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**Review of Evidence on the
Nutritional Status of Adolescent
Girls and Boys in Pakistan
October 2018**

**A Report by
Global Alliance for Improved Nutrition**

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LIST OF ABBREVIATIONS

AA-HA!	Accelerated Action for The Health Of Adolescents
ANC	Antenatal care
BMI	Body Mass Index
BMIZ	Body Mass Index-for-age Z-score
DHS	Demographic and Health Survey
FAO	Food and Agricultural Organization of the United Nations
FBS	Food Balance Sheets
GAIN	Global Alliance for Improved Nutrition
GHI	Global Hunger Index
HIES	Household Integrated Economic Surveys
ICN2	Second International Conference on Nutrition'
LMIC	Low- And Middle-Income Countries
MoNHSRC	Ministry of National Health Services Regulation and Coordination
NNS	National Nutrition Survey
PRHPS	Pakistan Rural Household Panel Survey
RAF	Research and Advocacy Fund
RMNCAH	Reproductive Maternal New-born Child Adolescent Health
SAFANSI	South Asia Food and Nutrition Security Initiative
SDG	Sustainable Development Goal
SMART	Specific, measurable, achievable, relevant and time-bound
UN	United Nations
UNFPA	United Nations Population Fund
WHO	World Health Organization

EXECUTIVE SUMMARY

There are 1.2 billion adolescents worldwide, 89% residing in low- and middle-income countries. This large and growing cohort has gained considerable attention from the global nutrition community and national governments in the past few years, and rightly so. While the first 1,000 days remains a critical period of nutritional need, adolescence—the period from 10-19 years of age¹—is characterized by rapid biological and psychosocial growth and development. Up to 45% of skeletal growth takes place and 15 to 25% of adult height is achieved during adolescence. It is a vulnerable time with increased nutritional requirements, particularly for girls who are biologically vulnerable, while often lacking access to nutritious food, education, and other opportunities owing to gendered cultural norms. Adolescence also presents unique opportunities to instil positive health behaviours before lifelong dietary and related habits are fully formed. Investing in nutrition during adolescence improves physical and cognitive development, shaping life course and intergenerational trajectories. Investment of US\$4.60 per capita annually through 2030 in interventions to improve adolescents' physical, sexual and mental health would yield ten times the benefits. Moreover, adolescence marks the last opportunity to reverse stunting.

Pakistan has a high burden of malnutrition, costing US\$ 7.6 billion or 3% of GDP annually (World Food Programme, 2017). Adolescents constitute one quarter of the population (approx. 40 million). Existing data on adolescent nutritional status is limited in scope and quality: It has not been routinely collected as it has for women and young children. Although 2017 saw the release of a much-needed initial assessment of ways to improve nutrition in adolescent girls, its analysis did not cover all available data and excluded adolescent boys.

In 2018, a new conceptual framework for adolescent health was released as well as a thorough review of the determinants of adolescent undernutrition. For these reasons, it was important to update and expand the 2017 initial assessment for Pakistan by including information on boys, incorporating additional resources, and more critically synthesising the available evidence.

The purpose of this report is to provide a detailed review of available evidence on the nutritional status of adolescent boys and girls as well as the primary determinants of adolescent malnutrition in Pakistan. We synthesize this information to better identify and prioritize critical data gaps and shape recommendations for future policies and programs. The evidence generated here will be used to develop a report outlining evidence requirements, policy options, and interventions to improve adolescent nutrition in Pakistan.

The current report begins by outlining the importance of nutrition during adolescence and setting the global context on goals, strategies, and guidelines for adolescent nutrition. We then present patterns and trends in nutritional status and the primary determinants of adolescent malnutrition. Before presenting the findings in Pakistan, an overview and the global context is provided at the beginning of the sections on anthropometry (2.1.1); micronutrient status, anaemia, and night blindness (2.2.1); determinants of malnutrition (3.1.1); and dietary intake (3.2.1). We conclude by summarizing the findings, identifying knowledge gaps, and discussing implications for policies and programs.

¹ World Health Organization's definition of adolescence (http://www.who.int/topics/adolescent_health/en/)

Summary of Findings

Adolescent Nutritional Status

- Available data suggests adolescents experience a high burden of stunting, thinness, and overweight. Girls appear to experience a higher burden of stunting (11-23%, depending on the population) and overweight/obesity (8%) than boys (5% for both). Overweight and obesity increase substantially in adulthood. Boys have a slightly higher prevalence of thinness (12%) than girls (10%). Apparent sex differences in these indicators should be interpreted with caution, since differences in the adolescent growth spurt between Pakistani adolescents and the US reference population can cause inaccurate estimates. Thinness is more common in rural areas and overweight/obesity in urban areas. There are no clear trends in anthropometry over time.
- Anaemia is prevalent among adolescent girls (54%) as well as deficiencies in folic acid (49%), zinc (42%), and vitamin A (40%). Deficiencies likely also exist in iodine, calcium, and vitamin D. No micronutrient deficiency data exists for adolescent boys. Trends from 2001 to 2011 in women of reproductive age suggest iodine deficiency and iron deficiency anaemia have decreased, while anaemia, vitamin A deficiency, and night blindness have increased. There are no clear time trends in other micronutrient deficiencies.
- Nutritional status of both adolescent boys and girls 10-19 years will be captured for the first time in the next National Nutrition Survey 2018, including disaggregated data on height, weight, mid-upper arm circumference, anaemia, and goiter (through clinical examination). Blood and urine specimens will be collected from girls 10-19 years. A qualitative section will include focus group discussions with adolescent girls and boys. Information on minimum dietary diversity will be collected from women of reproductive age (15-49 years).
- The preliminary findings of the 2017-18 Pakistan Demographic and Health Survey (data collected between November 22 and April 30, 2018) are available. However, the full report and datasets for age disaggregated analysis are currently unavailable. Moreover, like previous demographic and health surveys, it focuses on women of reproductive age (15-49 years) and has no separate information on adolescent girls and boys (10-19 years).

Key Determinants of Adolescent Malnutrition

- Household food insecurity is a major barrier to obtaining an adequate diet, especially in rural areas. More than half of households are food insecure.
- Adolescent diets are generally poor, inadequately diverse, consisting overwhelmingly of wheat and low in fruits, vegetables, pulses, potatoes, meat, and eggs. While dairy is regularly consumed, adolescents also consume high amounts of unhealthy foods, such as sweetened soft drinks, fast foods, and energy-dense snacks. Food is increasingly being consumed outside the home, especially in urban areas.
- It appears that adolescent girls rarely have control of food expenditure or distribution within the household, whereas the primary decision-makers for the purchase of packaged foods are their mothers, who have limited nutritional knowledge. More data at the national level is needed to confirm these observations and other factors such as intra-household food distribution.

- School attendance has increased but is still very low, especially for girls (34% of girls compared to 40% of boys 10-14 years are out of school), older adolescents (rates of drop out increase with age), and adolescents from poor households, rural areas, and Balochistan. Literacy is highly dependent on wealth, and boys are far more likely to be literate than girls, especially in Balochistan.
- Child marriage and adolescent pregnancy are declining but still common in girls from low-income, rural, and poorly-educated households. One third of women 25-49 years were married by age 18. Eight percent of women 20-24 years gave birth by age 18, increasing their risk of poor birth outcomes.
- Adolescents have poor access to sexual and reproductive health care: Only 13 % of adolescents 15-19 years used family planning services and 37% went for at least four antenatal visits. The adolescent fertility rate in Pakistan is high (38/1000 live births among girls 15-19 years).
- Many adolescents fail to obtain adequate physical activity, especially girls.

Recommendations

- Inadequate data prevents policies and programs from prioritizing adolescents. Large-scale surveys in Pakistan have not been designed to capture results for adolescents as a distinct group. The 2018 National Nutrition Survey will include the adolescent age group (10–19 years) for the first time. We need to routinely collect more information on adolescents, especially dietary behaviors, to guide Behaviour Change Communication Programs.
- A life course approach must be used to address malnutrition in women and children under 10 years, with a continued focus on the first 1,000 days and early childhood development, which influences adolescents. Additional investments should be made in adolescents specifically.
- Reducing undernutrition and overweight/obesity in adolescent girls should be a priority, because they are biologically vulnerable to malnutrition and because their nutritional status has a large impact on future generations.
- Do not forget adolescent boys. They have a bigger growth spurt than girls, and also experience a high burden of malnutrition owing to increased nutrient requirements.

1 INTRODUCTION

1.1 Importance of Nutrition during Adolescence

Adolescence—the period from 10-19 years of age²—marks a critical period of rapid biological and psychosocial growth and development that is unique among phases in the life cycle. It is a vulnerable time, particularly for girls who have increased nutritional requirements due to menstruation and often have restricted access to nutritious food, education, and economic opportunities due to gendered cultural norms (Ivers & Cullen, 2011). Boys also have increased nutritional requirements for adequate physical growth and development such as muscle mass accumulation, and they experience a high burden of malnutrition (Bundy et al., 2018). During adolescence, lifelong dietary and related habits are established, presenting a unique opportunity to instil positive health behaviours (Sawyer et al., 2012).

Undernutrition, including stunting, thinness, micronutrient deficiencies, and anaemia is widespread among adolescents in low- and middle-income countries (LMIC) (Black et al., 2013; NCD Risk Factor Collaboration, 2017; Stevens et al., 2013) (Patton et al., 2016; WHO, 2005). For example, about half of girls 15-19 years in South and Southeast Asia have anaemia (Bundy et al., 2018). Undernutrition during adolescence is associated with poor cognitive and educational performance (Madjdian et al., 2018). Improving adolescent health and development through nutrition is vital to prevent growth faltering during this rapid growth period and is a second window of opportunity for 'catch-up' growth for those who have already experienced stunting (Bundy et al., 2018; Prendergast & Humphrey, 2014; WHO, 2014). At the same time, overweight and obesity are increasing, putting adolescents at increased risk of non-communicable diseases, currently and as adults (Candler, Costa, Heys, Costello, & Viner, 2017; NCD Risk Factor Collaboration, 2017). Finally, combatting malnutrition in all its forms is essential to improve reproductive and birth outcomes for pregnant girls.

Six of the 11 top risk factors driving the global burden of disease are diet-related (Global Panel on Agriculture and Food Systems for Nutrition, 2016). Food choices in low-resource settings are constrained by high levels of poverty, leading to food insecurity, poor diet diversity, and lack of access to nutritious food (Akseer, Al-Gashm, Mehta, Mokdad, & Bhutta, 2017). The diets of adolescents in LMIC are typically characterized by low intakes of fruits and vegetables (Akseer et al., 2017) and high intakes of energy-dense, nutrient-poor foods, including sweet and salty items, sugar-sweetened beverages, and fast foods (USAID & SPRiNG, 2018). Half of all adolescent girls in LMIC do not eat 3 meals per day—breakfast is often skipped and snacking is common. Meals are commonly eaten outside the home (USAID & SPRiNG, 2018).

Throughout adolescence, nutrition is complexly interrelated with social, cultural, and economic trajectories including education, family formation (e.g., marriage and fertility), and labour participation. Investment in the human capital of adolescents is essential for economic growth because healthy physical and cognitive development across adolescence shapes life course and intergenerational trajectories, so that health investments yield a 'triple dividend'—for adolescents now, in their future adult lives, and for the next generation (Patton et al., 2016; Stephenson et al., 2018). For example, investment of US\$4.60 per capita annually through 2030 in interventions to improve adolescents' physical, sexual and mental health would yield ten times the benefits (Sheehan et al., 2017).

² World Health Organization's definition of adolescence (http://www.who.int/topics/adolescent_health/en/)

1.2 Global Goals, Strategies, & National Strategic Response for Adolescent Nutrition

Ensuring healthy lives and promoting well-being for everyone at all ages is the focus of 2030 Sustainable Development Goal (SDG) #3. The United Nations (UN) 'Global Strategy for Women's, Children's And Adolescents' Health (2016–2030)' was developed to translate the SDG agenda into a comprehensive 'survive, thrive, transform' framework for improving women's, children's, and adolescents' health through an inclusive and multi-sectoral approach (UN, 2015a). The strategy envisions a world in which they realize their rights to physical and mental health and well-being, have social and economic opportunities, and are able to participate fully in shaping prosperous and sustainable societies. The 'Countdown to 2030 For Women's, Children's And Adolescents' Health' is a multi-institutional network of academics from institutions around the world and representatives from UN agencies and civil society that addresses the SDG agenda, including nutrition, quality of care, and adolescent girls' reproductive health (Bhutta & Chopra, 2016; Victora et al., 2016).

Building on this momentum, World Health Organization (WHO) and partners developed the 'Global Accelerated Action for The Health of Adolescents (aa-ha!)', which identifies optimal nutrition during adolescence as fundamental to achieving lifelong health and wellbeing (WHO, 2017). This 2018 WHO 'Guideline: Implementing Effective Actions for Improving Adolescent Nutrition' provides a summary of existing evidence-informed guidelines specifically addressing malnutrition in all its forms in adolescents (WHO, 2018).

The 2017 Milan Global Nutrition Summit, under the umbrella of the UN 'Decade of Action on Nutrition' (UN, 2016) and 'Second International Conference on Nutrition' (ICN2), saw the launch of an Action Agenda to close the gap on women's and girls' nutrition, advocating for increased investment in adolescent nutrition, as it has a triple return: for adolescent health now, adult health later, and the health of future generations. The next step is to translate priorities of the Action Agenda into country-specific SMART commitments—specific, measurable, achievable, relevant and time-bound (Fanzo, Hawkes, & Rosettie, 2016).

The [Global Nutrition Report 2017](#) clearly indicated the scarcity/ unavailability of data related to adolescent nutrition across countries (Development Initiatives, 2017).

Pakistan is signatory to the SDGs and [Global Sun Movement](#) and has provincial multi-sectoral nutrition strategies in place, has also recently launched national-level [Pakistan Multi-Sectoral Nutrition Strategy 2018-25](#). There is a [National Health Vision 2016-25](#)³ and [National Vision Rmncah 2016-25](#) as well, which address adolescent health and nutrition with an increased focus on girls of reproductive age. The Ministry of National Health Services Regulation & Coordination in collaboration with the WHO is working on two important assignments: Anaemia Reduction Plan (covering interventions for adolescents as well) and Pakistan Adolescent Nutrition and Supplementation Guidelines. However, a coherent Adolescent Strategy and Framework for Action is yet to be seen.

