in preparation for, during, and after pregnancy. In Bangladesh, multiple constraints, such as poverty, inadequate health services, and culturally-based taboos on care-seeking, lead to a lack of adequate protection for pregnant women, compromising the health and well-being of both mothers and infants (1,2,3). Care in early pregnancy confers a beneficial effect on pregnancy outcomes. Women who do not receive clinical ANC have significantly higher odds of miscarriage compared to those who attended a clinic for an ANC check-up during their first trimester (4). Besides, the poor nutritional status of women results in giving birth to LBW babies. According to MICS 2012-2013, LBW (<2,500 g)

affected 26% of infants in Bangladesh, almost twice the 15% threshold that indicates a public health problem (5). A recent study in 2013 recorded even higher rates, with nearly one-quarter of children born pre-term, over one-half born with LBW, and over one-third of children stunted from birth (4).

Care during pregnancy has multiple components, some requiring health professionals and some dependent on family. In FSNS-NNS 2018-19, 291 pregnant women were interviewed and measured, and 197 women with a child aged less than six months were interviewed to obtain information about the care they received during and immediately after their pregnancy.

Reproductive history and menstrual hygiene

Reproductive and menstrual ill health is a burden among women in Bangladesh. A good hygiene practice during menstruation is essential for every woman, not only due to their health concerns but also for their reproductive life. At the time of our survey, 70.7% of women aged 20-59 years were in menstruation, with a high prevalence in the urban areas (80.5%). Among the 29.3% of the women who were not in menstruation, 9.7% were due to pregnancy. The mean age of onset of menstruation/menarche was 12.93 years at the national level. Regarding the use of materials during menstruation among the women, we found that 81% of study women used old clothes at the time of their period at the national level, only 10% of study women used sanitary pads. At the divisional level, the highest 90% of study women used old clothes in the Khulna division, and 60% from the Mymensingh division, which was the lowest. The use of sanitary pads was high in the urban areas (30%) and low in the rural areas (10%), which coincide with the national level. Chattogram division has the highest prevalence of using sanitary pads (19%), whereas the Rajshahi division has the lowest percentage (5%).

Table 9.7: Age at menarche (years) and menstrual status of the women aged 20-59 years

	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet

Age at menarche*	12.9±1.0	12.9±1.0	12.8±1.0	12.7±0.9	13.0±0.8	13.3±1.0	12.8±0.9	12.5±0.9	12.8±0.9	13.0±1.1	12.9±1.1	13.0±1.0
Menstruating**	70.7	70.3	80.5	74.0	74.0	76.8	72.3	59.4	72.5	71.1	68.4	66.6

* Mean ± Standard Deviation; **Not pregnant or menopaused
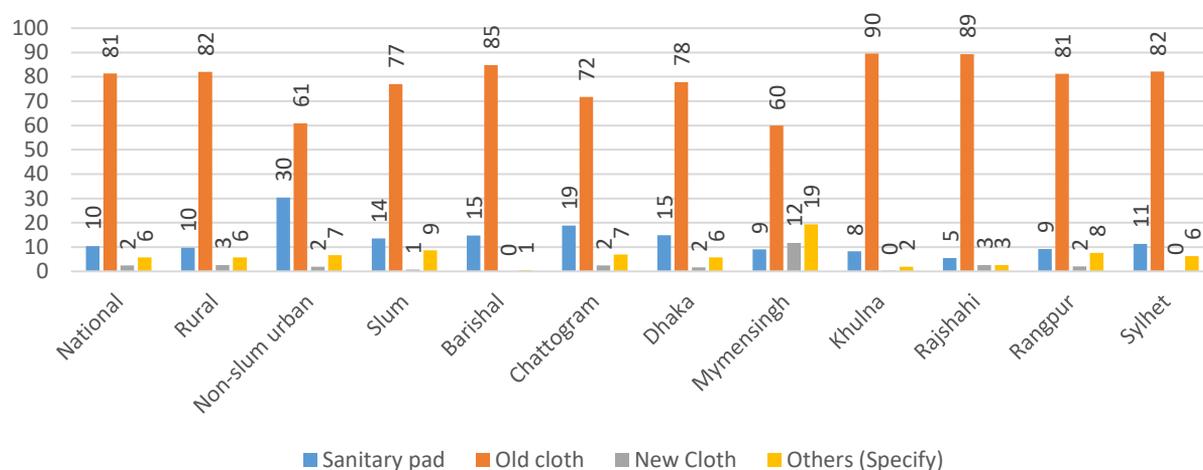
Figure 9.3: Materials used at the time of menstruation among adult women (20-59 years)

Antenatal care

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

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

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

In FSNS-NNS 2019, 39% received four or more ANC from any provider at the national level, this much higher than the previous FSNS-NNS (29%). The proportion of women who receive four or more ANC was higher in the non-slum urban population (68%) than the rural population or slum-dwelling women (38% and 50%, respectively) (Figure 9.4). The proportion of pregnant women who received   four or more ANC is highest in Chittagong (68%) and lowest in Rajshahi (24%) division.
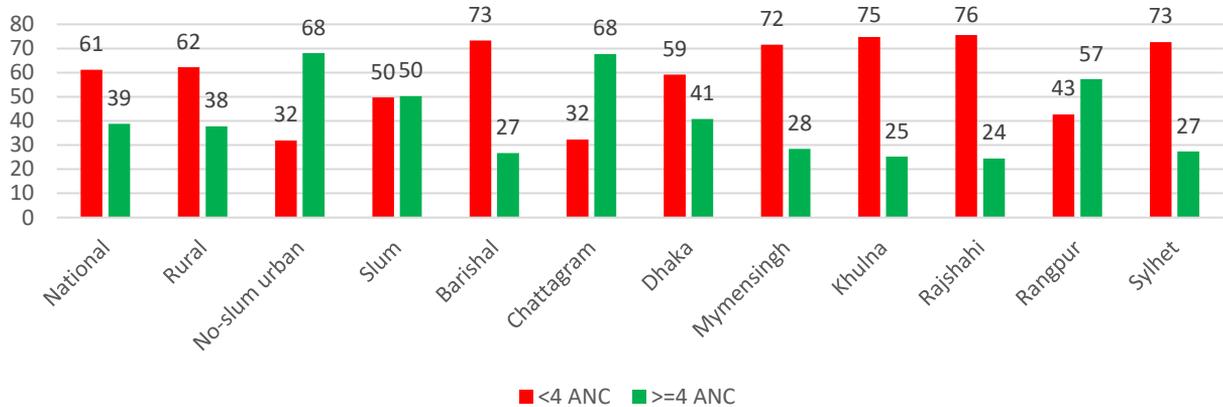
Figure 9.4: Mothers receiving ANC during their last pregnancy by area of residence

Nationally 44% of pregnant women received ANC from graduate doctors, and the proportion is higher in the non-slum urban areas (65%) than in rural areas 43%); surprisingly, the proportion   of women who received ANC from the graduate doctors was 71% in slums. The proportion of pregnant women receiving ANC from graduate doctors is highest in Chittagong (77%) and lowest in the Rangpur division (18%).
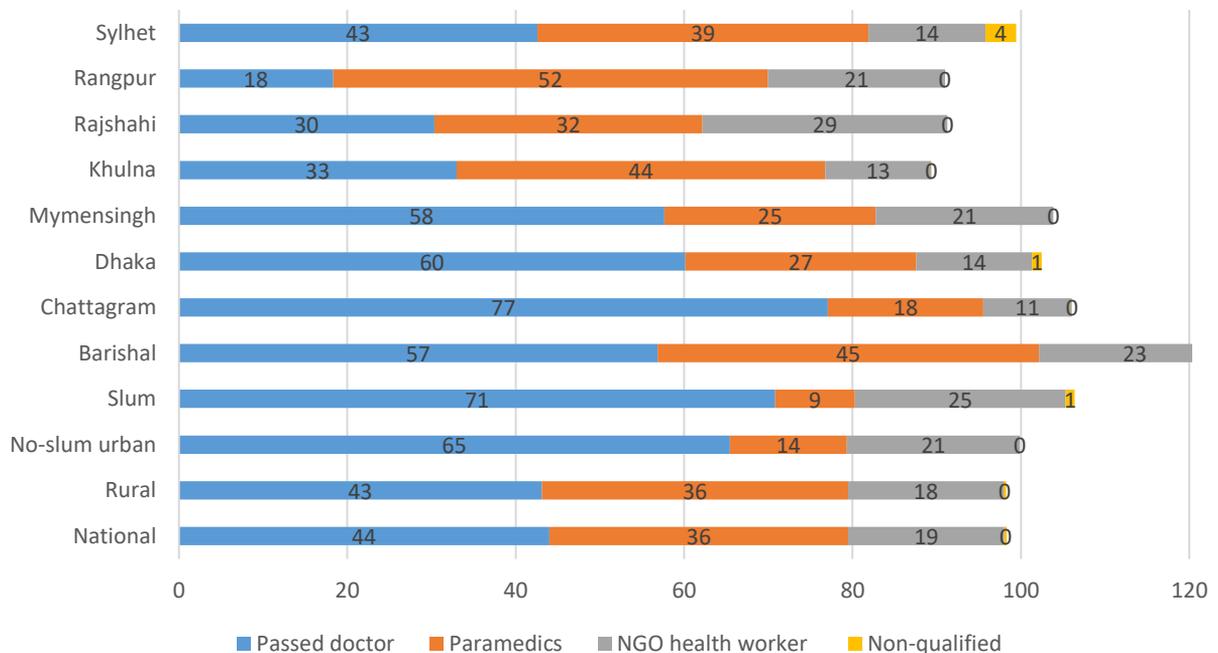
Figure 9.5: Providers of Antenatal Care (ANC)