1.3 Methods

This review was focused on two primary components: nutritional status and its determinants. To identify all existing resources related to nutritional status, the search included indicators of adolescent anthropometry (stunting, thinness, overweight, and obesity), micronutrient

³ http://nhsr.gov.pk/messageDetail5822.html?message_id=11

deficiencies, anaemia, and night blindness.

We identified determinants of adolescent malnutrition based on two recent publications. The first is the 2018 WHO guideline mentioned above, which provided a conceptual framework of interventions and determinants of adolescent nutrition . It outlined eight main actions: promoting healthy diets; providing additional micronutrients through fortification of staple foods and targeted supplementation; managing acute malnutrition; preventing adolescent pregnancy and poor reproductive outcomes; promoting preconception and antenatal nutrition; providing access to safe environment and hygiene; promoting physical activity; and disease prevention and management. The second is a 2018 narrative review of the socio-cultural and economic determinants and consequences associated with undernutrition⁴ among adolescents in LMIC (Madjian et al., 2018). At the individual level, significant determinants included age, sex, birth order, religion, ethnicity, education and literacy level, working status, and marital status. At the household level, parental education and occupation, household size and composition, income, socioeconomic status, and resources were associated with undernutrition. Only a few determinants at the community/environmental level were identified, including residence, sanitation, school type, and seasonality.

To identify literature related to nutritional status and its determinants of adolescent girls and boys in Pakistan, we conducted keyword searches in PubMed, PubMed Central (PMC), and Web of Science, using the following MeSH terms: 'Pakistan' and 'Adolescent' OR 'Child' OR 'Minors' OR 'Teens' OR 'Youth' and the terms in the table below (with "AND" between columns):

Nutritional Status	Anthropometry	'Adolescent Nutritional Physiological Phenomena' OR 'Maternal Nutritional Physiological Phenomena' OR 'Adolescent Nutrition Sciences' OR 'Child Nutrition Sciences' OR 'Nutritional Sciences'
		'Anthropometry' OR 'Growth Disorders (including stunting)'
		'Paediatric Obesity' OR 'Non-communicable Diseases'
	Micronutrient Status	'Malnutrition' OR 'Micronutrients' OR 'Anaemia, Iron-Deficiency'
		'Nutrition Assessment' OR 'Nutrition Surveys' OR 'Nutrition Status' OR 'Nutritive Value' OR 'Nutritional Requirements'
Main Determinant of Nutritional Status	Dietary Intake	'Food and Beverages' OR 'Feeding Behaviour' OR 'Food Preferences' OR 'Diet, Food, and Nutrition'
		Dietary diversity (not a MeSH term)
		'Food Supply (including food Insecurity)' OR 'Urbanization'
		'Dietary Sugars'
		'Dietary Supplements' OR 'Food, Fortified'
	Physical Activity	'Exercise'

⁴Defined by stunting, underweight, thinness, and micronutrient deficiencies

Main Determinants of Dietary Intake	Food insecurity	Food insecurity (not a MeSH term) 'Food Assistance'
	Nutritional knowledge of mothers	'Knowledge'
	Household decision-making regarding family diet and food distribution	Household food expenditure (not a MeSH term) OR Intra-household food allocation (not a MeSH term) OR Decision maker (not a MeSH term)
	Urbanization	'Urbanization'
	Early marriage and pregnancy	'Contraception' OR 'Pregnancy in Adolescence' OR 'Marriage (including marriage age)' OR 'Pregnancy Outcome'
	Adolescent access to health services	'Expenditures, Health' OR 'Health Services Accessibility'
	Outcomes	Pregnancy outcomes among adolescents
Trends in adult women and men overweight/obesity		'Overweight' OR 'Obesity' AND 'Men' or 'Women' or 'Adults'
Non-communicable disease		'Non-communicable Diseases'

We examined in detail cross-references and bibliographies of available data and publications to identify additional sources of information. Some additional information was acquired through personal communication with the Ministry of National Health Services, Regulation & Coordination (MNHSR&C) on the upcoming NNS. We limited our search to materials published in or after the year 2003 to ensure relevancy to the current socioeconomic and political conditions, applying the following inclusion/exclusion criteria:

- **Study site:** Studies conducted in Pakistan at any geographic level and studies in multiple countries where Pakistan was included.
- **Methodology:** Review and analysis of randomized and non-randomized controlled trials, observational studies, meta-analyses, literature reviews, and technical or survey reports.
- **Outcome:** Nutritional status or its determinants in adolescent boys or girls at any age between 10-19 years.
- **Relevance:** Studies published in English that addressed any aspect of adolescent nutritional status or its determinants identified in the 2018 WHO framework "Guideline: implementing effective actions for improving adolescent nutrition" (WHO, 2018) or in the recent review of determinants of adolescent undernutrition by Madjdian et al. (2018).

2 NUTRITIONAL STATUS

2.1 Anthropometric Indicators of Malnutrition

2.1.1 Overview and Global Context

Adolescent stunting, thinness, and overweight/obesity have been associated with increased risk of present, adult, and intergenerational adverse health outcomes (Stephenson et al., 2018). Stunting reflects chronic undernutrition and is associated with poor socioeconomic conditions and inadequate nutrition during childhood and adolescence. Adolescent height-for-age Z-score (HAZ)⁵ has been positively associated with school attendance (Fink & Rockers, 2014; Omwami, Neumann, & Bwibo, 2011), non-cognitive markers of self-efficacy, self-esteem, and educational aspirations (Dercon & Sánchez, 2011), and negatively associated with cognitive performance (Crookston, Forste, McClellan, Georgiadis, & Heaton, 2014; Dissanayake, Kumarasiri, Nugegoda, & Dissanayake, 2009; Fink & Rockers, 2014; Perignon et al., 2014) and school performance (Acham, Kikafunda, Oluka, Malde, & Tylleskar, 2008; Crookston et al., 2014; Dissanayake et al., 2009; Fink & Rockers, 2014; Perignon et al., 2014). The evidence for the impact of maternal stunted height on negative birth outcomes such as obstetric complications, child mortality, stunting, and underweight is well established (Addo et al., 2013; Monden & Smits, 2009; Özaltın, Hill, & Subramanian, 2010; Subramanian, Ackerson, Smith, & John, 2009).

Thinness is indicative of acute deficiency in macronutrients, and adolescent thinness has been negatively associated with school performance (Acham et al., 2008; Mukudi, 2003). Low maternal Body Mass Index (BMI) in early pregnancy increases the risk of small for gestational age (Black et al., 2013), and maternal BMI before pregnancy is positively associated with stillbirth, infant mortality, and cerebral palsy in offspring (Cnattingius & Villamor, 2016; Forthun et al., 2016).

Adolescent obesity is associated with increased risk of diet-related non-communicable diseases and numerous adverse health measures, such as hypertension, insulin resistance, metabolic syndrome, atherosclerosis, and non-alcoholic fatty liver disease (Calcaterra et al., 2008; Daniels, 2009; Wang et al., 2015). There is little evidence that obesity during childhood and adolescence is an independent risk factor for metabolic disease in adulthood (Lloyd, Langley-Evans, & McMullen, 2012; Owen et al., 2009); however, obesity during childhood and adolescence is strongly associated with adult obesity, which has been linked to higher risk of cardiovascular disease, diabetes, and cancer (Guh et al., 2009; Lloyd et al., 2012; Owen et al., 2009).

Adolescent stunting, thinness, and obesity are clearly associated with increased risks for numerous adverse health outcomes, but there are many challenges to current indicators. Unlike cut-offs for biological indicators—which define cut-offs based on functional impairment, clinical signs of deficiency, or adverse health outcomes (R.S. Gibson, 2005)—anthropometric cut-offs for adolescents are based on statistical probabilities. It is therefore unclear what reality is reflected in prevalence estimates for adolescent anthropometric indicators. Adolescent cut-offs for stunting and thinness differ substantially from adult cut-offs, with enormous consequences to prevalence estimates. It is not possible to accurately compare prevalence of anthropometric indicators across adolescent age groups since height and weight standard deviations increase with age, causing falsely inflated prevalence, particularly for stunting (Leroy, Ruel, Habicht, & Frongillo, 2014; Lundeen et al.). Further, current anthropometric indicators for adolescents are based on growth references rather than standards, so they are not representative of how children should grow under optimal conditions. Additionally, adjusting only for age and sex in

⁵ Indicator for stunting in relation to the World Health Organization (WHO) growth reference for children and adolescents 5-19 years (WHO, Growth reference data available at: <http://www.who.int/growthref/en/>).

growth curves poorly accounts for the onset and pace of puberty and therefore, indicators can misrepresent nutritional risk (Beunen, . In this report, adolescent anthropometric indicators are based on the World Health Organization (WHO) growth reference for children and adolescents 5-19 years(WHO, 2007) as shown in **Box 1**, unless otherwise stated.

Box 1: Commonly used anthropometric cut-offs for adolescents and adults

Adolescent cut-offs using Z-scores ^A	Corresponding cut-offs at 19 years	Adult cut-offs using height and BMIC	
GIRLS AND ADULT WOMEN			
Stunting Thinness Overweight Obesity	HAZ < -2 BMIZ < -2 BMIZ > +1 BMIZ > +2	Height < 150.1 cm BMI <16.5 BMI < 25.0 BMI < 29.7	Height < 145 cm BMI < 18.5 BMI < 25.0 BMI < 30.0
BOYS AND ADULT WOMEN			
Stunting Thinness Overweight Obesity	HAZ < -2 BMIZ < -2 BMIZ > +1 BMIZ > +2	Height < 161.9 cm BMI <17.6 BMI < 25.4 BMI < 29.7	BMI < 18.5 BMI < 25.0 BMI < 30.0

Bmi, body mass index (kg/m²); haz, height-for-age z-score, bmiz, body mass index-for-age z-score.

^A world health organization (who) recommended cut-offs based on the who growth reference for children and adolescents 5-19 years(who, 2007); ^bthe corresponding who adult cut-off at the oldest age of the growth reference (19 years and zero months); ^cused in the pakistan demographic and health surveys (dhs)(national institute of population studies (nips) & icf international, 2013).

There are no global estimates of adolescent stunting, but prevalence can be higher than 25% in individuals countries (Grant & School of Public Health and National Nutrition Services, 2015). Global prevalence of thinness in girls in LMIC remains high (Candler et al., 2017; Jaacks, Slining, & Popkin, 2015), while prevalence of overweight is increasing (Candler et al., 2017; NCD Risk Factor Collaboration, 2017), posing a significant threat to their health and that of the next generation. Data from [Demographic and Health Surveys \(DHS\)](#) across 53 countries and national surveys conducted in 5 countries shows that South Asia had the highest prevalence of thinness (Cole & Lobstein, 2012)—nearly double that of East Asia and the Pacific and sub-Saharan Africa—and is increasing annually by about one percent in rural areas (Jaacks et al., 2015). The data reveals substantial variation across and within regions in the burden of thinness and overweight, with increasing dual burdens in urban areas. Data from [Global School-Based Student Health Surveys \(GSHS\)](#) across 40 countries (n=61,603) confirms that thinness⁶ remains common in adolescent school girls (13-17 years), particularly in Asia (Candler et al., 2017).

⁶ Based on the International Obesity Task Force (IOTF) cut-offs

2.1.2 Anthropometry in Pakistani Adolescents

Anthropometric data on adolescents in Pakistan is scarce and mostly limited to girls. However, the 2009 [GSHS](#) provides data on school-going adolescent boys and girls aged 13-15 years (**Figure 1**) (WHO, 2009). Girls had a higher prevalence than boys of stunting (11% versus 5%) and overweight/obesity (8% versus 5%), boys have a slightly higher prevalence than girls of thinness (12% versus 10%). Cultural and lifestyle factors may be contributing to these differences. For example, the same survey found that girls drank soft drinks more frequently (**Figure 12**) and were less physically active at school than boys (**Figure 26**). Additionally, the higher prevalence of stunting in girls may be reflective of biased feeding or treatment prioritizing boys during early childhood. However, some of these differences may also be attributable to differences in the age and pace of puberty in the United States reference population compared to the Pakistani population. Furthermore, the survey was limited in that age of respondent was only obtained in years rather than months, which reduces the accuracy of prevalence estimates.

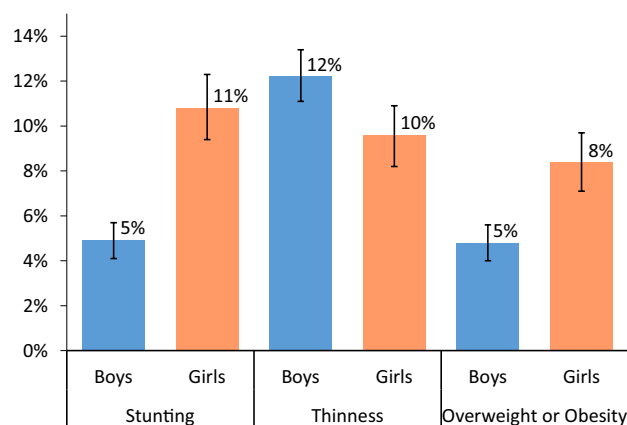


FIGURE 1: ANTHROPOMETRY IN PAKISTANI SCHOOL-GOING ADOLESCENT GIRLS AND BOYS 13-15 YEARS IN 2009

Stunting is defined as a height-for-age < -2 SD; thinness as a BMI-for-age < -2 SD; and overweight or obesity as a BMI-for-age $> +1$ SD from the WHO 2007 growth reference for children and adolescents 5-19 years. Observations were weighted based on the survey design. Error bars represent the 95% confidence intervals around the prevalence estimate. The sample size was 1,191 for girls and 3563 for boys. Since age was only reported by whole year, 6 months was added to each age to estimate the age in months. Source: Global School-based Student Health Survey (GSHS) (WHO, 2009).

The [DHS](#) in Pakistan conducted in 2012-13 among ever-married women 15-49 years provides some insight into the anthropometric status of older adolescent girls nationally (National Institute of Population Studies (NIPS) & ICF International, 2013). Figure 2 shows the prevalence of stunting, thinness, and overweight/obesity for the subsample of girls 15-19 years, analysed using WHO cut-offs for adolescents and recommended exclusion of biologically implausible values (Benedict & Namaste, 2018). Prevalence of stunting was 23%, thinness 4%, and overweight/obesity 8%. However, results need to be interpreted with caution because the survey was not powered or stratified for adolescents (WHO, 2009). The error bars showing the 95% confidence intervals are very wide, demonstrating the high uncertainty of these estimates. Furthermore, without excluding biologically implausible values, the prevalence of overweight/obesity is double the prevalence (16% compared to 8%). The prevalence of thinness was much lower than estimates shown for women aged 15-49 years in the DHS survey because the WHO cut-off of < -2 SD corresponds with an adult BMI of 16.5, two values lower than the

adult BMI cut-off for thinness of 18.5 and in-between the cut-offs for moderate (< 17) and severe thinness (< 16)⁷(Box 1). Therefore, the WHO thinness indicator for adolescents is representing a much more severe form of thinness than the adult indicator. If using the adult cut-off of 18.5, prevalence was 20.4%. However, the adult BMI cut-off is inappropriate since adolescent girls 15-19 years are still growing.

As stated above, comparing prevalence of anthropometric indicators between younger and older adolescents in Figures 1 and 2 is not recommended (Leroy et al., 2014; Lundeen et al.). Moreover, the population of younger adolescents were enrolled in school, while the population of older adolescent girls from the DHS sample were ever-married—many of whom never attended school.

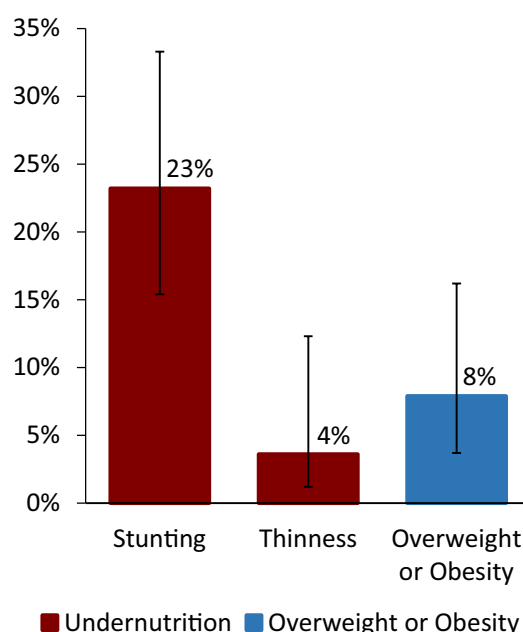


FIGURE 2: ANTHROPOMETRY IN EVER-MARRIED PAKISTANI ADOLESCENT GIRLS 15-19 YEARS IN 2012-13.

Stunting is defined as a height-for-age < -2 SD; thinness as a BMI-for-age < -2 SD; and overweight or obesity as a BMI-for-age > +1 SD from the WHO 2007 growth reference for children and adolescents 5-19 years. Note: the sample size was 158 for height and 119 for weight measurements. Observations were weighted based on the survey design. Biologically implausible values were excluded from the analysis (< -5 SD or > +5 SD for BMI-for-age and < -6 SD or > +6 SD for height-for-age). Error bars show 95% confidence intervals for estimates. Source: Comparative Analyses of Adolescent Nutrition Indicators (Benedict & Namaste, 2018).

Several observational studies in Pakistan, representing either specific population subgroups or convenience samples, showed coexisting high rates of thinness and overweight/obesity in school children (Mushtaq, Gull, Abdullah, et al., 2011; Mushtaq, Gull, Mushtaq, et al., 2011) and adolescents (Ahmed, Laghari, Naseer, & Mehraj, 2013; Aziz, Noorulain, Zaidi, Hossain, & Siddiqui, 2009; Iram, Zulfiqar, Malik, & Bilal, 2011; Ishaque, Ahmad, Zehra, & Amin, 2012; Mahmood, Zaman, Kumar, & Ali Khan, 2016; Mushtaq, Gull, Mushtaq, et al., 2011; Rehman et al., 2003; Sadia, Tabinda, Suresh, & Khan, 2016). Moreover, about 0.5% of the school-going adolescents 13-15 years in the GSHS survey were both stunted and overweight/obese (WHO, 2009).

⁷ Tables available at: http://www.who.int/growthref/bmifa_girls_5_19years_z.pdf?ua=1

2.1.3 Anthropometry in Pakistani Women

Given the relatively small sample size of adolescent girls in the DHS and to show where adolescents are headed, differences in prevalence of key indicators between subgroups are presented for women aged 15-49 years using common adult anthropometric cut-offs: stunted height (height < 145 cm), thinness (BMI < 18.5), and overweight or obesity (BMI ≥25) as shown in **Box 1**. As discussed above, there is a disjunction between adolescent and adult anthropometric cut-offs, particularly for stunting and thinness. Thinness was already discussed, but the cut-offs for stunted height are also very misaligned between adolescents and adults, albeit in the opposite direction than for thinness. The stunting cut-off used for adolescent girls (< -2 SD) corresponds with an adult height of 150.1 cm, while the adult cut-off for stunted women is 145 cm. This is closer to the severe adolescent stunting cut-off of < -3 SD which corresponds with an adult height of 143.5 cm. Thus, stunted height in adulthood represents much more severe stunted growth than the stunting indicator for adolescents. Adolescent cut-offs for overweight and obesity correspond well with adult cut-offs and are therefore less problematic to compare.

Figures 3-5 show results from the [DHS \(2012-13\)](#) and [National Nutrition Surveys \(NNSS\) \(2001-2002 and 2011\)](#) –(Government of Pakistan, 2002) for women 15-49 years. These data must be interpreted with caution because the indicators are misaligned with indicators for adolescents, making presented prevalence difficult to interpret. Moreover, **Figure 3** includes ever-married women, **Figure 4** non-pregnant married women, and **Figure 5** all women, further complicating interpretation. Nevertheless, this information is informative because it illustrates trends and patterns in anthropometric data across adult women subpopulations.

Prevalence of stunted height was only available for ever-married women in the 2012-13 [DHS](#) survey and was just 5%, given the high severity of the cut-off. Stunted height was higher in ever-married rural (5.3%) than urban women (3.7%) (National Institute of Population Studies (NIPS) & ICF International, 2013). The likelihood of stunted height decreased with increasing education and wealth quintile.

The [2001-2002 AND 2011 NNSS](#) found that thinness was 13% for non-pregnant married women in 2001-2002; 15% for non-pregnant married women in 2011; 18% for all women in 2011; and 14% for ever-married women in 2012-13 –(Aga Khan University & UNICEF, 2011; Government of Pakistan, 2002). It is unclear whether these data represent time trends or differences between women subgroups and whether thinness in adulthood is higher or lower than in adolescence. [DHS](#) data suggests thinness in adolescent girls 15-19 years was 20.4% in 2012-13. This is only about 2% higher than for all adult women, but it is likely an overestimate since adolescents 15-19 years are still growing. Rural women are far more likely to be thin than urban women—17% versus 7% of ever-married rural women were thin in 2012-13 (**Figure 3**). Mean BMI generally increases with age and increasing wealth quintile. Women with no education are more likely to have a lower mean BMI than those with a secondary or higher education (23.6 and 26.0 kg/m², respectively).

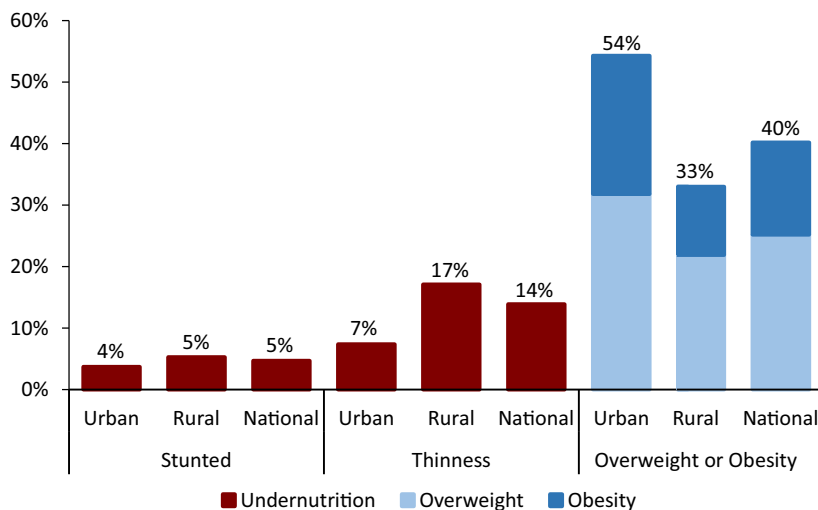


FIGURE3: ANTHROPOMETRY IN EVER-MARRIED PAKISTANI WOMEN 15-49 YEARS BY LOCALITY IN 2012-13

Adult cut-offs were used for classification: Stunted height is defined as a height < 145 cm; thinness as a BMI < 18.5; overweight as a BMI ≥25 but < 30; and obesity as a BMI ≥30. Source: Pakistan Demographic and Health Survey (DHS) 2012-13(National Institute of Population Studies (NIPS) & ICF International, 2013).

NNS show that overweight/obesity was 35% for non-pregnant married women in 2001-2002; 31% for non-pregnant married women in 2011 (Figure 4); 29% for all women in 2011 (Figure 5); and 40% for ever-married women in 2012-13 (Figure 3). From these data, it is unclear whether there are time trends or primarily differences between different subgroups of women. Prevalence of overweight/obesity for women is clearly much higher than for adolescents—between 29-40% (Figures 3, 4 & 5) versus 8% (Figure 2), respectively. Overweight/obesity is substantially higher in urban than rural women—54% in urban versus 33% in rural ever-married women (Figure 3).

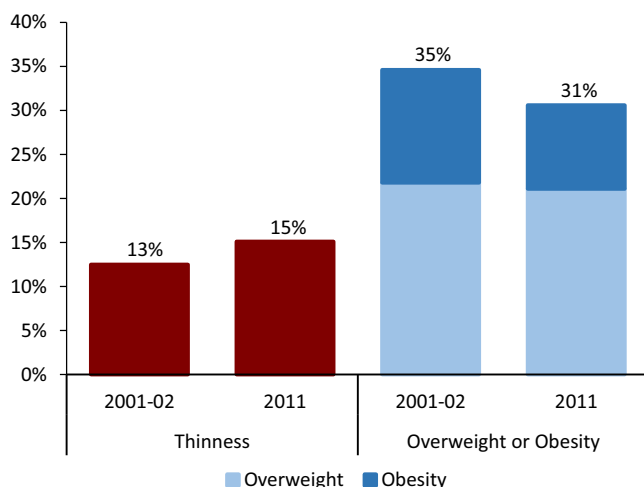


FIGURE4: ANTHROPOMETRY IN NON-PREGNANT MARRIED PAKISTANI WOMEN 15-49 YEARS BY YEAR.

Adult cut-offs were used for classification: Thinness is defined as a BMI < 18.5; overweight as a BMI ≥ 25 but < 30; obesity as a BMI ≥30. Sources: National Nutrition Survey (NNS) 2001-2002 –(Government of Pakistan, 2002) and 2011 (Aga Khan University & UNICEF, 2011).

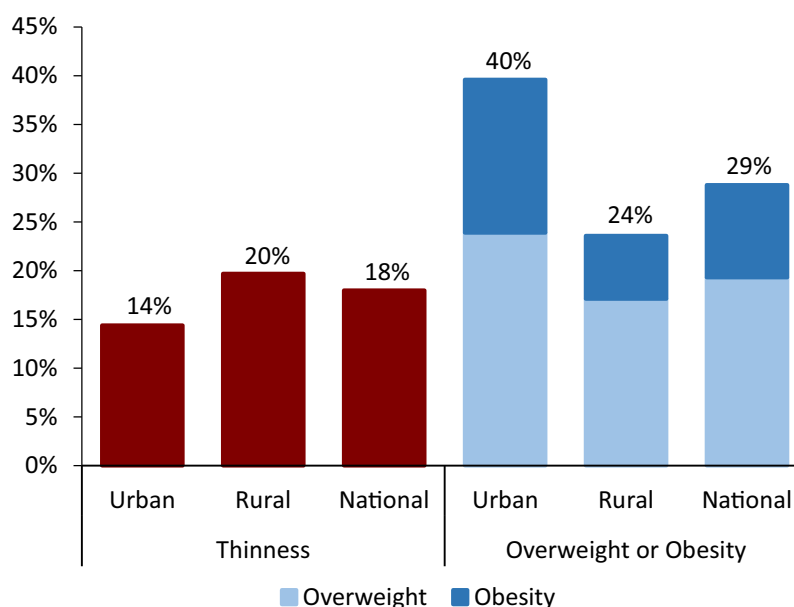


FIGURE 5: ANTHROPOMETRY IN PAKISTANI WOMEN 15-49 YEARS BY LOCALITY IN 2011.

Adult cut-offs were used for classification: Thinness is defined as a BMI < 18.5; overweight as a BMI ≥ 25 but < 30; and obesity as a BMI ≥ 30. Source: National Nutrition Survey (NNS) 2011.

2.2 Micronutrient Status, Anaemia, and Night Blindness

2.2.1 Overview and Global Context

Adequate nutrition during adolescence is essential for optimal growth as well as physical and cognitive development (Bundy et al., 2018). Micronutrient deficiencies play a large role in the global disease burden (Black et al., 2013). Micronutrients also influence muscle strength and functioning, athletic and physical work capacity, cognitive functioning, growth, and peak bone mass (Bundy et al., 2018). Adolescent girls have increased iron requirements due to menstrual blood loss and boys have increased requirements due to muscle mass accumulation. Calcium requirements increase because about 45% of total adult skeletal mass is built during adolescence, with the majority of skeletal growth taking place during pubescence (Bundy, de Silva, Horton, Jamison, & Patton, 2017).