IFA tablets are an essential component of adequate ANC. Pregnant women need additional IFA to meet their own nutritional needs as well as those of the developing fetus (25). Iron assists in the prevention of anemia and associated complications during pregnancy and delivery – such as pre-term and LBW births, as well as increased risk of hemorrhage during delivery – and folic acid reduces the risk of neural tube defects in infants while helping fight anemia (26). In Bangladesh, this supplement is provided to pregnant women by the government as part of regular ANC services. However, coverage of and compliance with the IFA supplementation intervention are low due to a lack of awareness and inadequate delivery mechanisms (27). About three-fourths of the women (73%) reported receiving IFA tablets during their last pregnancy (Figure 9.5). The mean intake of IFA was 114.5±79.1, and the mean intake of calcium tablets was 103.2±87.0 during the entire pregnancy period among adult women (data not shown in the figure). The rate is higher   in rural (73%) than in non-slum urban areas (69%). Nationally half (55%) reported that they also received calcium tablets during their last pregnancy.
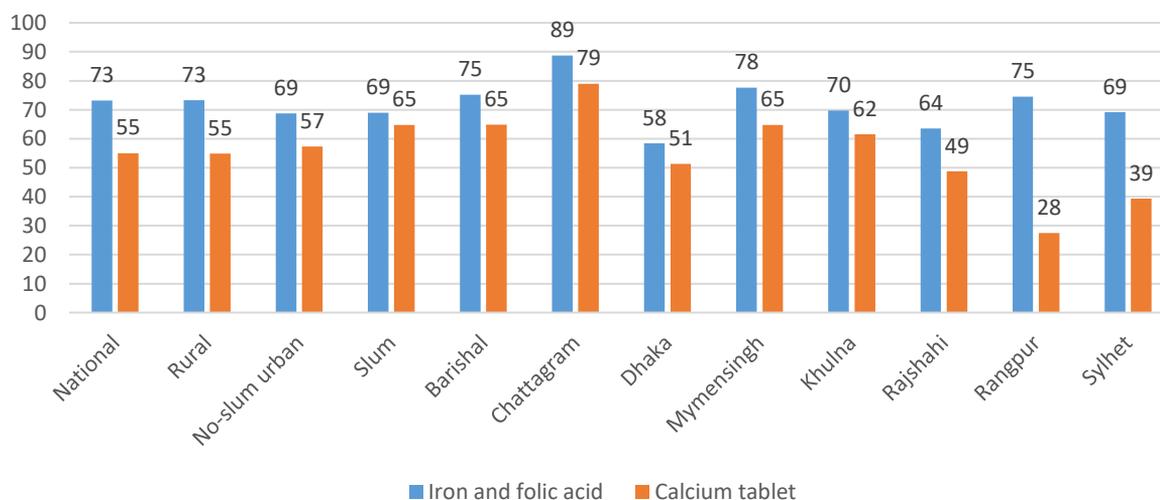
Figure 9.6: Pregnant women taking IFA and Calcium tablets

Weight measurement during pregnancy

The FSNSP-NNS 2018-19 also collects information from the women about their weight measurement

during the last pregnancy period, an important indicator of antenatal care (Figure 9.6). About 79% of women reported that weight measurement was done at least once during their last pregnancy period. This proportion was highest among the women from non-slum urban areas (91%), followed by slums and rural areas. Among the administrative divisions, the lowest proportion was observed in Sylhet (64%).
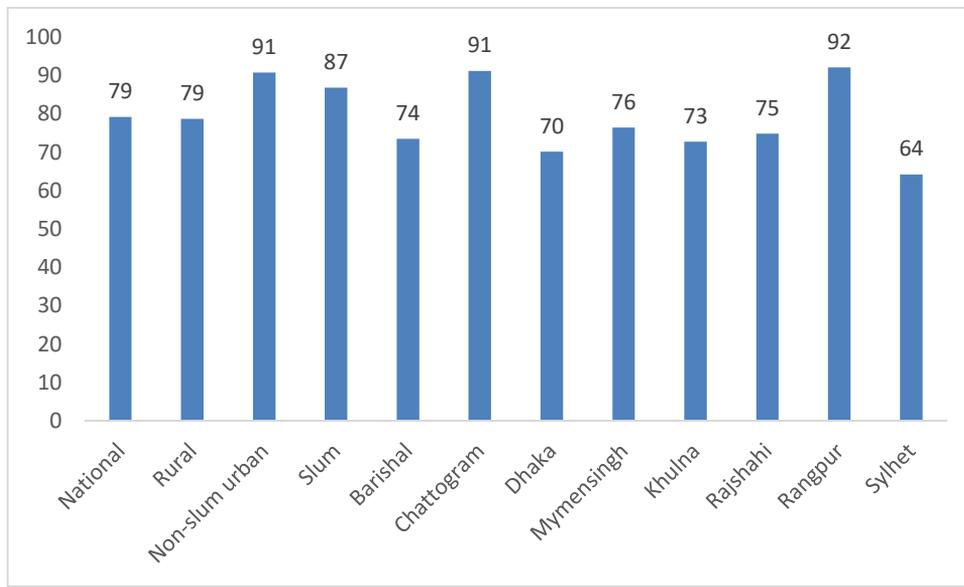
Figure 9.6: Weight measurement during pregnancy

Nutrition counseling during pregnancy and lactation period

Increasing the percentage of pregnant women receiving nutrition counseling during the antenatal period and also during the lactation period is one of the priority areas among different maternity services in Bangladesh. The survey findings revealed that nationally, 75% and 34% of the women received nutrition counseling during pregnancy and after delivery, respectively (Figure 9.7). However, the proportion of women who received nutritional counseling was lowest in Barisal division for both time periods, followed by Rajshahi and Sylhet divisions.
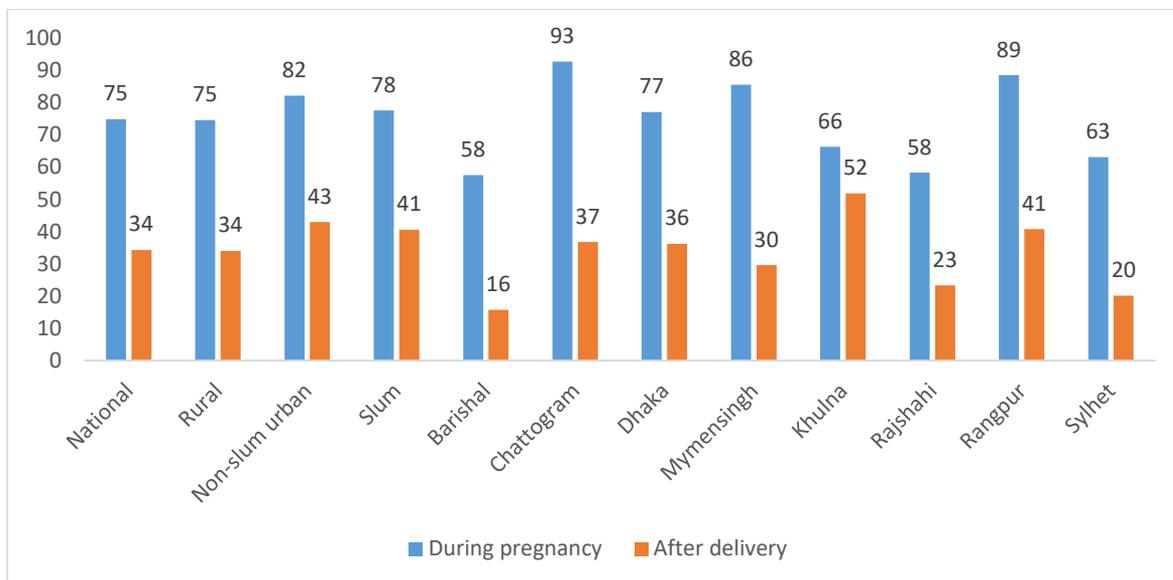
Figure 9.7: Proportion of women received nutritional counseling during pregnancy and after delivery by any health care provider

Figure 9.8 presents the proportion of mothers who received counseling on different components of infant and young child feeding practices during the lactation period or after the delivery. Most of them (82%) have been counseled about exclusive breastfeeding for six months nationally though this proportion was significantly lower in non-slum urban areas. Based on division, this proportion was highest in the Rangpur division and lowest in the Mymensingh division. Nationally, 35% and 27% of mothers have been counseled on continuing breastfeeding up to 2 years and complementary feeding, respectively. Similar to the exclusive breastfeeding counseling, these proportions were also observed as lowest in non-slum urban areas (7%).
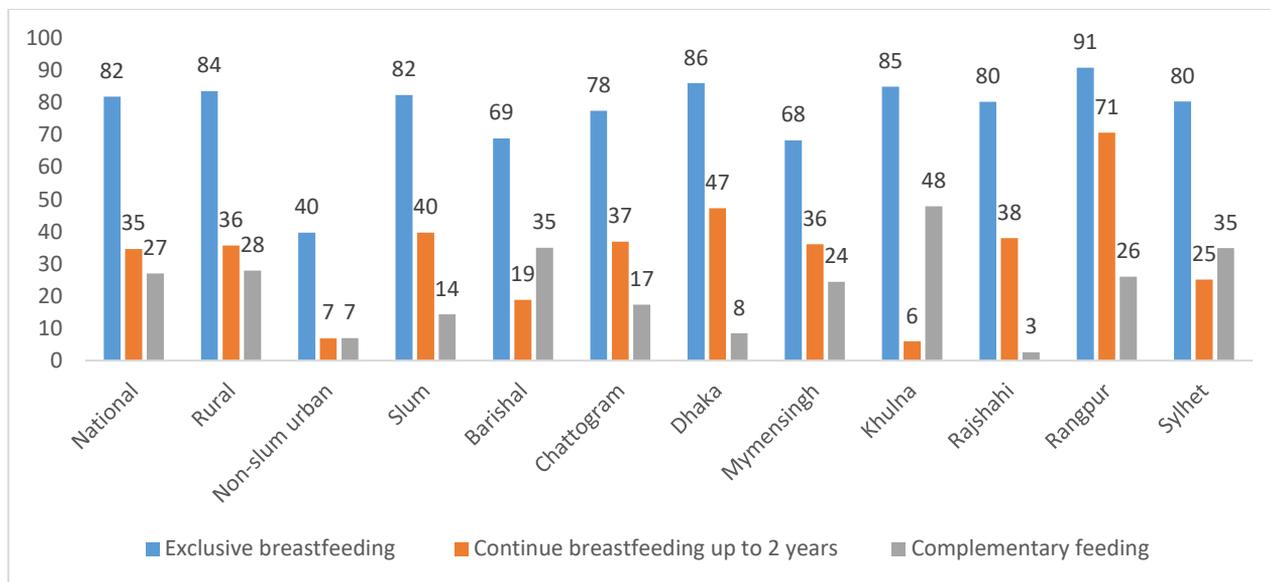
Figure 9.8: Percentage of mothers receiving counseling on infant and child feeding components

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

Behavioral risk factors of noncommunicable diseases

We have collected data on behavioral risk factors of noncommunicable diseases such as smoking and smokeless tobacco use, physical inactivity, and inadequate consumption of fruits and vegetables from the women of this age group (Table 9.5). The prevalence of smoking among women was extremely low (0.1%) at the national level. However, 0.7% of study women from the Chattogram division were found to be smokers at the time of the survey . Consumption of smokeless tobacco among women has cultural acceptance in our country. The percentage of smokeless tobacco use was 25.3% at the national level. The percentage was high among the slum population (35.9%) and low among the urban population (18.1%). At the divisional level, the proportion was highest in the Mymensingh division (44.1%), and lowest in the Chattogram division (15.0%). On the status of physical activity, 91.2% of the women were physically active ≥ 150 mins/week. However, women from the urban areas had the lowest prevalence of adequate physical activity (38.3%), whereas women from the rural areas had the highest (93.2%). The majority of the women from the Mymensingh division (98.7%) were physically active,

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followed by the Sylhet division (97.2%) and Rangpur division (94.4%).