Deficiencies in vitamin B-6, folate, magnesium, and zinc can cause anaemia, but iron deficiency is the most common cause (Bundy et al., 2018). However, the proportion of anaemia that is attributable to iron deficiency is highly variable (Aaron, 2015). Anaemia can result in impaired physical growth, mental and motor development, and learning capacity in children and adolescents and may impair body temperature regulation, lower resistance to infection, and affect attention –(Christian & Smith, 2018). In adolescents, iron deficiency, including iron deficiency anaemia, is a particularly harmful deficiency (Akseer et al., 2017). High prevalence of anaemia (haemoglobin < 12 g/dl) in adolescents (15-19 years) and adults (15-49 years) exist across all developing regions (Bundy et al., 2018). Iron deficiency anaemia is generally more prevalent in adolescent girls than boys, particularly in countries with a low-middle socio-demographic index, but the differences are small in countries with a low socio-demographic index –(Christian & Smith, 2018). Differences between younger and older adolescents appear negligible –(Christian & Smith, 2018).

Vitamin A deficiency can cause night blindness, reduce immunity to infections, and increase mortality among pregnant women and their infants —(Biesalski & Black, 2016). Vitamin A deficiency⁸ is highly prevalent in adolescents from countries with a low socio-demographic index (about 20%) or low-middle socio-demographic index (about 12%) —(Christian & Smith, 2018). Prevalence is generally higher in adolescent boys than girls and slightly higher in younger adolescents. Night blindness, which is indicative of a more severe form of vitamin A deficiency, is less prevalent globally (Akseer et al., 2017). Iodine deficiency impairs brain development and cognition and can cause goitre—enlargement of the thyroid gland —(Biesalski & Black, 2016). Prevalence of iodine deficiency in adolescents is low globally (less than 5% in all socio-demographic index categories) —(Christian & Smith, 2018), but still contributes to the burden of disease (Akseer et al., 2017). Prevalence is consistently higher in adolescent girls than boys and slightly higher in older adolescents. There is little adolescent-specific data on the prevalence of other micronutrient deficiencies globally, but there are likely other common deficiencies, given that many micronutrients are lacking in the food supply, such as calcium and zinc (Beal, Massiot, Arsenault, Smith, & Hijmans, 2017).

2.2.2 Micronutrient and Anaemia Status in Pakistani Adolescent Girls

The 2011 NNS reported anaemia and micronutrient status in women 15-49 years, which provides some insight into the micronutrient and anaemia status of adolescent girls. **Figure 6** shows the prevalence of anaemia, iron deficiency anaemia, folic acid, zinc, and vitamin A deficiencies in a subsample of non-pregnant, adolescent girls (15-19 years) (Aga Khan University & UNICEF, 2011). Over half of adolescent girls were anaemic,⁹ with 21% due to iron deficiency anaemia. Half were deficient in folic acid and about 40% deficient in zinc and vitamin A. However, since the survey was not powered or stratified for adolescents, results should be interpreted with caution.

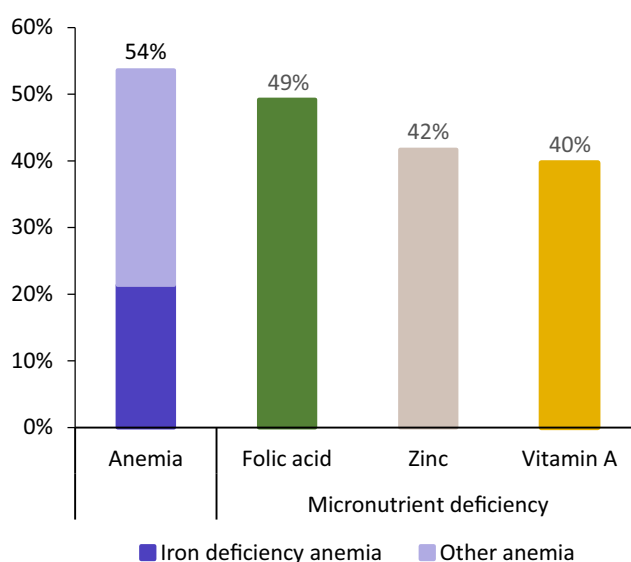


FIGURE 6 : ANAEMIA AND MICRONUTRIENT DEFICIENCIES IN PAKISTANI NON-PREGNANT ADOLESCENT GIRLS 15-19 YEARS IN 2011

Anaemia is defined as a haemoglobin level < 12.0 g/dL; folic acid deficiency a serum folic acid concentration < 3.0 ng/mL; zinc deficiency a serum zinc concentration < 60 µg/dL; and vitamin A deficiency a serum retinol concentration < 0.70 µmol/L. Note: the sample size for anaemia prevalence was 158, iron deficiency anaemia 106, folic acid deficiency 131, zinc deficiency 101, and vitamin A deficiency 109. Source: Pakistan National Nutrition Survey (NNS) 2011. (Aga Khan University & UNICEF, 2011).

⁸ Defined as serum retinol < 0.7 mmol/L

⁹ Prevalence of anaemia 40 or higher is considered a 'severe' category of public health significance by the WHO. Available at: <http://www.who.int/vmnis/indicators/haemoglobin.pdf?ua=1>.

2.2.3 Micronutrient and Anaemia Status in Pakistani Women

Figure 7 uses data from the [NNS](#) to show trends in micronutrient deficiencies and anaemia in women 15-49 years between 2001-02 (Government of Pakistan, 2002) and 2011 (Aga Khan University & UNICEF, 2011), since the sample size was small for adolescent girls 15-19 years and because disaggregated data on adolescent girls was not available for 2001-2002. Furthermore, calcium and vitamin D status were not available for adolescent girls from either survey. Anaemia impacted more than half of women 15-49 years in 2011, well above the threshold for a public health problem of 'severe' significance.¹⁰ While anaemia increased from 33% to 51% from 2001-02 to 2011, surprisingly, iron deficiency anaemia decreased from 29% to 20%. Iodine deficiency showed the largest reduction, from 76% to 48%. Unfortunately, zinc deficiency increased from 41% to 47% and vitamin A deficiency from 6% to 30%. Data on calcium and vitamin D were only reported for 2011. Calcium deficiency impacted more than half of women and vitamin D deficiency an alarming 85%. Since vitamin D is only available in limited quantities from select foods, there is an urgent need for Pakistani women to either obtain adequate sunshine on exposed skin or supplement with vitamin D.

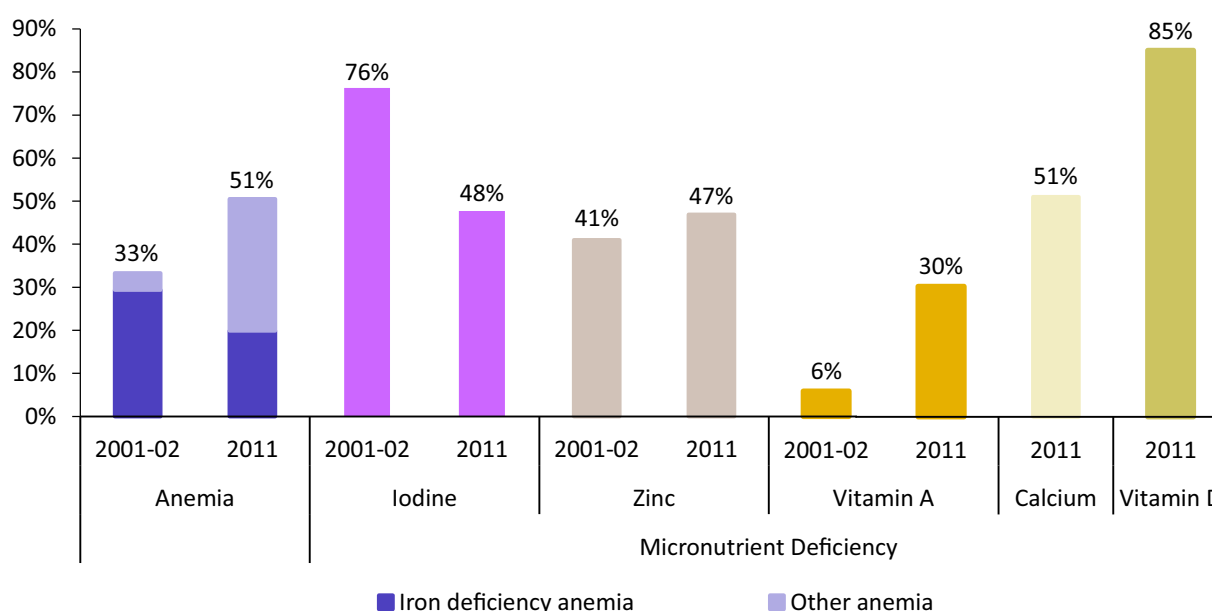


FIGURE 7: ANAEMIA AND MICRONUTRIENT DEFICIENCIES IN PAKISTANI WOMEN 15-49 YEARS BY YEAR.

Anaemia is defined as a haemoglobin level < 12.0 g/dl; iron-deficiency anaemia a serum ferritin concentration < 12 ng/dl; iodine deficiency a urinary iodine excretion < 100 µg/l; zinc deficiency a serum zinc concentration < 60 µg/dl; vitamin A deficiency a serum retinol concentration < 0.70 µmol/l; calcium deficiency a serum calcium concentration < 8.4 mg/dl; and vitamin D deficiency a serum vitamin D concentration ≤ 30.0 ng/ml. Note: iodine and zinc deficiency is reported for all women of reproductive age; anaemia and deficiency in calcium and vitamins A and D are reported only for non-pregnant mothers. Sources: Pakistan National Nutrition Survey (NNS) 2001-2002 (Government of Pakistan, 2002) and 2011 (Aga Khan University & UNICEF, 2011).

¹⁰ Prevalence of anaemia 40 or higher is considered a 'severe' category of public health significance by the WHO. Available at: <http://www.who.int/vmnis/indicators/haemoglobin.pdf?ua=1>.

2.2.4 Night Blindness in Pakistani Mothers

Night blindness, a condition in which a person cannot see in dim light, is generally the earliest clinical manifestation of vitamin A deficiency and is both a sensitive and a specific indicator for low serum retinol levels (3, 4). As shown in **Figure 8**, prevalence of night blindness reported by mothers 15-49 years included in the **NNS** is high, constituting a severe public health problem¹¹ (WHO, 2011). Alarming, prevalence of night blindness increased significantly between 2001-02 –(Government of Pakistan, 2002) and 2011 (Aga Khan University & UNICEF, 2011) from 8% to 13% during the respondent's last pregnancy and from 10% to 16% during the current pregnancy.

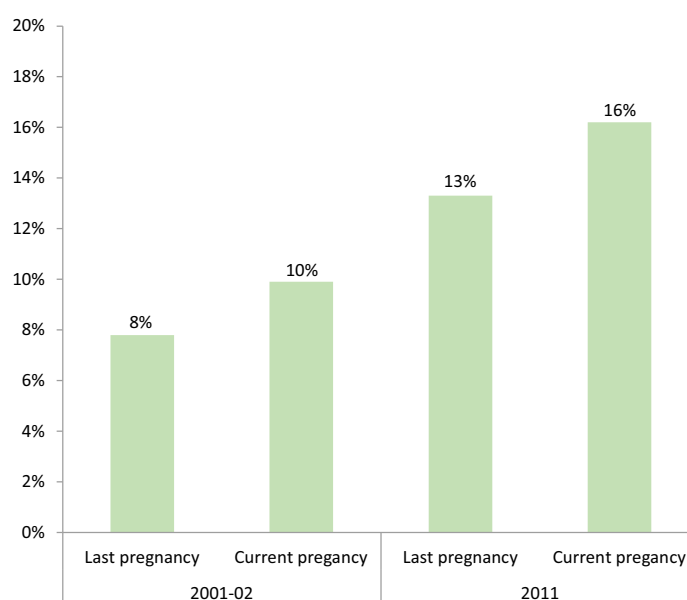


FIGURE 8: SELF-REPORTED NIGHT BLINDNESS IN PAKISTANI MOTHERS 15-49 YEARS BY YEAR AND PREGNANCY.

Sources: National Nutrition Survey Pakistan 2001-2002 –(Government of Pakistan, 2002) and 2011 (Aga Khan University & UNICEF, 2011)

¹¹Vitamin A deficiency is a severe public health problem if $\geq 5\%$ of women in a population have a history of night blindness in their most recent pregnancy in the previous 3-5 years that ended in a live birth.

3 Key Determinants of Malnutrition in Adolescents

3.1 Overview and Global Context

3.1.1 Determinants of Malnutrition

In many LMIC, stunting, thinness, and micronutrient deficiencies among adolescents frequently result from inadequate nutrition and infections during early childhood combined with a diet insufficient to meet the intense nutritional demands of rapid growth during adolescence. Since children and adolescents are vulnerable to food insecurity, it is important to ensure regular and permanent access to nutritious food (Ke & Ford-Jones, 2015). Adolescent pregnancy, which is common in many developing countries, exacts an additional nutritional toll. However, this undernutrition increasingly coexists with overweight and obesity (Cusick & Kuch, 2012).

A recent narrative review of the socio-cultural and economic determinants and consequences associated with undernutrition¹² among adolescents in LMIC identified common determinants (Madjdian et al., 2018). At the individual level, significant determinants included age, sex, birth order, religion, ethnicity, education and literacy level, working status, and marital status. At the household level, parental education and occupation, household size and composition, income, socioeconomic status, and resources were associated with undernutrition. Only a few determinants at the community/environmental level were identified, including residence, sanitation, school type, and seasonality.

The immediate causes of malnutrition in Pakistani adolescents include low-quality diets and infections as well as malnutrition during childhood. Contextual determinants include poverty, mal-distribution of food, lack of nutritional knowledge, low literacy, and poor health services. Several observational studies representing either specific population subgroups or convenience samples of Pakistani adolescents report associations between nutritional status of adolescent girls with mother's education (Mahmood et al., 2016), family income (Mahmood et al., 2016), and socio-demographic characteristics (Ahmed et al., 2013; Mushtaq, Gull, Mushtaq, et al., 2011). This section provides an overview of the key determinants of adolescent malnutrition in Pakistan based on limited available data.