Emphasis on the consumption of adequate fruits and vegetables has been increasing worldwide. The WHO recommends fruits and vegetables as crucial for a healthy   diet and has advocated for increased consumption of adequate (≥5 servings) fruits and vegetables through targeted campaigns. We have calculated daily fruits and vegetable intake servings among adult women at the national and divisional levels. Nine out of ten (90%) of the studied adult women consumed less than 5 servings of fruits and vegetables per day at the national level. The proportion was high in the slum areas (95%). Most of the women from the Rajshahi division (97%) consume less than 5 servings of fruits and vegetables, and the proportion was lowest in the Mymensingh division (68%) (Table 9.3).

Table 9.8: Prevalence of behavioral risk factors of NCDs among adult women aged 20-59 years

Risk factors	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Smoking*	0.1	0.1	0.0	0.0	0.0	0.7	0.1	0.0	0.0	0.0	0.0	0.2
Smokeless tobacco*	25.3	25.5	18.1	35.9	31.5	15.0	35.7	44.1	28.5	16.7	21.6	43.3
Physical inactivity**	8.8	6.8	61.7	10.8	17.8	18.3	11.8	1.3	4.6	9.5	5.6	2.8
Inadequate Fruits and vegetable consumption***	90.3	90.2	92.3	94.9	92.2	92.9	89.5	67.6	85.8	97.1	95.2	91.1

* Current smoker/current user of smokeless tobacco; **<150 minutes of moderate to vigorous activity per week; *** <5 servings of fruits and vegetables per day

Hypertension and other noncommunicable diseases (NCD)

We measured the blood pressure among the women and asked them about several chronic diseases. For the selected chronic diseases, we asked them whether any health care provider told them that they had the disease. The following table (Table 9.6) presents data on blood pressure and the prevalence of hypertension in the adult female population. The prevalence of hypertension was 24.2% in rural area, 22.9% in non-slum urban, and 19.4% in slum areas.

Table 9.9: Blood pressure and prevalence of hypertension among adult women aged 20-59 years

Chronic Disease	National	Rural	No-slum urban	Slum	Barishal	Chattagram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Systolic (mean ± SD) mm of Hg	116.1 ±16.1	116.1 ±16.0	114.5 ±16.3	115.2 ±19.2	117.3 ±15.5	118.4 ±15.1	116.2 ±16.5	114.3 ±15.0	120.5 ±17.4	111.4 ±15.2	115.8 ±15.4	112.8 ±15.1
Diastolic (mean ± SD) mm of Hg	78.2± 10.5	77.0± 10.1	76.7± 9.3	76.8± 11.5	76.7± 10.3	81.0± 9.2	77.8± 10.3	75.9± 9.7	78.3± 10.1	73.9± 9.6	76.0± 10.0	78.3± 9.4
Hypertension (%)	24.2	24.2	22.9	19.4	28.8	27.5	23.8	19.2	21.8	22.8	26.5	22.6

We also collected data on the self-reported prevalence of heart diseases, asthma, kidney diseases, diabetes, stroke, cancer, and mental health problems by asking whether any qualified health care provider ever told them that they have any of these diseases. Nationally, self-reported prevalence of heart diseases, asthma, kidney diseases, diabetes, stroke, cancer, and mental health problem prevalence of the adult women aged 20-59 years was 8%, 6%, 2%, 4%, 2%, 0.3%, and 1% respectively. Table 9.7 shows the further distribution of the self-reported NCDs of adult women.

Table 9.10: Prevalence of self-reported non-communicable diseases among adult women by area of residence

Chronic Disease	National	Rural	No-slum urban	Slum	Barishal	Chattagram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet

Hypertension (%)	19.4	19.4	19.1	13.7	24.0	20.9	19.7	15.8	17.6	20.2	19.5	17.1
Any heart diseases (%)	8.3	8.3	6.4	6.6	12.7	7.1	10.6	10.6	8.8	7.5	7.0	5.4
Asthma (%)	5.9	5.9	5.5	2.8	4.6	7.5	3.7	8.7	4.3	4.1	7.6	8.2
Kidney diseases (%)	2.2	2.2	1.9	0.0	1.0	1.2	1.5	0.5	4.1	2.0	2.7	0.7
Diabetes (%)	3.9	3.8	7.8	4.3	5.6	7.4	1.7	1.1	2.6	3.3	4.6	2.1
Stroke (%)	2.1	2.1	1.3	0.5	5.6	3.1	0.6	0.6	2.9	0.0	2.9	0.0
Cancer (%)	0.3	0.3	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.1	0.0
Mental health problem (%)	0.5	0.5	0.3	2.6	0.7	1.1	0.8	0.3	0.6	0.0	0.1	3.0

CHAPTER 10: HEALTH & NUTRITION STATUS of ADULT MEN (20-59 YEARS)

To capture the health and nutritional situation of Bangladeshi adult men, FSNSP-NNS 2018-19 collected data on their dietary habits and measured their height, weight, and MUAC. In 2018-19, over 4,904 adult men aged 20-59 were interviewed and measured throughout the country.

Table 10.1: Characteristics of adult men by area of residence

Characterist-ics	National	Rural	Non-slum urban	Slum	Barisal	Chittagong	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Age (mean±SD)	37.9 ±11.1	38.0 ±11.2	36.5± 10.6	35.6 ±9.6	38.1 ±10.9	36.8 ±10.8	39.1 ±11.5	37.2 ±11.6	37.4 ±10.2	37.5 ±11.7	39.4 ±11.2	37.3 ±11.2
Marital status												
Never married	16.7	16.5	23.4	13.4	17.8	26.6	15.1	14.0	12.7	19.1	12.6	20.5
Currently married	82.7	83.0	76.0	85.8	81.9	72.8	82.9	85.5	86.5	80.6	87.1	78.6
Separated	0.1	0.1	0.4	0.1	0.0	0.0	0.3	0.0	0.3	0.2	0.0	0.0
Divorced	0.2	0.2	0.2	0.7	0.0	0.5	1.3	0.5	0.0	0.0	0.0	0.2
Widowed	0.3	0.3	0.0	0.0	0.3	0.1	0.5	0.0	0.5	0.0	0.3	0.7
Educational level												
No education	29.6	30.2	15.4	33.0	18.0	15.6	31.2	42.3	24.7	38.7	31.3	30.0
Partial primary	15.0	15.1	13.5	14.0	18.4	18.3	16.3	10.6	18.3	11.8	13.8	14.9
Complete primary	14.9	14.8	15.8	21.7	12.6	19.6	15.1	12.2	13.2	18.3	11.5	17.6
Partial secondary	19.7	19.5	24.9	19.8	20.5	23.8	18.1	17.0	21.1	14.8	22.0	19.5
Complete SSC	6.7	6.4	14.0	5.2	9.3	11.4	6.9	5.2	6.3	4.8	6.0	4.3
HSC or more	14.1	14.1	16.5	6.3	21.3	11.4	12.5	12.7	16.5	11.6	15.3	13.7
Occupation												
Farmer	18.5	19.4	0.1	0.0	16.1	7.8	23.9	30.4	27.3	9.8	19.8	15.7
Unskilled day labor	15.9	16.5	3.1	9.5	11.4	9.7	7.8	17.7	14.7	11.5	27.1	26.4
Skilled day labor	9.5	9.5	9.0	10.9	11.4	10.7	10.6	9.9	10.2	7.9	8.9	5.3
Transport	12.3	11.9	21.4	16.2	13.8	13.4	16.1	8.5	9.3	18.2	9.7	5.8
Fisherman	0.8	0.8	0.0	0.5	1.3	2.3	2.1	0.3	0.8	0.0	0.0	2.4
Salaried	8.8	7.8	30.0	26.8	10.1	17.8	7.4	4.8	8.1	4.6	9.9	6.3
Business	19.4	19.1	23.8	30.1	21.6	26.7	23.8	18.7	19.2	14.0	18.2	23.5
No income	1.7	1.5	6.7	2.7	3.2	3.8	1.9	1.9	0.4	1.0	1.7	2.7
Student	6.1	6.2	4.8	2.4	6.6	5.7	4.6	7.5	6.8	7.8	3.2	8.2
others	7.1	7.4	1.2	0.8	4.6	2.2	1.9	0.2	3.4	25.0	1.4	3.8

This report provides nationwide estimates of nutritional status and dietary patterns. In addition, data have been collected on socio-demographic characteristics, dietary diversity, behavioral risk factors for non-communicable diseases, self-reported non-communicable diseases, quality of life, blood pressure, and anthropometric indicators, including weight, height, percentage of body fat and water, mid-upper arm circumference, calf circumference, and waist circumference. Table 10.1 displays the socio-demographic characteristics of this population group. Among the adult men, 82.7% were currently married, 29.6% were illiterate, and 18.5% were farmers. The levels of education and professional categories varied among the adult men by areas of residence.

Dietary diversity

Dietary diversity was assessed by interviewing selected men aged 20-59 years about the food items they consumed during the day before the interview. Food items were classified into 10 different pre-coded food groups containing different nutrients, including those with high micronutrient content, such as dark green leafy vegetables, and those with poor nutrient content but denote increased household purchasing power such as soft drinks (4,5). A composite measure of dietary diversity is derived by clustering the 19 food types listed in the questionnaire into a ten-item scale to measure Minimum Dietary Diversity – Women (MDD-W), which is a proxy indicator for global use in assessing the micronutrient adequacy of men's diets. MDD-W was developed to ascertain the quality of a woman's diet in light of her nutritional needs and validated for women in Bangladesh (4,5). Because minimum dietary diversity is not yet defined for men, MDD-W is used in this report to define   the diet quality of men. The ten items are starchy staple foods, beans and peas, nuts and seeds, dairy, flesh foods, eggs, vitamin A-rich dark green leafy vegetables, and other vitamin A-rich vegetables and fruits.

MDD is useful in identifying food access and consumption problems among men and targeting interventions when needed. It may also be used at the community level to evaluate programs intended to improve food security and nutrition. According to Food and Nutrition Technical Assistance 2 (FANTA-2), it has been seen that the most consistent relationships between the food group scores and the micronutrient status of individuals are for riboflavin, folate, vitamin B12, vitamin A, and calcium. These nutrients were also positively correlated with dietary diversity indicators and remained so even after

controlling for energy intake. FSNS-NNS uses the FANTA-2 cut-off considers the consumption of fewer than five food groups out of ten as indicating a diet inadequate in micro-and/or macronutrients (6).

We collected dietary diversity data asking the question, "Yesterday during the day or night, did you consume the following food items?". Then we grouped all the food items into 10 major food groups and defined having dietary diversity if someone consumed 5 or more than 5 food groups out of these 10 food groups. Figure 10.1 below demonstrated the data on the dietary diversity of the adult men aged 20-59 years of the survey. At the national level, the majority (50%) of the men consumed inadequately diversified diets. Nearly two-thirds (63%) of the men from the slum area consumed inadequately diversified diets. Most of the men from Sylhet (76%) consume an inadequately diversified diet, and the proportion is lowest in Rajshahi (33 %). Table 10.2 below listed the 10 groups of food consumed by the adult men in our survey.
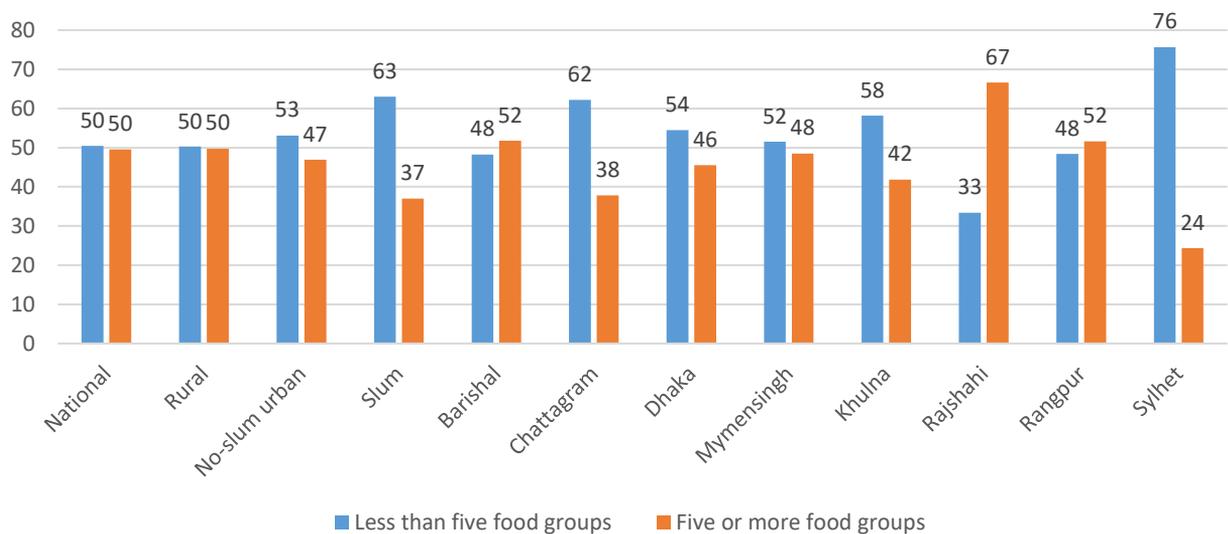
Figure 10.1: Dietary diversity of adult men

Table 10.2 below showed the data on each of the 10 food groups consumed by the adult men by place of residence and division. We found that 100% of the adult male respondents, irrespective of residence and division, consumed starchy staples in the previous day and night (24 hours) of the interview day. About 2 out of 5 respondents consumed dark green leafy vegetables, and 1 out of 4 reported consumption of pulses (beans, peas, and lentils) in the previous   day and night. While about 79% of the adult male

respondents in our survey reported consuming eggs in the previous   day and night, only 38% reported consuming meat, fish, or poultry in the same period. While consumption of most protein-rich foods such as meat, fish or poultry, pulses, nuts, or seeds is highest among the adult males of non-slum urban areas compared to the rural or slums areas, adult males living in rural areas reported the highest consumption of eggs and dairy products.

Table 10.2: Consumption of 10 food groups in 7-day dietary recall by adult men (20-59 years)

Dietary diversity 10 food groups	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Starchy staples	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Dark green leafy vegetables	40.2	39.6	54.1	45.8	54.0	38.2	52.1	32.7	33.4	40.8	43.9	41.1
Other vitamin A-rich fruits or vegetables	8.9	9.0	6.4	5.3	6.5	6.1	6.3	3.3	8.0	20.7	4.6	0.8
Other vegetables	36.5	36.6	33.4	28.4	30.9	28.2	37.6	45.1	27.5	36.1	50.2	23.2
Other fruit	26.6	27.2	14.3	15.3	36.9	15.8	10.2	18.7	12.9	60.5	18.1	18.5
Meat, fish or poultry	37.8	37.6	43.1	37.0	47.6	30.4	30.9	46.6	28.6	46.8	39.0	24.7
Eggs	79.2	80.1	60.9	59.2	54.6	77.8	75.6	81.3	96.7	87.8	65.9	44.4
Pulses (beans, peas and lentils)	27.3	27.1	34.1	25.3	32.9	18.3	27.8	22.1	25.7	23.6	41.7	11.8
Nuts and seeds	72.0	71.9	74.4	67.9	76.6	60.4	81.3	80.6	82.8	75.5	58.8	62.2
Dairy	26.5	26.6	26.4	10.9	22.3	30.6	19.7	22.1	12.9	32.8	37.8	12.4

Process food consumption

Consumption of processed   food such as savory crispy or fried snacks (SCFS), sugary snacks (SS), and sugar-sweetened beverages (SSB) are associated with an increased prevalence of obesity and noncommunicable diseases (NCD). In this survey, adult men aged 20-59 years were interviewed for the 7-days recall on intake of these 3 types of processed food where the intake of savory crispy or fried snacks (SCFS), sweet snacks (SS), and sugar-sweetened beverages (SSB) intake were measured by asking questions about each item with example. For example, to collect data about the weekly frequency of SCFS, the question was, "in the last seven days, how many days did you eat savory crispy or fried snacks like

chips, singara, samosa, etcetera?".

In Table 10.3 below, the frequency of consuming savory crispy or fried snacks (SCFS) is reported. Savory crispy or fried snacks (SCFS) included spicy or salty snacks (but not sweet), including commonly consumed snacks prepared at home for consumption between meals or during traveling, e.g., pakoras, samosas, singara. Besides, it also included commercially prepared foods bought from restaurants or grocery stores, such as chips, chanachur, deep fat fried pulses. According to the current survey, 9.8% of the adult men aged 20-59 years consumed SCFS 7 times or more in 7 days before the interview day, with an additional 11.1% of the adult men who consumed such snacks 4-6 times in the same   recall period. Consumption of SCFS 7 times or more per week is highest (23.2%) among the adult men who lived in non-slum urban areas compared to their rural or slum counterparts (9.3% and 12.7%, respectively). From the 8 divisions, consumption of SCFS 7 times or more per week is highest (7.2%) among the adult men of Chattogram division and lowest (4.2%) in the Rajshahi division.

Table 10.3: Consumption of Savory Crispy or fried Snacks (SCFS) among adult men

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	42.3	42.8	31.0	34.0	37.9	17.7	47.7	56.7	34.8	57.8	42.8	43.2
1-3 times	36.8	36.9	34.6	36.5	36.2	37.5	36.6	28.6	44.8	32.4	36.3	40.5
4-6 times	11.1	11.1	11.3	16.7	14.9	23.9	8.5	8.4	11.7	5.6	8.8	11.5
7 or more times	9.8	9.3	23.2	12.7	11.0	20.9	7.2	6.4	8.7	4.2	12.2	4.7

Table 10.4 demonstrates the frequency of consumption of Sweet Snacks (SS) among adult men. Sugary snacks include traditional milk-based sweetmeats of South Asia and snacks and desserts prepared with added sugar like halwa or sugar-containing snacks purchased from restaurants, or grocery stores, such as biscuits, cakes, chocolate, candy. According to the data collected in the survey, 25.4% of the adult men consumed sweet snacks at least 7 times in the week before the interview day. It was highest among the adult men living in the slum areas compared to rural and non-slum urban areas. Among the divisions, adult

men living in the Chattagram division consumed SS in the highest frequencies. On the other hand, adult men of the Rajshahi division consumed such snacks in the lowest frequencies.