3.2 Dietary Intake

3.2.1 Overview and Global Context

Nutrition indicators discussed above—anthropometry and micronutrient deficiencies—are largely dependent on a healthy diet (Song, Joung, Engelhardt, Yoo, & Paik, 2005). Yet the quality of the diet for adolescent girls in LMIC is generally poor (Akseer et al., 2017; USAID & SPRiNG, 2018). A recent review showed that diets of adolescent girls in LMIC are characterized by low dietary diversity with limited consumption of fruits and vegetables and other nutrient-rich foods, and widespread access to energy-dense foods, such as sweet and salty items, sugar-sweetened beverages, and fast foods (USAID & SPRiNG, 2018).

On the one side, half of the adolescent girls in LMIC do not eat 3 meals per day, frequently skipping breakfast. On the other side, as a result of the global nutrition transition, meal patterns are shifting towards regular snacking and more meals consumed outside the home, which tend to have a negative effect on the diet. Presumably, the diets of adolescent boys in LMIC follow similar patterns to that of girls, but information is scarce. In Pakistan, a small-scale observational study among adolescents in urban and rural schools in the district of Chakwal (n=702) reported

¹² Defined by stunting, underweight, thinness, and micronutrient deficiencies

more favourable dietary practices among boys when compared to girls, mostly due to lesser tendency to skip meals among boys. (Adeel et al., 2012).

Poor quality of the diet and consumption of harmful foods can lead to micronutrient deficiencies and unhealthy body composition as well as eating disorders (Herpertz-Dahlmann, 2015). Moreover, dietary patterns developed in childhood and adolescence are carried into adulthood, with lifelong consequences (Raphael, 2013).

3.2.2 Food Security among Pakistani Households

A major factor influencing dietary intakes across population groups in Pakistan is food security.¹³ According to the [2011 NNS](#), only 42% of households were food secure, whereas 28% were food insecure without hunger, 20% food insecure with moderate hunger and 10% food insecure with severe hunger (Aga Khan University & UNICEF, 2011). A greater proportion of rural households were food insecure compared to urban households (61% versus 52%). According to the [2017 Global Hunger Index \(GHI\)](#) a composite index for insufficient energy intake, child undernutrition, and child mortality—Pakistan ranks 106th out of 119 countries (von Grebmer et al., 2017). With a score of 32.6, its status is classified as 'serious' (bordering on 'alarming'). Data from the [GSHS](#) across 40 countries, confirms going to bed hungry is associated with increased risk of thinness (Candler et al., 2017).

A 2014 study conducted by the [Research and Advocacy Fund \(RAF\)](#) among poor adolescent girls aged 15-19 years from four major provinces in Pakistan (n=200) found that most households spent a large proportion of their income on food ($\geq 75\%$ among 80% of households in the province of Khyber Pakhtunkhwa), and many households experienced frequent or occasional food shortages in the last year (62% in Sindh, 50% in Punjab, 15% in Khyber Pakhtunkhwa and 32% in Balochistan) (Research and Advocacy Fund (RAF), 2014). Overall, 60% of both unmarried and married girls said they never had enough food to eat and 25% of unmarried and 30% of married girls had two meals or less per day.

The Food and Agricultural Organization (FAO) [Food Balance Sheets \(FBS\)](#)¹⁴ and the [Household Integrated Economic Surveys \(HIES\)](#)¹⁵ provide insights into particular foods that are available for consumption at the national level in Pakistan. These datasets illustrate the dependence on wheat as a main source of energy, and lack of availability of nutrient-dense foods such as meats and eggs. However, dairy sources such as milk are adequate and contribute significantly to the quality of the diet.

[FBS](#) data for 2013 show that 2438 kcal/capita/day are available for human consumption. Almost half the food supply is comprised of staple foods (1164 kcal, or 48% of total energy) such as wheat products (37%), maize products (5%), and rice (5%). Staples are generally micronutrient poor and high in anti-nutrients such as phytate, which binds to minerals, preventing absorption—an overdependence on staples can lead to nutritional deficiencies (R. S. Gibson, Bailey, Gibbs, & Ferguson, 2010). A further 28% (685 kcal) of the food supply is comprised of micronutrient-poor foods such as fats and oils (15%) and sugars (12%). Animal-source foods, which have much higher micronutrient bioavailability, comprise 21% (505 kcal) of the food supply. Milk, which is an important source of calcium, but a poor source of iron and zinc, is prevalent (13%), whereas other animal-source foods are scarce [meat (3.2%), eggs (0.5%) and fish (0.1%)]. Other nutrient-dense foods comprise only 7% (167 kcal) of the food supply.

¹³ Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life. As defined by the FAO, <http://www.fao.org/economic/ess/ess-fs/en/>

¹⁴ <http://www.fao.org/faostat/>

¹⁵ HIES surveys were performed in 2001-02, 2004-05, 2005-06, 2007-08, 2010-11 and 2011-12 at national-level illustrating trends in household income and consumption expenditure data.

Malik and colleagues – used 2010-2011 HIES data on the purchased quantities of various food items to derive the energy contribution from different foods (Figure 9). The overall daily per adult equivalent energy intake was 2536 kcal in non-poor and 1848 kcal in poor households. Wheat provided the bulk of energy; 52% of the energy for poor households and 43% in non-poor households. Energy from nutrient-dense foods such as fruits, vegetables, pulses, and meat were particularly low.

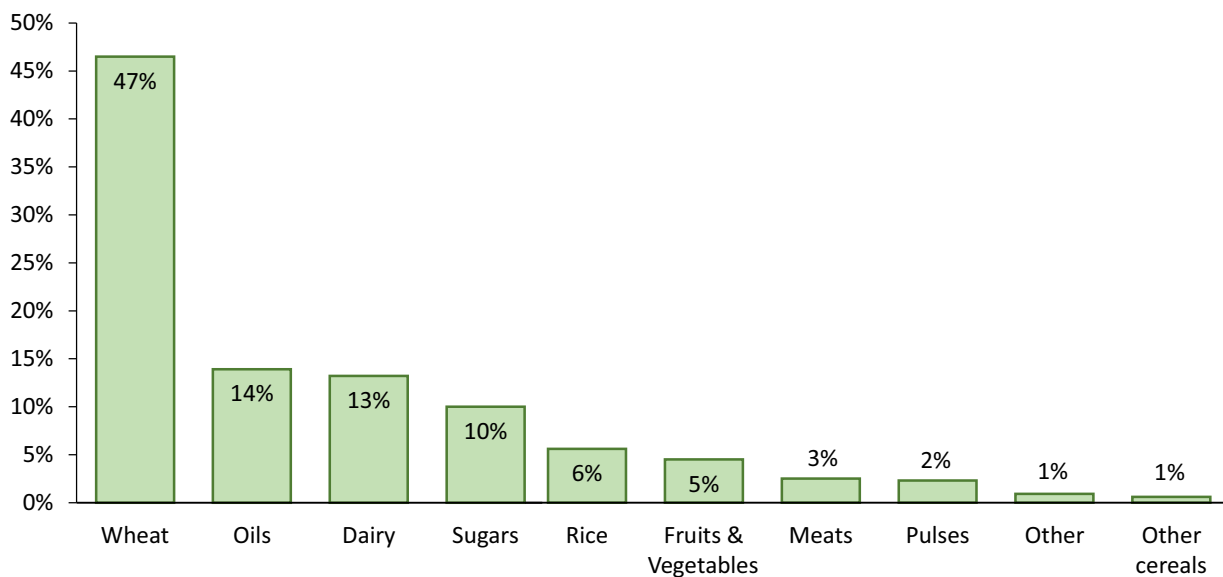


FIGURE 9: PROPORTION OF TOTAL ENERGY FROM SELECT FOOD GROUPS IN PAKISTANI HOUSEHOLDS IN 2010-2011.

Estimated By Malik Et Al. (2015) Using Household Income And Expenditure Data From 2010-2011 And Food Composition Tables For Pakistan In 2001 –(malik et al., 2015).

The 2015-2016 HIES shows that Pakistani households spent more than one-third (37%) of income on food (Government of Pakistan, 2017). As shown in Figure 10, consumption patterns varied significantly between poor and non-poor households, with the poorest spending more on nutrient-poor foods such as vegetable ghee, wheat products, and sugar and the wealthiest spending considerably more on fruits and animal products such as mutton, fish, chicken, and milk, which have high micronutrient density and bioavailability.

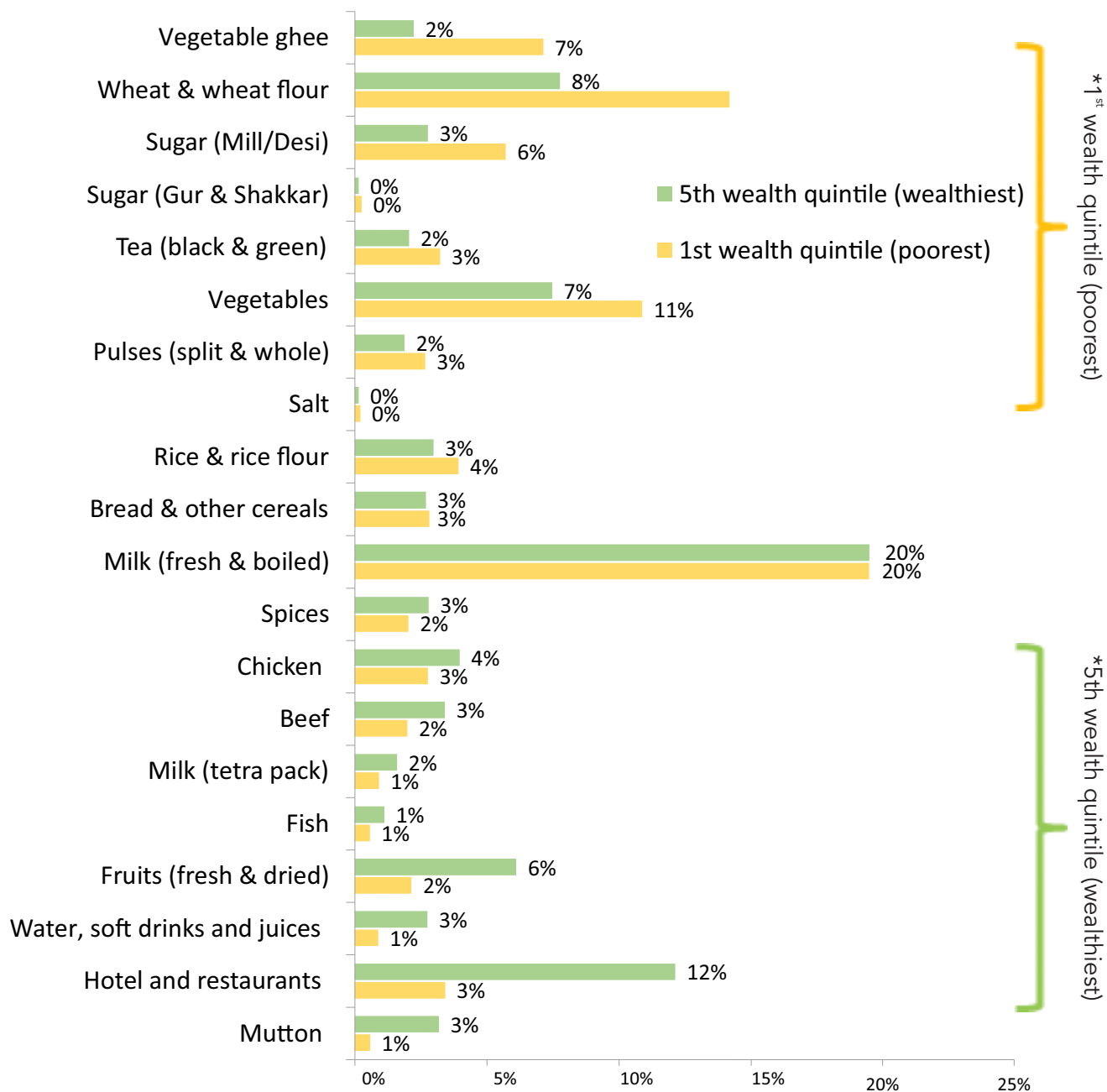


FIGURE 10: PERCENTAGE OF MONTHLY EXPENDITURE ON 20 MAJOR FOOD ITEMS BY WEALTH QUINTILES.

*higher expenditure by population in the indicated wealth Quintile. Source: 2015-2016 household integrated economic surveys (hies)(Government of Pakistan, 2017).

As shown in **Figure 11**, consumption patterns also varied significantly between rural and urban areas, but differences were less extreme than between wealth quintiles. Urban households spent more on animal-source foods such as mutton, milk, beef, and chicken, whereas rural households spent more on nutrient-poor foods such as vegetable ghee and wheat products, but also nutrient-dense foods such as fish and milk.