Table 10.4: Consumption of Sweet Snacks (SS) among adult men

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	24.9	24.9	26.2	18.1	14.8	13.0	22.5	25.6	15.0	42.8	29.3	10.2
1-3 times	33.0	33.2	29.0	23.6	30.4	15.1	33.5	33.9	30.8	37.3	44.1	23.8
4-6 times	16.7	16.7	17.7	21.3	25.6	15.3	18.0	16.7	27.1	7.6	11.2	37.0
7 or more times	25.4	25.2	27.1	36.9	29.3	56.5	26.0	23.8	27.1	12.3	15.5	29.0

Table 10.5 demonstrates the frequency of consumption of Sugar-Sweetened beverages (SSB) among adult men. Sugar-sweetened beverages (SSB) are defined as beverages that contain added sugars in line with the definition provided by the Center for Diseases Control and Prevention (CDC), USA. According to the data collected in this survey, 55.9% of the adult men consumed SSB at least 7 times in the week before the interview day, with the highest percentage (80.4%) among the adult men living in non-slum urban areas. Among the divisions, the highest consumption of sugar-sweetened beverages (SSB) was reported by the adult men of the Chattogram division (92.6%), with the lowest consumption reported by adult men of the Khulna division (30.1%).

Table 10.5: Consumption of Sugar-Sweetened Beverage (SSB) among adult men

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	22.7	23.3	9.3	12.9	7.8	4.8	21.8	15.1	31.2	36.7	21.4	9.1
1-3 times	15.4	15.8	5.8	7.9	10.6	1.9	10.3	11.3	17.4	27.7	15.1	8.1
4-6 times	6.1	6.2	4.4	4.2	8.1	0.7	6.1	5.0	8.4	5.6	8.3	3.0
7 or more times	55.9	54.7	80.4	75.1	73.5	92.6	61.8	68.6	42.9	30.1	55.2	79.9

Body Mass Index (BMI) of men (20-59 years)

BMI indicates the thinness or obesity of an individual {BMI=Weight (kilograms)/Height^2 (meters)} and is used to represent the nutritional status of non-pregnant men. By normalizing the weights of individuals against their heights, nutritional status indicators based on BMI are useful in detecting acute malnutrition (12).[7] For adult men aged 20 to 59, nutritional status is calculated through the use of BMI cut-offs (Asian). BMI measures are also used to estimate the proportion of the overweight or obese population and thereby at higher risk for non-communicable disease (13). Men are classified based on the BMI score at which an increased risk of non-communicable diseases has been observed (13).

Table 10.6: Classification of malnutrition based on BMI for men

Population	Rationale	Category	Definition
Adult men (20 to 59 years of age)	Identifying the proportion of the reproductive age population with an increased risk of communicable illness and decreased energy levels	Severely thin	BMI of less than 16
		Moderately thin	BMI less than 17 but higher than or equal to 16
		Mildly thin	BMI less than 18.5 but higher than or equal to 17
		Chronically energy deficient (CED)	BMI of less than 18.5
	Identifying the proportion of the reproductive age population with an increased risk of non-communicable disease	Increased risk for Asian populations	BMI greater than 23 but less than 27.5
		Overweight (International cut-off)	BMI greater than 25 but less than 30
		High risk for Asian populations	BMI greater than or equal to 27.5
		Obesity (International cut-off)	BMI higher than or equal to 30

According to BMI based on Asian cut-off values, 51% of men fell into normal categories (Fig. 10.2). The proportion of over-nourished men (33.8%) was more than the proportion of undernourished men (15%).

[7]
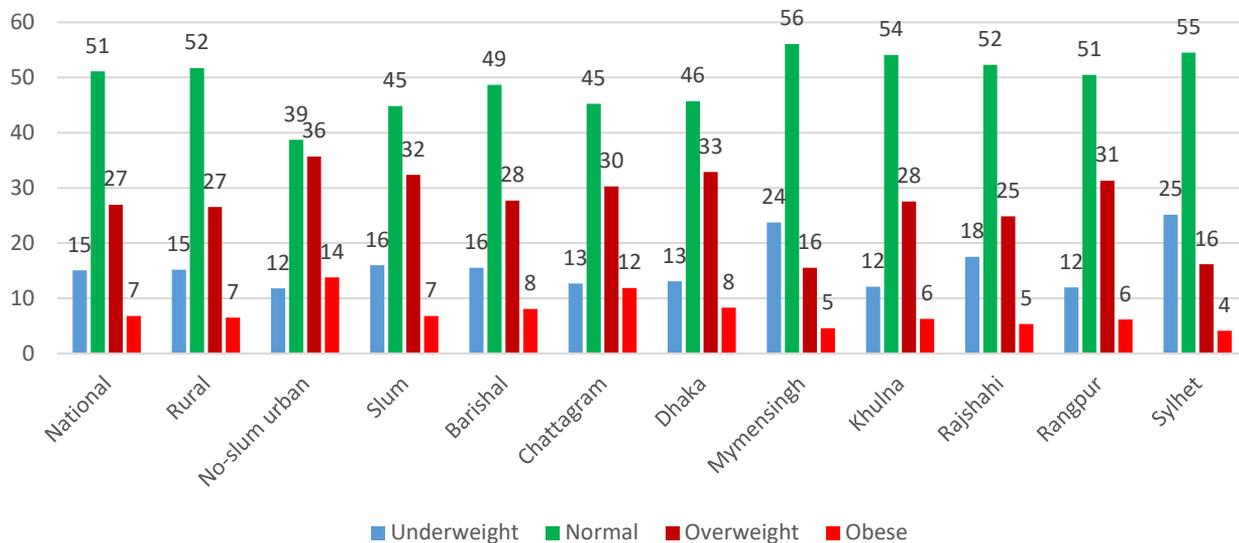
Figure 10.2: Nutritional status of adult men

In the non-slum urban areas, only 39%) of the men fell into the normal category, and nearly half (49.5%) were overnourished. In non-slum urban areas, the proportions of obese men (13.8%) were substantially higher than that of rural areas (6.5%) and slum areas (6.8%).

Behavioral risk factors of noncommunicable diseases

We have collected data on smoking and smokeless tobacco use, physical inactivity, and inadequate consumption of fruits and vegetables among adult men aged 20-59 years as the behavioral risk factors of noncommunicable diseases (NCD). The prevalence of smoking among the adult men of this age group in our survey was 39.6% at the national level, with the highest prevalence in slums (55.4%) and lowest in rural areas (39.2%). Among all the divisions, adult men in the Mymensingh division smoke in the highest percentage (55.4%). Nationally, about 24.1% of the adult men use smokeless tobacco in some form or another, with the highest 24.5% in rural areas and the lowest 16.3% in slums. The percentage of smokeless tobacco is highest in the Rangpur division (42.4%) and lowest in the Chattogram division (15.4%). Nationally, 20.1% of the adult men performed less than 150 minutes of moderate to vigorous physical activity every week. Adult men living in rural areas are more physically active than non-slum urban residents and slum dwellers. About 69% of the adult men living in non-slum areas reported performing less than 150 minutes of moderate to vigorous physical activity in a week at the time of interview. From

the divisional estimates, adult men in the Rajshahi division are most physically inactive (30.0%), with the lowest percentage in the Mymensingh division (6.3%).

The WHO recommends fruits and vegetables as crucial for a healthy diet and has advocated for increased consumption of adequate (≥ 5 servings per day) fruits and vegetables through targeted campaigns. We have calculated daily fruits and vegetable intake servings among adult men at the national and divisional levels. More than eight out of ten (83%) of the studied adult men consumed less than 5 servings of fruits and vegetables per day at the national level. The proportion of adult men consuming inadequate fruits and vegetables was highest in the non-slum urban areas (94.5%) and lowest in rural areas (82.5%). Most of the women from the Rajshahi division (94.5%) consumed less than 5 servings of fruits and vegetables, and the proportion was lowest in the Mymensingh division (49.7%) (Table 10.7).

Table 10.7: Prevalence of behavioral risk factors of NCDs among adult men aged 20-59 years

Risk factors	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Smoking*	39.6	39.2	46.8	55.4	37.3	48.4	43.7	55.4	32.5	34.2	37.2	48.0
Smokeless tobacco*	24.1	24.5	16.6	16.3	18.5	15.4	20.9	20.3	22.7	16.7	42.4	31.4
Physical inactivity**	20.1	18.0	68.8	25.4	28.4	28.2	20.5	6.3	14.9	30.0	14.6	9.6
Inadequate fruits and vegetable consumption***	83.0	82.5	94.5	92.8	87.5	88.2	83.9	49.7	72.5	94.6	90.8	92.0

* Current smoker/current user of smokeless tobacco; **<150 minutes of moderate to vigorous activity per week; *** <5 servings of fruits and vegetables per day

Noncommunicable diseases (NCD)

We measured the blood pressure of the men and asked them about several chronic diseases. For the selected chronic diseases, we asked them whether any health care provider diagnosed the disease. The following table (Table 10.8) presents data on blood pressure and the prevalence of hypertension. The results revealed that mean systolic BP was higher in rural areas compared to other areas, and the mean

Table 10.8: Blood pressure and prevalence of hypertension among adult men aged 20-59 years

Chronic Disease	National	Rural	No-slum urban	Slum	Barishal	Chattagram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Systolic (mean ± SD) mm of Hg	119.0 ±14.2	119.0 ±14.2	118.9 ±14.7	116.6 ±11.7	120.5 ±13.7	122.4 ±14.2	120.0 ±14.7	116.5 ±13.0	122.9 ±13.7	113.9 ±13.2	119.2 ±14.6	114.8 ±13.4
Diastolic (mean ± SD) mm of Hg	76.7± 10.0	76.6± 10.0	79.1± 9.8	77.1± 8.4	76.4± 10.0	81.1± 8.4	79.0± 9.8	74.4± 9.6	78.3± 9.4	73.3± 9.4	76.2± 11.0	77.0± 9.3
Hypertension (%)	18.5	18.5	19.3	15.1	20.5	20.0	21.6	14.1	20.7	12.5	22.5	15.5

Diastolic   blood pressure is highest in the non-slum areas. The prevalence of hypertension is highest among the adult men residing in the non-slum urban areas and lowest among those living in the slum areas. Among the divisions, the prevalence of hypertension is highest in the Rangpur division (22.5%) and lowest in the Rajshahi division (12.5%)

We also collected data on the self-reported prevalence of heart diseases, asthma, kidney diseases, diabetes, stroke, cancer, and mental health problems   by asking whether any qualified health care provider ever told them that they have any of these diseases. Nationally, self-reported prevalence of heart diseases, asthma, kidney diseases, diabetes, stroke, cancer, and mental health problem prevalence of the adult men aged 20-59 years was 7%, 6%, 2%, 3%, 1%, 0.3%, and 1% respectively. Table 10.9 shows the further distribution of the self-reported NCDs of adult men.

Table 10.9: Prevalence of self-reported NCDs among adult men aged 20-59 years

Self-reported Chronic Disease	National	Rural	No-slum urban	Slum	Barishal	Chattagram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Hypertension	12.2	12.2	12.0	9.3	16.2	11.0	12.1	8.8	12.1	9.2	16.7	10.6
Any heart diseases (%)	6.8	6.9	3.7	8.9	10.5	4.9	7.1	6.8	7.8	5.8	6.8	7.0
Asthma (%)	5.6	5.6	4.7	6.5	4.1	4.6	3.4	6.2	6.6	5.1	6.4	6.1

Kidney diseases (%)	2.1	2.1	1.6	1.0	3.5	1.0	1.5	0.6	4.0	1.2	2.3	0.2
Diabetes (%)	3.2	3.1	5.5	3.9	5.4	5.2	5.1	2.4	1.2	3.0	3.7	0.4
Stroke (%)	1.4	1.5	0.6	1.0	4.9	1.5	0.5	0.7	1.4	1.1	1.4	0.9
Cancer (%)	0.3	0.3	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.7	0.2	0.0
Mental health problem (%)	0.7	0.8	0.1	1.5	0.5	0.8	0.9	0.3	1.6	0.2	0.5	2.0

CHAPTER 11: HEALTH & NUTRITION STATUS OF ELDERLY PEOPLE

The epidemiological transition took place in Bangladesh, and the disease burden has been shifted from communicable to non-communicable disease. The life expectancy at birth has increased substantially (71.6% for both sexes as per SVRS, 2016) during the past decades [1]. According to Health   Bulletin 2017, people over 60 years constituted over 11% of the total population in 2011 and are estimated to constitute 14.4% in 2021 and 21.3% of the total population in 2031. Geriatric nutrition is one of the essential components of geriatric health. However, Bangladesh lacks data to take the necessary policy and programmatic action. Accordingly, this study collected data from the geriatric population to assess their nutrition status and quality of life. We anticipate that this data would help develop a geriatric nutrition strategy, which is one of the activities stated in the latest program implementation plan (PIP) under the leadership of the National Nutrition Service [2].

Table 11.1: Characteristics of elderly people by area of residence

Characteristics	Rural (n=3,463)	Non-slum urban (n=807)	Slum (n = 548)	National (n=4,818)
Sex (%)				
Male	52.4	54.0	51.1	52.4
Female	47.6	46.0	49.0	47.6
Age (mean ± SD) years	68.7±8.1	67.4±6.6	67.5±8.0	68.7±8.1
Education (%)				
No education	63.9	47.7	79.2	63.7
Partial primary	14.1	10.2	11.2	14.0
Complete primary	7.9	14.5	4.9	8.0
Partial secondary	7.9	13.3	3.8	8.0
Complete SSC	2.8	5.5	0.9	2.8
Above SSC	3.4	8.8	0.0	3.5
Profession (%)				
Farmer	16.9	0.8	0.1	16.6
Unskilled day labor	7.3	2.7	7.3	7.2
Skilled day labor	1.0	1.4	2.9	1.0
Transport	1.4	4.0	2.6	1.4
Fisherman	0.6	0.0	0.7	0.6
Salaried	1.5	8.6	6.9	1.6
Business	6.5	12.0	25.2	6.6
No income	23.6	33.4	24.6	23.8
Homemaker	33.6	25.4	23.7	33.5
Others	7.7	11.8	6.0	7.8

The FSNSP round 2018-2019 collected data on socio-demographic characteristics, dietary diversity, behavioral risk factors for non-communicable diseases, self-reported non-communicable diseases, quality of life, blood pressure and anthropometric indicators including weight, height, percentage of body fat and water, mid-upper arm circumference, calf circumference, and waist circumference. Table 11.1 displays the socio-demographic characteristics of this population group. Among the elderly people, 52.4% were male, 63.9% were illiterate, and 16.6% were farmers. The level of education and professional categories varied among the elderly people by areas of residence. Twenty-four percent of elderly people did not have any income during the data collection.

Dietary diversity

Measures of dietary diversity provide a means of documenting food purchases at the household level and capturing the quality of diet in terms of macro and micronutrient content, and the number of different

food groups consumed. Furthermore, the dietary assessment makes it possible to examine food security at the household and intra-household levels. Dietary diversity was assessed by interviewing selected elderly people aged 60 years or above about the food items they consumed during the day before the interview. We collected dietary diversity data asking the question, "Yesterday during the day or night, did you consume the following food items?". Food items were classified into 10 different pre-coded food groups containing different nutrients, including those with high micronutrient content, such as dark green leafy vegetables, and those with poor nutrient content but denote increased household purchasing power, such as soft drinks.

The Figure below (Figure 11.1) demonstrated the data on the dietary diversity of the elderly population of the survey. Elderly people in non-slum urban areas consumed a more diverse diet than those living in rural and slum areas. Elderly people in Sylhet and Khulna divisions are most deprived in terms of dietary diversity, while elderly people in the Rajshahi division have been found with the highest percentage consuming diverse food.
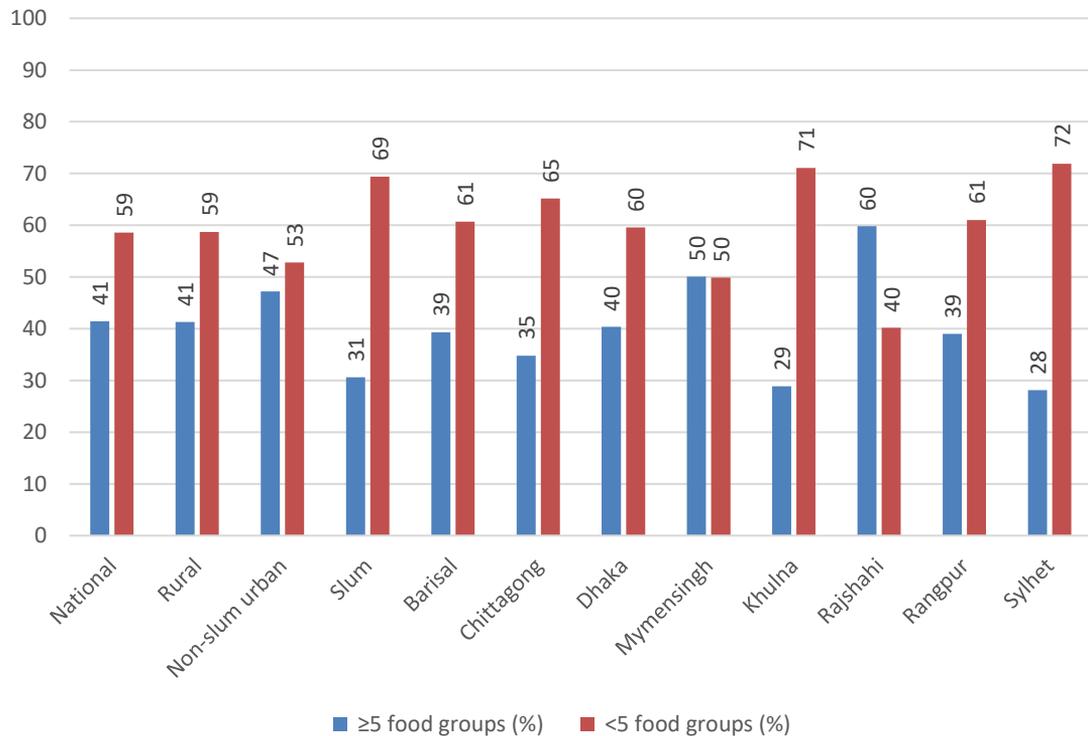
Figure 11.1: Dietary diversity among elderly people by area of residence

Table 11.2 below showed the data on each of the 10 food groups consumed by the adult men by place of residence and division. We found that almost all of the elderly respondents consumed starchy staples in the last 7 days, with the highest consumption in non-slum urban areas and   lowest consumption in rural areas. About 2 out of 5 respondents consumed dark green leafy vegetables, and 1 out of 5 reported consumption of pulses (beans, peas, and lentils) in the same recall period. While about 75% of the elderly people in our survey reported consuming eggs in the last 7 days, only 31% reported that they had consumed meat, fish, or poultry in the same period. Consumption of all protein-rich foods such as eggs, meat, fish or poultry, pulses, nuts, or seeds is highest among the elderly people living in the non-slum urban areas compared to those of the rural or slums areas.

Table 11.2: Consumption of 10 food groups in 7 day dietary recall by elderly people by place of residence

Dietary diversity 10 food groups	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Starchy staples	99.8	99.8	99.7	99.8	99.7	99.7	100.0	100.0	100.0	99.4	100.0	100.0
Dark green leafy vegetables	37.6	37.3	54.5	40.4	47.5	33.5	53.2	34.5	28.5	39.1	39.4	47.1
Other vitamin A-rich fruits or vegetables	4.5	4.5	3.0	3.4	2.8	6.7	3.0	0.2	3.2	10.1	2.5	1.7
Other vegetables	34.7	34.7	34.3	31.8	24.8	27.6	38.6	44.5	28.4	36.2	44.7	18.5
Other fruit	24.4	24.6	15.7	18.0	33.8	11.3	10.7	19.4	8.9	61.1	15.0	18.1
Meat, fish or poultry	31.4	31.3	36.1	27.4	43.0	32.1	28.0	43.1	17.5	38.6	30.6	18.7
Eggs	74.7	74.9	63.9	66.2	45.4	76.9	71.9	79.1	94.6	83.5	57.7	59.6
Pulses (beans, peas and lentils)	19.7	19.6	29.4	13.8	18.1	12.6	20.5	16.0	15.3	18.3	34.4	8.6
Nuts and seeds	67.9	67.8	74.1	62.2	73.9	59.6	74.5	82.6	74.0	71.6	53.5	61.2
Dairy	29.0	29.1	27.9	15.8	25.6	28.1	21.4	29.5	14.6	39.7	39.6	12.3

Process food consumption

Consumption of processed   food such as savory crispy or fried snacks (SCFS), sugary snacks (SS), and sugar-sweetened beverages (SSB) are associated with an increased prevalence of obesity and noncommunicable diseases (NCD). In this survey, elderly people aged 60 years or more were interviewed for the 7-days recall on intake of these 3 types of processed food where the intake of savory crispy or fried snacks (SCFS), sweet snacks (SS), and sugar-sweetened beverages (SSB) intake were measured by asking questions about each item with example. For example, to collect data about the weekly frequency of SCFS, the question was, "in the last seven days, how many days did you eat savory crispy or fried snacks like chips, singara, samosa, etcetera?".