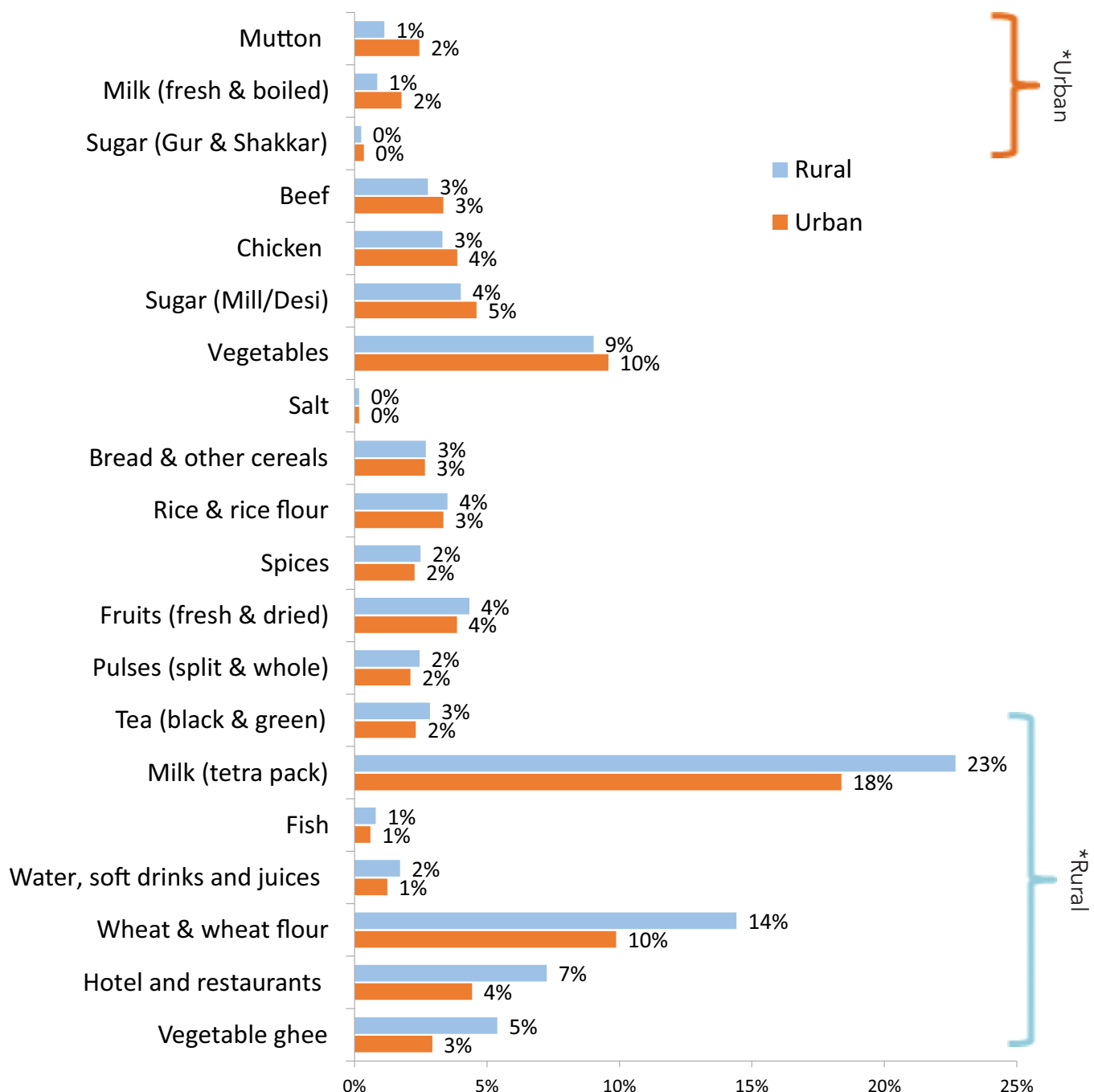


FIGURE 11: PERCENTAGE OF MONTHLY EXPENDITURE ON 20 MAJOR FOOD ITEMS BY LOCALITY.

*higher expenditure by population in the indicated geographical area. Source: 2015-2016 household integrated economic surveys (hies)(Government of Pakistan, 2017).

3.2.3 Food Consumption Patterns in Pakistan

The 2009 GSHS provides dietary data for school-going adolescent boys and girls aged primarily 13-15 years (WHO, 2009). Twenty-one percent of boys and 16% of girls experienced hunger in the previous month. Most adolescents consumed fruit daily, with higher consumption among girls (80%) than boys (60%) (Figure 12), but only about one-fifth consumed fruit at least twice a day (26% of boys and 18% of girls). Vegetables were consumed more frequently than fruits; more than half of adolescents consumed vegetables at least twice a day with more frequent consumption among boys (61%) than girls (50%). Twenty-eight percent of boys and 49% of girls consumed soft drinks daily. Twenty-one percent of boys and girls consumed fast foods at least daily the previous week. The release of GSHS data for 2016 will allow analysis of trends for these key dietary behaviours.

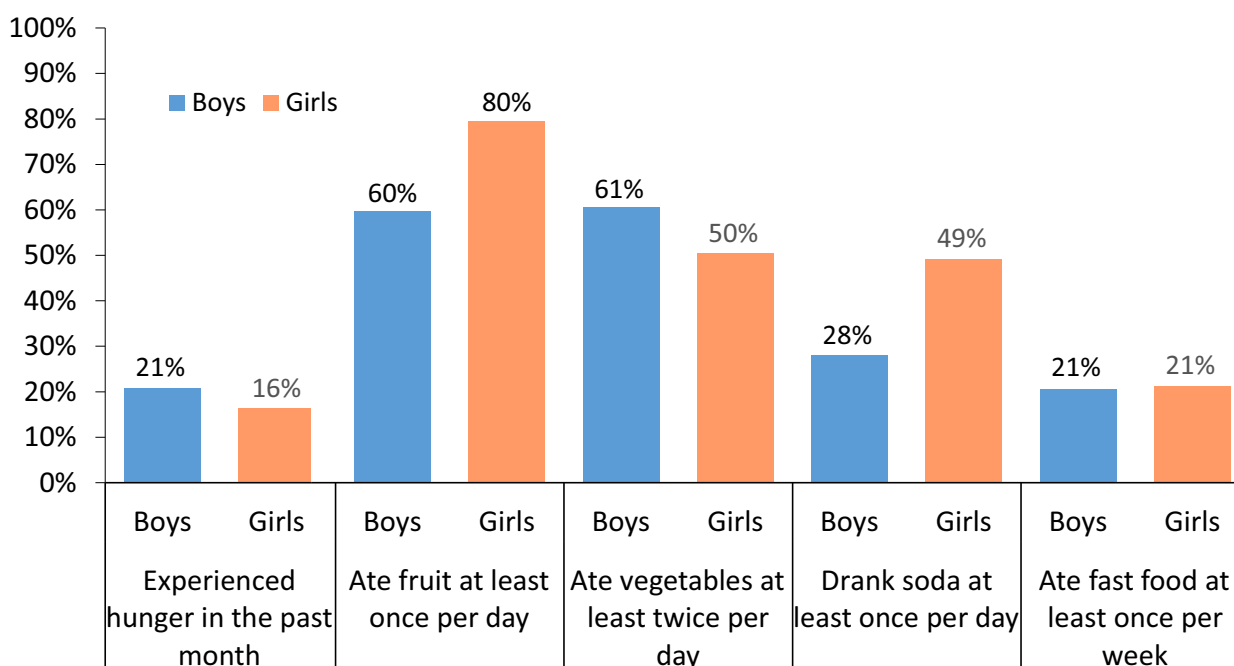


FIGURE 12: REPORTED FREQUENCY OF HUNGER AND CONSUMPTION OF FRUIT, VEGETABLES, SODA, AND FAST FOOD AMONG SCHOOL-GOING ADOLESCENT BOYS AND GIRLS PRIMARILY 13-15 YEARS. Observations Were Weighted Based On The Survey Design. Data Source: 2009 Global School-based Student Health Survey (GSHS)(WHO, 2009).

The 2011 NNS, which includes a small subsample of adolescent mothers, illustrates the poor quality of maternal diets in Pakistan. Grains such as wheat products were consumed by virtually all mothers, whereas foods typically considered to be nutrient-dense were not consumed on a daily basis (Figure 13). Animal-source foods, which tend to be nutrient-dense with high bioavailability, were limited, especially among rural populations. Dairy products were reported by less than half the women, flesh foods by one-third, and eggs by about 10% of women (Aga Khan University & UNICEF, 2011).

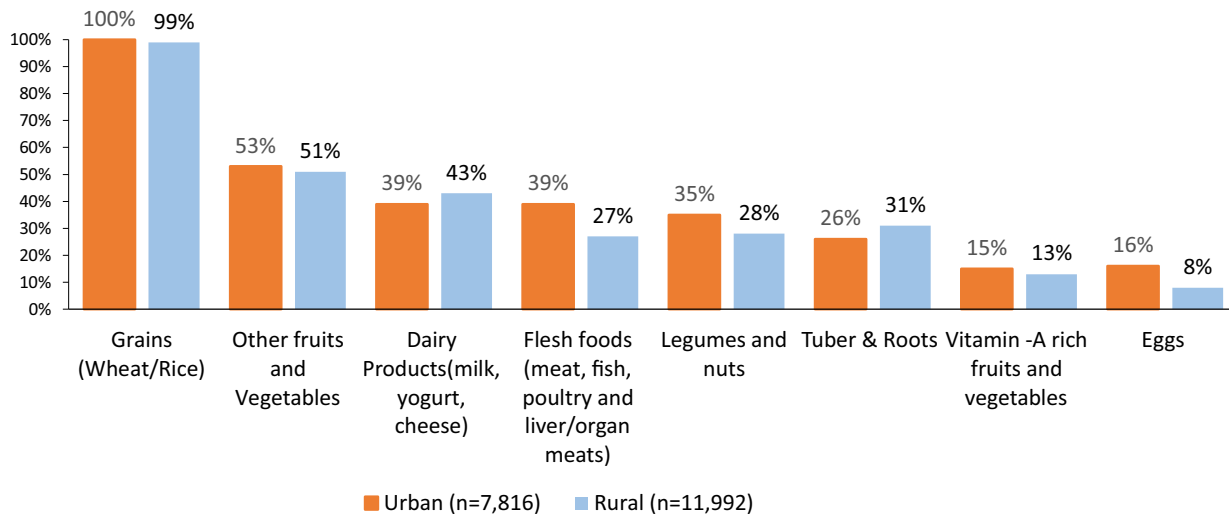


FIGURE 13: PROPORTION OF MOTHERS OF CHILDREN BELOW 2 YEARS WHO CONSUMED FOOD ITEMS OF THE LISTED FOOD GROUPS IN THE PREVIOUS 24 HOURS.

Data source: 2011 National Nutrition Survey (Aga Khan University & UNICEF, 2011)

The 2014 [Pakistan Rural Household Panel Survey \(PRHPS\)](#) reported low dietary diversity among rural households, suggesting a high risk of nutritionally inadequate diets (International Food Policy Research Institute (IFPRI) & (IDS), 2017). Whereas nutrient-poor foods including wheat flour, ghee/butter/oil, and sugar, were consumed by more than 90% of households, nutrient-dense foods including vitamin A-rich fruits, eggs, poultry, fresh meat, and dark green leafy vegetables were consumed by less than 20% of households the day before the interview. However, dairy products and vegetables (tomato, onions, and eggplants) were frequently consumed. Nutrient-poor staple foods were typically consumed daily, whereas vitamin A-rich fruits, eggs, and pulses were typically consumed once a week, and poultry, fresh meat, and dark green leafy vegetables were consumed less than once a week.

The [2014-2015 Food Consumption Survey \(FCS\)](#), conducted among adolescent girls 10-19 years in two districts of Pakistan, shows that the typical diet of adolescent girls is of poor quality (Aga Khan University, 2015). As shown in **Figure 14**, staple foods such as bread, roti, and rice were consumed very frequently, whereas consumption of nutrient-dense foods such as eggs, chicken, pulses, green leafy vegetables, and potatoes were limited. Dairy products such as milk and yogurt, which are important sources of protein and calcium, were consumed frequently. Furthermore, the highly prevalent consumption of tea, which 70% of girls reported drinking two hours before or after a meal, may compromise iron absorption, particularly in the absence of vitamin C (Wierzejska, 2014). The observed food pattern, with limited sources of key micronutrients essential for growth and development, puts adolescent girls at risk of iron, folate, and other micronutrient deficiencies. However, these findings must be interpreted with caution, as the survey was not representative of all of Pakistan.

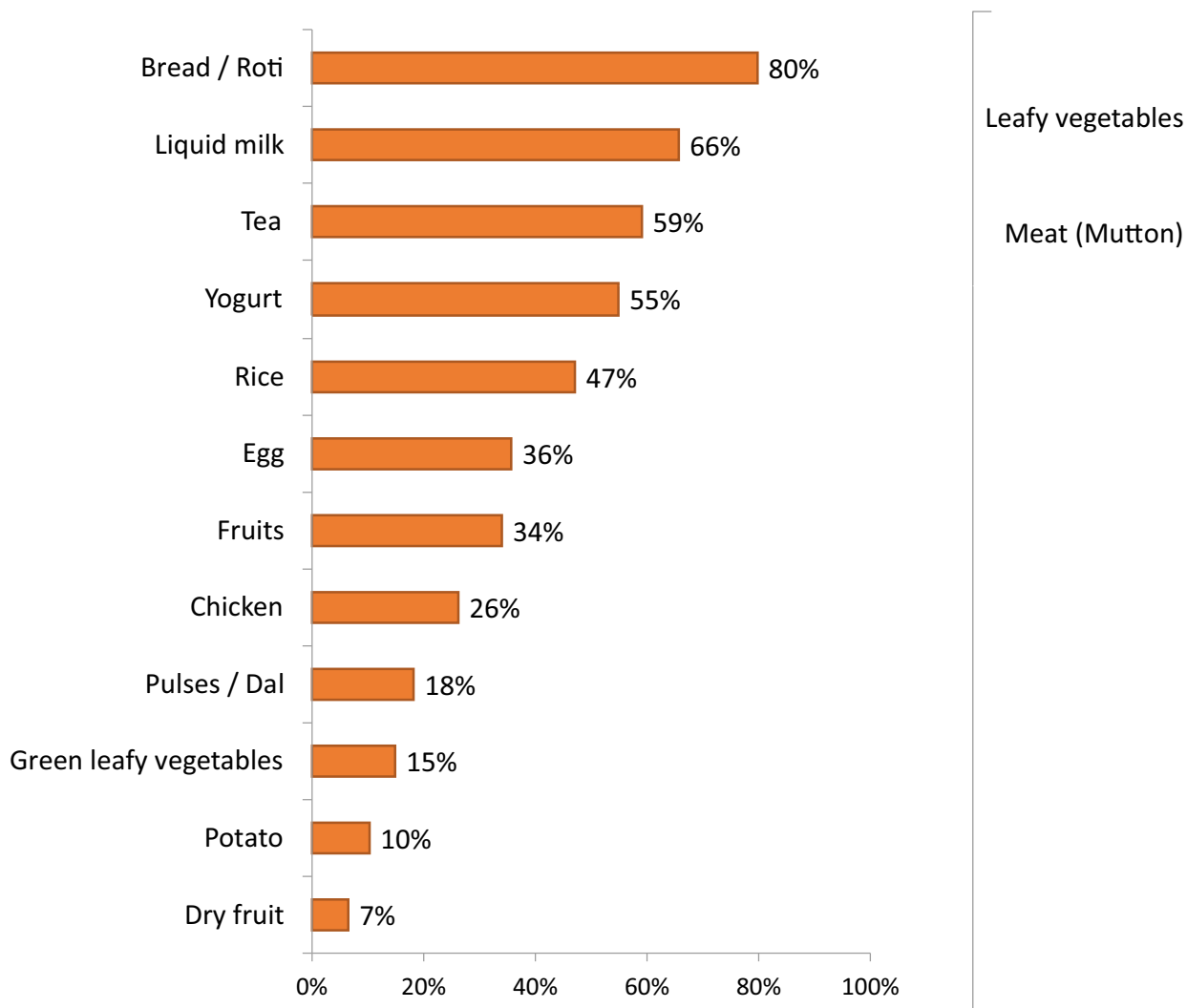


FIGURE 14: PROPORTION OF PAKISTANI ADOLESCENT GIRLS 10-19 YEARS CONSUMING A GIVEN FOOD GROUP IN THE PAST 24 HOURS IN 2014-2015.

Data from adolescent girls in Hyderabad, Sindh and Faisalabad, Punjab (n=1,680). Source: Food Consumption Survey (FCS) 2014-2015.

A study conducted by [Allama Iqbal Open University Islamabad](#) and [PLAN International](#) in 2007 looked at dietary practices, particularly comparing boys and girls. Among 702 girls and boys aged 14-16 years revealed that boys were taking meals more regularly (78%) compared to girls (62%). Similar trends were seen for regular breakfast (87% of boys, 64% of girls), lunch (80% of boys, 70% of girls), and dinner (89% of boys, 65% of girls), when probed for skipping. Respondents stated lack of time, personal likes and dislikes, sports activities, and consciousness for weight and figure as reasons (Adeel et al., 2012). A study by [RAF and Care International Pakistan](#)

generally found that girls 10-18 years consumed insufficient amounts of vitamins, protein, and energy (CARE International Pakistan & Research and Advocacy Fund (RAF), 2013).

Several observational studies, representing either specific population subgroups or convenience samples of Pakistani adolescents confirm dietary patterns described above. A few studies document the limited number of meals consumed by adolescents with frequent meal skipping (Research and Advocacy Fund (RAF), 2014; Rifat-uz-Zaman, Iqbal, & Ali, 2013), especially breakfast among girls (Adeel et al., 2012). Several studies report energy intakes below requirements (Research and Advocacy Fund (RAF), 2014) and inadequate intakes of key micronutrients including vitamins A, D, and E, folic acid, calcium, iron, zinc and iodine (Fariha, Asifa, & Asad, 2014; Imdad, Muzaffar, & Shoukat, 2013; Rifat-uz-Zaman et al., 2013).

Most studies confirm that diets of adolescents in Pakistan are characterized by low frequency of intake of nutrient-dense foods such as meat, eggs, and lentils, but moderate consumption of dairy products (Ahmed, Rehman, & Mughal, 2016; Research and Advocacy Fund (RAF), 2014; Sadia et al., 2016). Numerous authors reported concern for increased access to energy-dense snacks and meals consumed outside the home (Ahmed et al., 2016) and an alarming consumption of junk food such as fizzy drinks (Ahmad, Liaqat, Paracha, Qayyum, & Arshad Uppa, 2009; Iram et al., 2011), especially in urbanized areas (Aziz et al., 2010).

Many studies examined the link between urbanization and unhealthy eating patterns with the increased prevalence of overweight and obesity among adolescent girls and boys (Ahmad et al., 2009; Ahmed et al., 2013; Aziz et al., 2009; Aziz et al., 2010; Ishaque et al., 2012; Mushtaq, Gull, Abdullah, et al., 2011; Mushtaq, Gull, Mushtaq, et al., 2011; Rizwan, Akhter, & Jafar, 2011). Poor diets, characterized by breakfast skipping (Ishaque et al., 2012), eating out (Ishaque et al., 2012), high consumption of sweetened beverages (Iram et al., 2011; Ishaque et al., 2012; Rizwan et al., 2011), frequent snacking (Rehman et al., 2003), and low intake of fresh fruits and vegetables (Ahmed et al., 2013; Ishaque et al., 2012) are identified as main determinants of overweight and obesity.

3.2.4 Main Determinants of Dietary Intake in Pakistani Adolescents

The dietary intake of adolescent girls in Pakistan is complex and therefore is likely to be influenced by a variety of factors.

Knowledge Related to Diet and Nutrition

Lack of knowledge about nutrition among mothers and girls can also influence purchasing and eating behaviours. The 2011 NNS found that knowledge regarding micronutrients was generally poor among mothers, especially in rural areas (Aga Khan University & UNICEF, 2011). Few mothers reported awareness of the importance of specific micronutrients, and even fewer could report important foods sources for key micronutrients. Less than half of mothers (43%) reported awareness of the importance of iodine and only one-quarter of mothers (25%) had knowledge about iron.

The 2014-2015 FCS also suggests mothers have a limited nutritional knowledge (Aga Khan University, 2015). Just over half of the mothers surveyed had heard of anaemia (54%) or iron deficiency (57%), and fewer could correctly name good dietary sources of iron. Fruits and milk were frequently wrongly identified as good iron sources, whereas leafy vegetables were frequently correctly named. Surprisingly, few mothers named meat as a good iron source. With regards to knowledge about health consequences related to lack of iron consumption, only half

of respondents (50%) correctly reported that it could lead to lethargy/weakness and anaemia/blood deficiency.

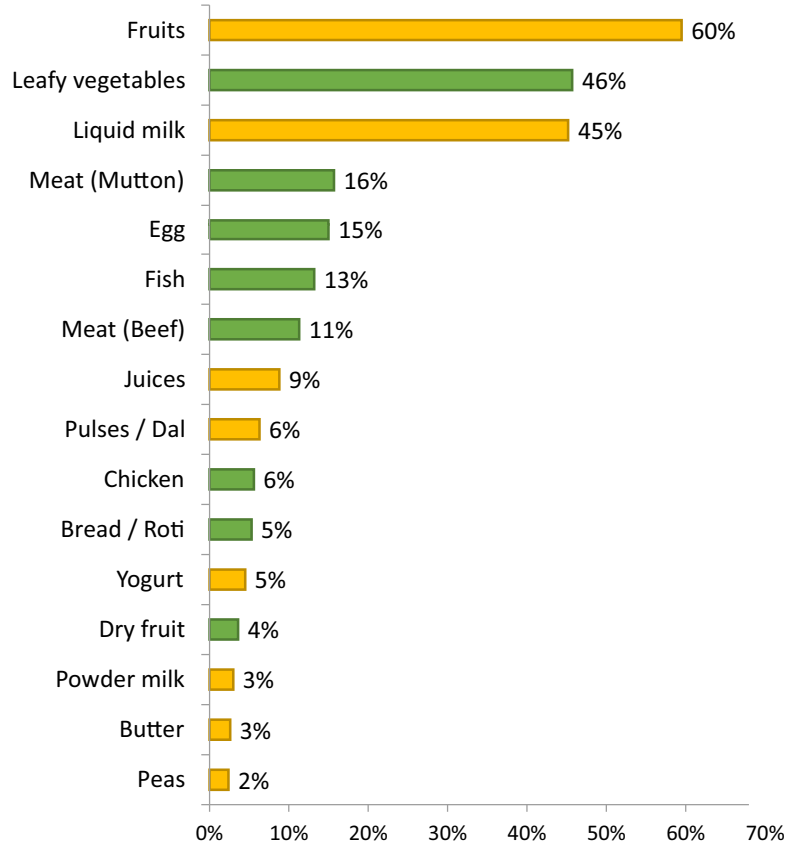


FIGURE 15: DATA FROM ADOLESCENTS IN HYDERABAD, SINDH AND FAISALABAD, PUNJAB ON SIGNIFICANT IRON SOURCES.

Data from adolescents in Hyderabad, Sindh and Faisalabad, Punjab. Bars in yellow are unlikely to be significant sources of iron, whereas bars in green are likely to be important sources of iron. Source: Food Consumption Survey 2014-2015 (Aga Khan University, 2015).

The 2014 [RAF](#) study among poor adolescent girls found that community members are generally aware of the enhanced nutritional needs in the adolescent period (Research and Advocacy Fund (RAF), 2013). However, poverty and lack of understanding of food substitution prevent girls from obtaining healthy diets. Main sources of nutrition advice and information were parents and siblings (70% for unmarried girls) and in-laws (55% for married girls), whereas health workers were rarely a source of information (Research and Advocacy Fund (RAF), 2014). The study also found that girls avoid certain foods during menstruation such as Lassi (8/10 districts), sour items (7/10 districts), cold drinks (4/10 districts), legumes (3/10 districts), beef (3/10 districts), spicy items (3/10 districts), and cold milk (3/10 districts). The limited data and conflicting evidence on nutritional knowledge of adolescents suggest caution should be taken when interpreting these results.

Household decision-making regarding family diet and food distribution

Adolescents rarely have control over household food expenditure or are involved in intra-household food allocation. The [2014-2015 FCS](#) found that the principal decision makers for the purchase of packaged food items for adolescent girls are their mothers (85%); only 9% of fathers

and 8% of other family members are the principal decision makers. The influence of a mother's purchasing decisions directly reflects what their adolescent daughters consume. For instance, twice as many mothers prefer to purchase milk for their daughters than chicken (Aga Khan University, 2015). However, these results should not be applied to all of Pakistan since the survey was only based on two cities.

3.3 School Enrolment and Literacy Rates in Pakistan

3.3.1 Overview

Educational indicators for Pakistan remain dismally low, with large discrepancies between wealth quintiles, geography, and sex (Ministry of Education, 2014; Pakistan National Human Development Report 2017 team, 2017). At the national level, about two-thirds of women 15 years or older cannot read and write, and 35% of girls remain out of school. Encouragingly, steady progress has been documented during last few decades.

3.3.2 School Enrolment

The [2017 Pakistan National Human Development Report](#) states that Pakistan has one of the world's lowest completion rates for primary education as a direct consequence of poor access to education (Pakistan National Human Development Report 2017 team, 2017). Disparities are stark between more and less developed regions, male-female, and urban-rural areas.

The [2012-13 DHS](#) shows that 54% of ever-married adolescents aged 15-19 years never attended school, 22% attended primary school and the remaining 25% attended middle, secondary or higher school (National Institute of Population Studies (NIPS) & ICF International, 2013). As shown in **Figure 16**, school attendance is much higher in urban than rural areas and generally higher among boys than girls. The DHS survey shows that the gender-gap remains high in rural areas but is closing in urban areas.



FIGURE 16: SCHOOL ATTENDANCE IN ADOLESCENTS 10-14 YEARS BY SEX AND LOCALITY

Source: Pakistan Demographic and Health Survey (DHS) 2012-13 (National Institute of Population Studies (NIPS) & ICF International, 2013).

Pakistan suffers from a considerable disparity in school attendance according to the wealth quintiles, ranging from 10% in the poorest households to 66% in the richest (Figure 17).

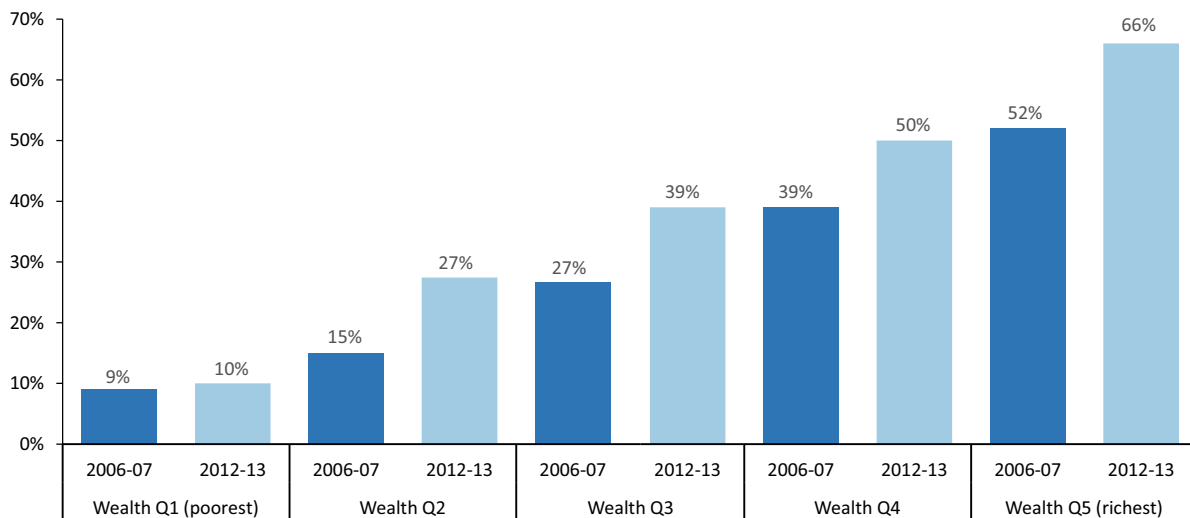


FIGURE 17: SCHOOL ATTENDANCE IN ADOLESCENTS 10-14 YEARS BY WEALTH QUINTILE IN 2012-13

Source: Pakistan Demographic and Health Survey (DHS) 2012-13 (National Institute of Population Studies (NIPS) & ICF International, 2013).

Figure 18 shows clear improvements in school attendance between 2006-07 and 2012-13 in most regions, but attendance in all regions was still below 45% (National Institute of Population Studies (NIPS) & ICF International, 2007, 2013). Attendance remains particularly low in Balochistan. Despite progress over the last two decades, educational outcomes for girls remain poor.