In Table 11.3 below, the frequency of consuming savory crispy or fried snacks (SCFS) is reported. Savory crispy or fried snacks (SCFS) included spicy or salty snacks (but not sweet), including commonly consumed snacks prepared at home for consumption between meals or during traveling, e.g., pakoras, samosas, singara. Besides, it also included commercially prepared foods bought from restaurants or grocery stores, such as chips, chanachur, deep fat fried pulses. According to the current survey, 2.1% of the elderly people aged 60 years or more consumed SCFS 7 times or more in 7 days before the interview day, with an

additional 4.1% of the elderly people who consumed such snacks 4-6 times in the same   recall period. Consumption of SCFS 7 times or more per week is highest (3.9%) among the elderly people who lived in non-slum urban areas compared to their rural or slum counterparts (2.1% and 3.5%, respectively). From the 8 divisions, consumption of SCFS 7 times or more per week is highest (5.3%) among the elderly people of the Barishal division and lowest (0.3%) in the Sylhet division.

Table 11.3: Consumption of Savory Crispy or fried Snacks (SCFS) among elderly people

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	74.0	74.1	67.4	65.9	63.7	49.6	80.0	83.7	74.4	86.6	73.5	75.8
1-3 times	19.9	19.8	24.9	25.0	26.3	36.6	16.1	13.4	22.3	10.2	18.6	19.6
4-6 times	4.1	4.1	3.8	5.6	4.8	11.2	3.0	1.8	2.6	1.8	4.3	4.4
7 or more times	2.1	2.1	3.9	3.5	5.3	2.6	1.0	1.1	0.7	1.5	3.6	0.3

Table 11.4 demonstrates the frequency of consumption of Sweet Snacks (SS) among elderly people. Sugary snacks include traditional milk-based sweetmeats of South Asia and snacks and desserts prepared with added sugar like halwa or sugar-containing snacks purchased from restaurants, or grocery stores, such as biscuits, cakes, chocolate, candy. According to the data collected in the survey, 17.6% of the elderly people consumed sweet snacks at least 7 times in the week   before the interview day, and it was highest among the elderly people living in the slum areas compared to rural and non-slum urban areas. Among the divisions, elderly people living in the Chattagram division consumed SS in the highest frequencies, and elderly people of the Rajshahi division consumed such snacks in the lowest frequencies.

Table 11.4: Consumption of Sweet Snacks (SS) among elderly people

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	39.7	39.6	43.2	37.4	30.4	17.0	42.5	45.9	26.5	56.9	52.7	22.7
1-3 times	31.4	31.5	23.7	20.2	34.0	15.8	34.1	25.7	44.7	31.2	29.5	29.5
4-6 times	11.4	11.4	10.1	14.1	15.2	15.9	10.6	10.6	17.9	4.6	6.3	19.7
7 or more times	17.6	17.5	23.0	28.3	20.4	51.3	12.8	17.8	10.9	7.4	11.6	28.1

Table 11.5 demonstrates the frequency of consumption of Sugar-Sweetened   beverages (SSB) among elderly people. Sugar-sweetened beverages (SSB) are defined as beverages that contain added sugars in line with the definition provided by the Center for Diseases Control and Prevention (CDC), USA. According to the data collected in this survey, 40.4% of the elderly people consumed SSB at least 7 times in the week before the interview day, with the highest percentage (74.9%) among the elderly people living in non-slum urban areas. Among the divisions, the highest consumption of sugar-sweetened   beverages   (SSB) was reported by the elderly people of the Chattogram division (88.1%), with the lowest consumption reported by elderly people of the Rajshahi division (17.9%).

Table 11. 5: Consumption of Sugar-Sweetened Beverage (SSB) among elderly people

Frequency of Intake in 7-days	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Never	47.4	47.9	19.4	19.8	27.0	10.2	45.9	41.0	71.2	70.0	42.9	11.9
1-3 times	8.7	8.8	3.7	5.6	18.9	1.0	12.0	9.0	6.6	9.6	11.0	3.9
4-6 times	3.4	3.5	2.3	4.6	6.2	0.8	4.0	4.7	3.2	2.5	3.9	5.8
7 or more times	40.4	39.8	74.6	70.0	47.9	88.1	38.1	45.4	19.1	17.9	42.2	78.5

Mini-nutritional   assessment (MNA)

We conducted a preliminary screening for the risk of malnutrition among the elderly people using the mini-nutritional   assessment short-form (MNA-SF) questionnaire developed and validated jointly by the Centre for Internal Medicine and Clinical Gerontology of Toulouse (France), the Clinical Nutrition Program at the University of New Mexico (United States), and the Nestle´ Research Centre in Lausanne (Switzerland) [3]. Figure 11.2 demonstrates the status of nutrition of the elderly people in Bangladesh assessed by the MNA-SF. As per the data, 20% of the elderly people of Bangladesh are estimated as malnourished, with an additional 69% of them are at risk of being malnourished   . From the divisional estimates, elderly people who were living in the Mymensingh district were malnourished in the highest percentage (37%), whereas the lowest percentage (13%) of elderly people were malnourished in the Barishal division. Among three types of places of residence, rural areas had the highest percentage (19%)

of malnourished people while non-slum urban areas had the lowest (13%).
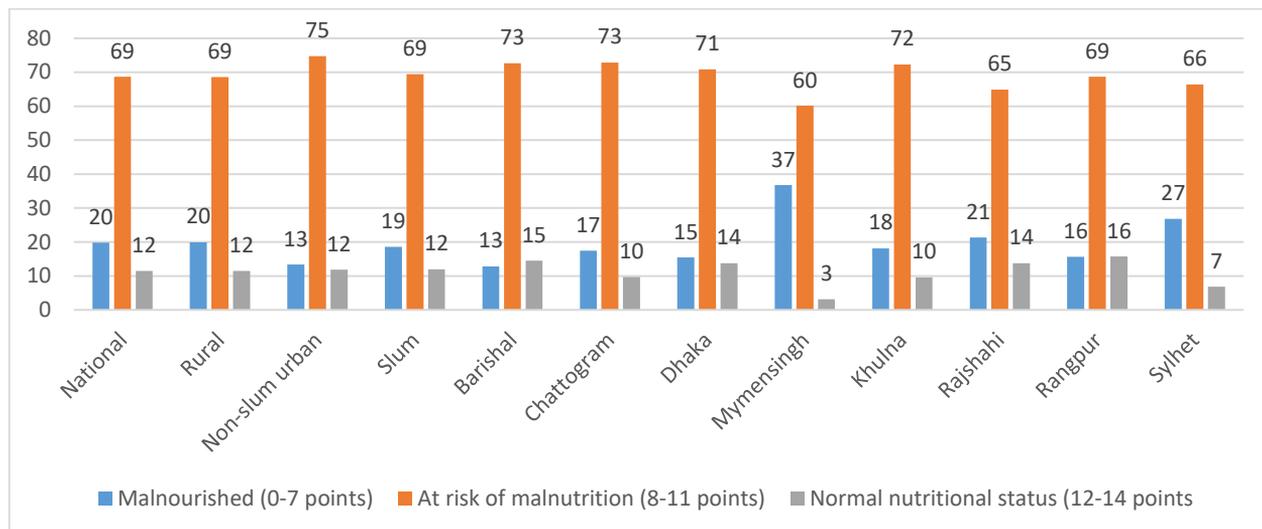
Figure 11.2: Nutritional status of elderly people using mini-nutritional assessment

Assessment of nutritional status

As there are no nationally representative data on the nutritional status of the elderly population, we measured the height (using locally made stadiometer), weight (using Tanita weighing scale), mid-upper arm circumference (using ShorrTape©), calf circumference and waist circumference (using measuring tape). Moreover, we measured the percentage of body fat and the percentage of body water in this population. The following table (Table 11.6) presents the mean ± SD weight, height, mid-upper arm circumference, calf circumference, and waist circumference.

Table 11.6: Selected anthropometric indicators of elderly people by area of residence

Anthropometric measurements (mean±SD)	National	Rural	Non-slum urban	Slum	Barisal	Chittagong	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Weight (kg)	49.7 ±10.4	49.5 ±10.3	55.6 ±12.3	52.2 ±11.1	50.4 ±11.3	51.1 ±10.7	52.0 ±10.2	47.1 ±9.2	49.3 ±9.9	49.0 ±9.5	50.8 ±11.4	46.3 ±9.5
Height (cm)	153.8 ±9.0	153.7 ±8.9	154.4 ±10.0	154.2 ±8.7	153.0 ±8.9	152.9 ±8.6	154.3 ±9.1	154.4 ±9.2	153.4 ±9.2	154.2 ±8.7	154.4 ±8.9	152.5 ±9.2
Mid-upper arm circumference (cm)	25.0 ±4.1	24.9 ±4.1	26.3 ±4.8	25.5 ±3.3	24.9 ±5.7	25.5 ±3.4	25.7 ±3.6	24.1 ±2.8	24.6 ±3.3	25.0 ±5.5	25.5 ±3.5	23.8 ±2.7
Calf circumference	26.5 ±4.9	26.3 ±4.8	30.8 ±5.2	28.9 ±4.5	25.4 ±2.1	31.3 ±5.1	27.2 ±2.9	27.2 ±4.8	26.7 ±2.7	24.7 ±7.7	27.6 ±2.8	25.9 ±4.0
Waist circumference	78.5 ±11.5	78.4 ±11.4	85.1 ±12.4	81.3 ±11.6	80.3 ±12.0	81.7 ±11.1	81.0 ±11.0	75.3 ±10.2	77.8 ±10.6	77.4 ±11.1	78.9 ±12.6	75.9 ±10.8

Body mass index (BMI) categories

BMI comprises data from two measurements (height and weight). We used the Asian cut-off of BMI to categorize underweight, normal, overweight, and obesity. Figure 11.3 shows the categorization by area of

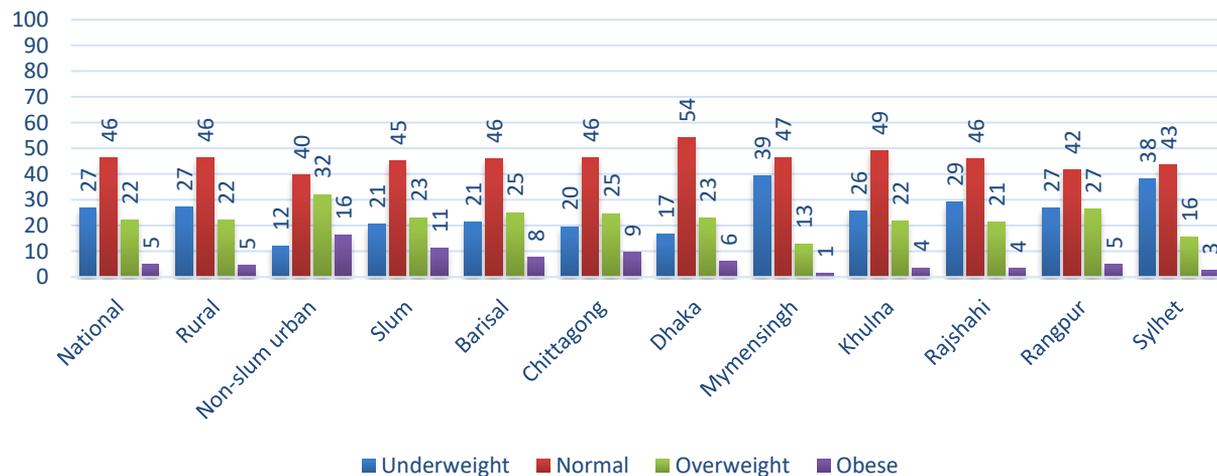Figure 11.3: Prevalence of underweight, normal, overweight, and obesity among elderly people by area of residence

The prevalence of underweight is higher among the elderly population in rural areas. In contrast, the prevalence of overweight and obesity is higher in non-slum urban areas. Of all the divisions, Mymensingh and Sylhet divisions have the highest percentages of underweight elderly people.

Behavioral risk factors of noncommunicable diseases

We have collected data on smoking and smokeless tobacco use, physical inactivity, and inadequate consumption of fruits and vegetables   among elderly people (60 years and above) as the behavioral risk factors of noncommunicable diseases (NCD). The prevalence of smoking among the elderly people in our survey was 18.4% at the national level, with the highest prevalence   in slums   (26.4%) and the lowest in non-slum urban areas   (16.5%). Nationally, about 52% of the elderly people use smokeless tobacco, with the highest 58% in slums and the lowest 34% in non-slum urban areas. The percentage of smoking tobacco is highest in the Khulna division and lowest in the Chattogram divisions. In terms of physical inactivity, 38% of the elderly people performed less than 150 minutes of moderate to vigorous physical activity every week. Approximately 4 out of 5 elderly people in non-slum urban areas were physically inactive at the time of the survey, with 2 out 5 such elderly persons in both rural and slum areas. From divisional estimates, elderly people in the Barishal division were most physically inactive (56%), with the lowest percentage in the Mymensingh division (23%).

The WHO recommends fruits and vegetables as crucial for a healthy   diet and has advocated for increased consumption of adequate (≥ 5 servings per day) fruits and vegetables through targeted campaigns. We have calculated the servings of daily fruits and vegetable intake among elderly people at the national and divisional levels. Nine out of ten (91%) of the studied elderly people consumed less than 5 servings of fruits and vegetables per day at the national level. The proportion of elderly people consuming inadequate fruits   and vegetables   was highest in the slum areas (97%). Most of the elderly people from the Rajshahi division (98%) consumed less than 5 servings of fruits and vegetables, and the proportion was lowest in the Mymensingh division (66%) (Table 11.7).

Table 11.7: Prevalence of behavioral risk factors of NCDs among elderly people aged 60 years and above

Risk factors	National	Rural	Non-slum urban	Slum	Barishal	Chattogram	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Smoking*	18.4	18.4	16.5	26.4	13.2	23.2	24.0	29.9	13.8	18.0	13.3	28.7
Smokeless tobacco*	51.7	52.0	33.6	58.0	57.0	38.3	56.2	51.3	60.6	50.4	48.7	57.1
Physical inactivity**	38.4	37.8	78.9	38.6	56.0	54.0	42.9	23.3	33.2	39.6	32.4	37.2
Inadequate fruits	91.0	90.9	95.4	96.7	97.2	93.2	90.5	66.2	86.7	97.7	97.2	90.9

and vegetable consumption***												

* Current smoker/current user of smokeless tobacco; **<150 minutes of moderate to vigorous activity per week; *** <5 servings of fruits and vegetables per day

Noncommunicable Diseases (NCD)

We measured the blood pressure of elderly people and asked them about several   chronic diseases. For the selected chronic diseases, we asked them whether any health care provider diagnosed the disease. The following table (Table 11.8) presents data on blood pressure and hypertension. Nationally, the mean ± SD of systolic BP is 130.8 ± 23.5 mm Hg. The mean ± SD of diastolic BP is 79.5 ± 12.4 mm Hg. The results reveal that the mean of both systolic and diastolic BP was highest in non-slum urban areas. In addition, the prevalence of hypertension was highest in non-slum urban elderlies.

Table 11.8: Blood pressure and prevalence of hypertension among elderly people aged 60 years and above

Blood pressure and Hypertension	National	Rural	Non-slum Urban	Slum	Barisal	Chittagong	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Systolic (mean ± SD) mm of Hg	130.8 ±23.5	130.8 ±23.5	133.8 ±23.3	128.4 ±21.2	133.7 ±23.4	134.8 ±21.0	132.4 ±22.3	127.9 ±23.5	136.2 ±24.2	124.8 ±24.4	129.8 ±22.1	127.0 ±22.1
Diastolic (mean ± SD) mm of Hg	79.5 ±12.4	79.5 ±12.4	80.5 ±11.5	79.0 ±10.9	78.1 ±11.3	84.1 ±10.0	81.3 ±10.9	78.1 ±12.2	80.5 ±12.3	76.5 ±12.7	79.1 ±13.6	81.1 ±11.4
Hypertension (%)	49.0	49.0	53.2	39.4	59.1	53.9	49.2	43.3	53.3	39.6	50.0	49.4

We also collected data on the self-reported prevalence of heart diseases, asthma, kidney diseases, diabetes, stroke, cancer, and mental health problems   by asking whether any qualified health care provider ever told them that they have any of these diseases. Nationally, the self-reported prevalence of heart diseases, asthma, kidney diseases, diabetes, stroke, cancer, and mental health problems prevalence was 16%, 14%, 3%, 9%, 7.5%, 0.5%, and 1%, respectively. The prevalence of heart disease, asthma, kidney diseases, diabetes, and mental health problems is higher in non-slum urban areas. Table 11.9 shows the distribution of the self-reported NCDs (other than hypertension).

Table 11.9: Prevalence of self-reported NCDs among elderly people aged 60 years and above

	National	Rural	Non-slum Urban	Slum	Barisal	Chittagong	Dhaka	Mymensingh	Khulna	Rajshahi	Rangpur	Sylhet
Hypertension	36.0	35.9	41.2	28.4	48.4	39.1	32.9	29.7	35.7	31.3	37.7	37.1
Any heart diseases (%)	16.1	21.8	16.0	16.9	19.7	23.7	11.9	11.8	18.8	14.6	11.0	21.1
Asthma (%)	14.0	19.4	13.9	16.6	12.4	19.7	10.7	16.7	17.6	12.2	9.2	13.0
Kidney diseases (%)	3.1	6.3	3.0	3.5	2.5	2.2	1.9	2.5	4.2	3.0	3.9	0.9
Diabetes (%)	8.9	24.3	8.7	11.9	13.8	15.5	11.0	5.4	7.8	7.5	7.2	6.0
Stroke (%)	7.5	7.3	7.5	7.4	12.4	4.4	6.1	5.0	13.5	6.3	4.6	5.8
Cancer (%)	0.5	0.0	0.5	0.0	0.5	0.8	0.0	1.0	0.0	0.6	0.5	0.7
Mental health problem (%)	1.4	2.3	1.4	0.3	2.4	1.3	1.6	0.5	2.3	1.4	0.7	1.7

ANNEX-1

Annex -1: Comparison of major indications with recent national surveys

Sl no	Indicators	BDHS 2017-18	MICS 2019	FSNSP 2015	FSNSP-NNS 2018-19
1	Mean size of household	4.5 (BDHS 2014)	4.3	4.8	4.5
2	Household food security status* (HFIAS) (% of households)				
	● Food secure			75	59
	● Mild food insecurity			3	24
	● Moderate food insecurity			2	5
	● Severe food insecurity			20	12
3	Improved sanitation facility (not shared)	43			37
4	Improve source of drinking water	98 (BDHS 2014)			91
5	Nutritional status of children (0 to 59 months)				
	● Stunting	31	28	35	28
	● Underweight	22	23	31	25
	● Wasting	8	10	10	10
6	Receipt of vitamin A capsule for six months (0-59 months)	79		67	70
7	Inadequate dietary diversity among adult women**			66	55
8	Maternal nutritional status	(BDHS 2014) (International cut-off)		(Asian cut-off)	(Asian cut-off)
	● Undernourished	19		16	11
	● Normal	58		43	40
	● Overweight	19		29	35
	● Obesity	4		12	14
9	ANC visit (4 or more visits to any provider)	31 (BDHS 2014)	37	29	39

*For food security status, FSNSP 2014 was compared as FSNSP 2015 does not have this indicator.

**Different indicators/scales for different surveys.

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