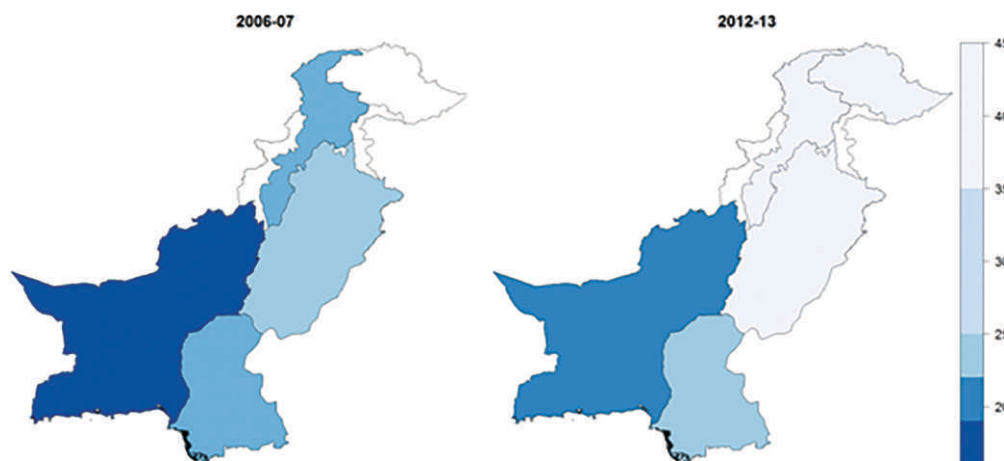


FIGURE 18: SCHOOL ATTENDANCE IN ADOLESCENTS 10-14 YEARS BY YEAR AND REGION

Source: Pakistan Demographic and Health Surveys (DHS) 2006-07 and 2012-13 (National Institute of Population Studies (NIPS) & ICF International, 2007, 2013).

3.3.3 Literacy

Literacy is associated with many positive health and nutrition outcomes. The [2014-2015 Pakistan Social and Living Standards Measurement Survey](#) reports that 40% of the population 10 years and older is illiterate, with little improvement between 2012-13 and 2014-2015 (Government of Pakistan & Pakistan Bureau of Statistics, 2016). Women and individuals from rural areas are particularly illiterate (Government of Pakistan & Pakistan Bureau of Statistics, 2016).

The [2012-13 DHS](#) shows that 30% of adolescents are illiterate (defined as the ability to read all or part of a sentence) (National Institute of Population Studies (NIPS) & ICF International, 2013). Illiteracy among adolescent girls decreased between 1990-1991 and 2012-13 from 33% to 28% in 10-14-year-olds and from 38% to 30% in the 15-19-year-olds. As shown in Figure 19, Pakistan suffers from a considerable disparity in literacy according to the wealth quintiles, ranging from 31% in the poorest to 97% in the richest quintile.

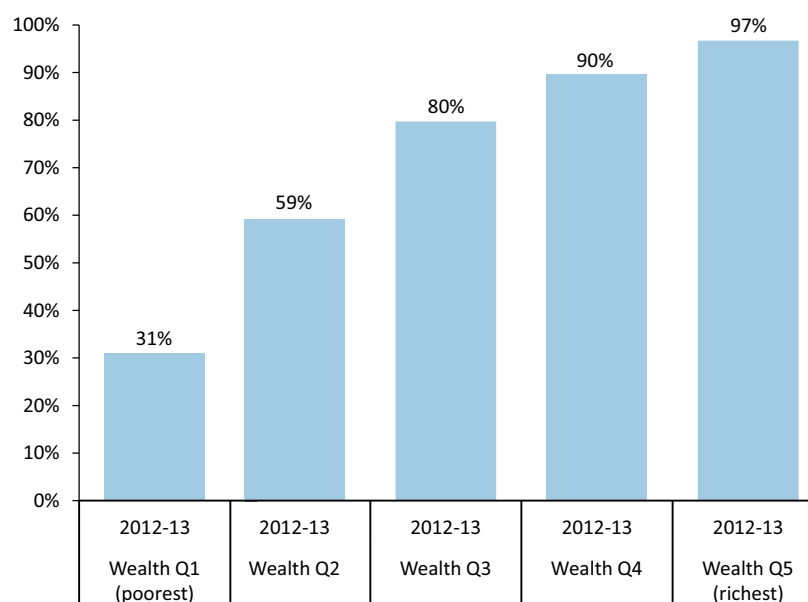


FIGURE 19: LITERACY AMONG ADOLESCENTS GIRLS 15-19 YEARS BY WEALTH QUINTILES

Source: Pakistan Demographic and Health Survey (DHS) 2012-13 (National Institute of Population Studies (NIPS) & ICF International, 2013).

Gender inequalities in education remain prominent in Pakistan, especially in rural and remote areas of the country. The [Education for All 2015 National Review](#) highlights the shortage of qualified and trained female teachers; high opportunity cost of a girl attending school as she has to undertake household chores; cultural factors; and the overall security issues as key barriers to girls' education (Ministry of Education, 2014). **Figure 20**, shows literacy rates among youth 15-24 years by division and sex, illustrating the enormous gender gaps in education still prevalent across the country.

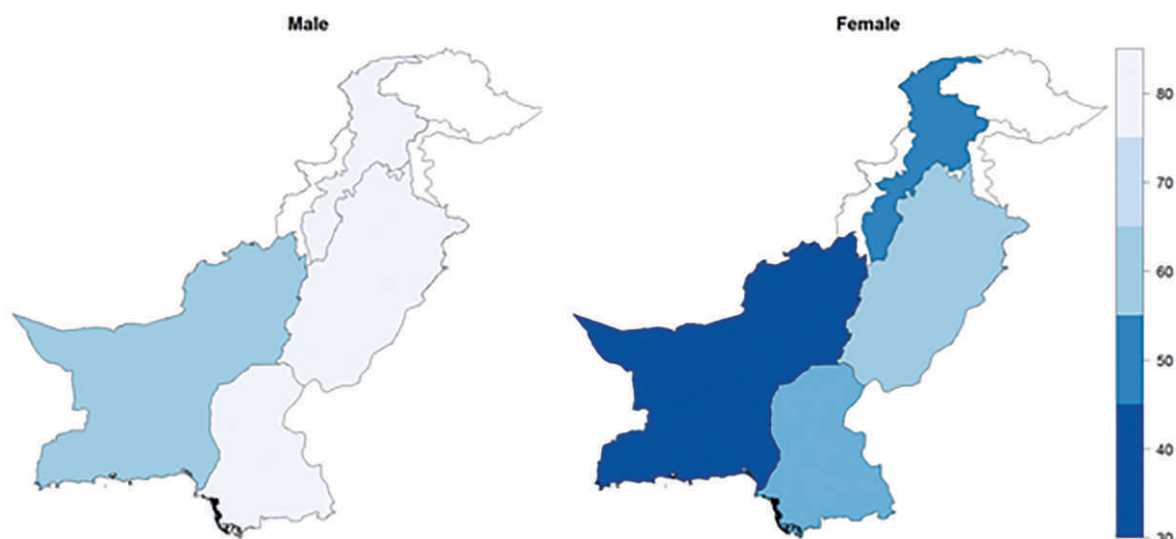


FIGURE 20: YOUTH LITERACY RATE IN 2012-13 AMONG YOUTH 15-24 YEARS BY SEX AND PROVINCE

Source: Pakistan Education for All Review Report 2015. (Ministry of Education, 2014).

3.3 Child Marriage and Pregnancy in Pakistan

3.3.1 Child Marriage

UNICEF considers child marriage (before 18 years), which often results in early pregnancy and social isolation, a violation of human rights compromising the wellbeing of girls'. Girls who marry as children often have little education and poor vocational training, reinforcing gender disparities in poverty'. Pakistan's Child Marriage Restraint Act 1929 sets the legal age for marriage to 16 for women and 18 for men and marriage defines the onset of the socially acceptable time for childbearing. Most recent legislation on preventing child marriages has been created in Sindh ("The Sindh Child Marriages Restraint Act 2014," 2014) and Punjab, and other provinces generally follow suit. However, implementation needs to be more effective.

Child marriage is common in Pakistan and disproportionately affects young girls from rural, low-income, and poorly-educated households. The [2012-13 DHS](#) shows that at the national level, among women aged 25-49 years, almost one-third (35%) were married by age 18 (National Institute of Population Studies (NIPS) & ICF International, 2013). Furthermore, median age at first marriage was 19.5 years, with significant differences between population subgroups. The median age at first marriage varied by region; ranges from 17.7 years in Gilgit Baltistan to 22.7 years in Islamabad. Median age of first marriage was higher in urban areas (20.7 years) than rural areas (18.8 years), among mothers with secondary education (22.3 years) compared to those without education (18.3 years), and among mothers in the highest wealth quintile (22.1 years) compared to those in the lowest quintile (17.8 years).

Encouragingly, data from the [2012-13 DHS](#) provide clear evidence of the rising age at first marriage. Among women 25-49 years (**Figure 21**), median age at first marriage increased from 19 in 2006-07 to 20 in 2012-13 (National Institute of Population Studies (NIPS) & ICF International, 2007, 2013). Further indications are the higher median age at first marriage among women 25-29 years (20.9 years) compared to older women 45-49 years (18.5 years) and the decline in the proportion of women married by 15 years from 10% among those 45-49 years to 1.6% among those 15-19 years (National Institute of Population Studies (NIPS) & ICF International, 2013).

An analysis of 2012-13 DHS data shows that women married as children compared with women married as adults were more likely to justify wife beating for the following reasons: “goes out without telling husband”, “neglects the children”, “argues with husband”, “refuses to have sex with husband”, “burns the food” (Nasrullah, Muazzam, Khosa, & Khan, 2016). However, these associations were lost when social equity indicators and national region of residence were adjusted in the regression models.

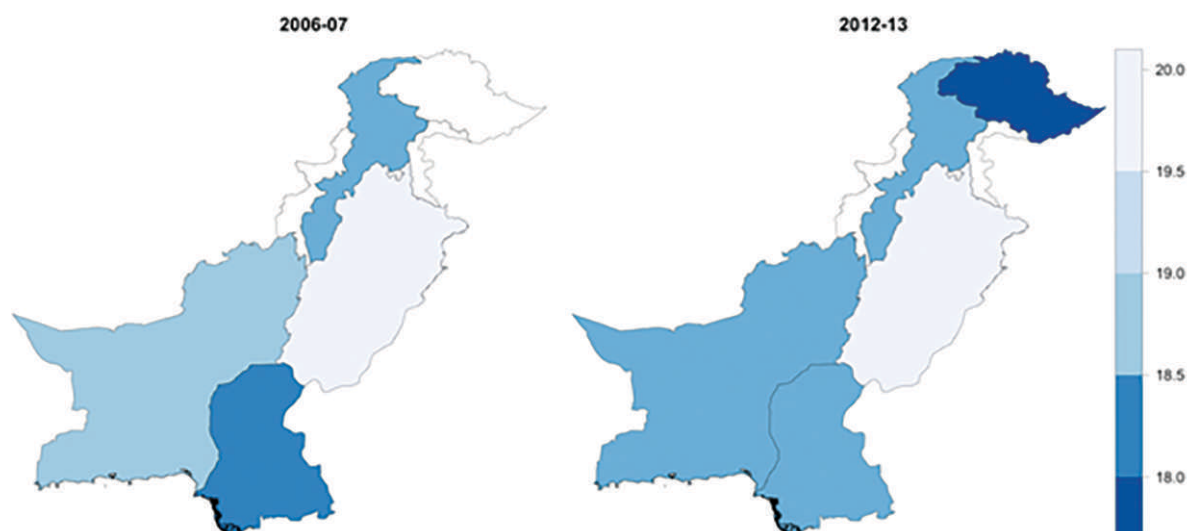


FIGURE 21: MEDIAN AGE AT FIRST MARRIAGE AMONG EVER-MARRIED WOMEN 25-49 YEARS BY YEAR AND REGION IN PAKISTAN.

Age at first marriage is defined as the age at which the respondent began living with her first spouse/partner. Note: Data for Islamabad Capital Territory and Gilgit-Baltistan are only available for 2012-13. Data are unavailable for the Federally Administered Tribal Areas and Azad Jammu and Kashmir. Sources: Pakistan Demographic and Health Survey 2006-07 and 2012-13 (National Institute of Population Studies (NIPS) & ICF International, 2007, 2013).

3.3.2 Adolescent Pregnancy

Adolescent pregnancy is a direct result of child marriage, cultural pressure for married women to start childbearing shortly after marriage, and poor sexual and reproductive services available to young women. Pakistan continues to observe socio-cultural norms that contribute to adolescent pregnancy, especially in rural areas where poverty and illiteracy prevail. The adolescent fertility rate in Pakistan is high (38/1000 live births among girls 15-19 years) (UN, 2016).

Many women in LMIC, especially adolescents, will not be prepared nutritionally for pregnancy, and adolescent pregnancy is a major contributor to maternal and child mortality and to intergenerational cycles of ill-health and poverty. (Stephenson et al., 2018). Globally, pregnancy and childbirth complications are the leading cause of death among girls 15-19 years, and the risk of dying decreases with increasing age (WHO, 2016a). The LMIC account for all (99%) global maternal deaths of women between 15-49 years of age (Raj & Boehmer, 2013; WHO, 2016b). Early motherhood not only causes poor health outcomes (Althabe et al., 2015), but often also deprives adolescent girls of educational, social, and economic development opportunities for the rest of their lives.

Adolescents in Pakistan have extremely poor pregnancy outcomes (Mubeen & Baig, 2016). Several studies report worse outcomes of pregnancy for adolescent girls compared to older mothers (Mubeen & Baig, 2016). A case-control study reported a threefold frequency of anaemia among adolescent mothers compared to non-adolescent mothers (Shah et al., 2011). Moreover, adolescent mothers had significantly lower pre-pregnancy BMI, were twice as likely to have instrumental births, and three times more likely to acquire chorioamnionitis (Shah et al., 2011). Other studies report higher incidence of eclampsia, pregnancy induced hypertension, prolonged and obstructed labour, obstetric fistulas, spontaneous and unsafe abortions, and increased rates of caesarean sections among adolescent mothers, as well as a higher risk of low Apgar scores, being born preterm, intrauterine growth restriction, meconium aspiration, and neonatal death among the offspring (Naqvi & Naseem, 2010; Pradhan, Wynter, & Fisher, 2015; Tanveer & Fatima, 2016; Tufail & Hashmi, 2008).

In Pakistan, although the proportion of teenage pregnancy has declined over the past 20 years, childbearing during adolescence is still common. The [2012-13 DHS](#) reported that 8% of women 20-24 years gave birth by age 18 (National Institute of Population Studies (NIPS) & ICF International, 2013). At the national level, among women aged 25-49 years, the median age at first birth was 22.2 years, with significant differences between population subgroups. The age at the onset of childbearing varied by region; ranges from 21.3 years in Balochistan to 24.5 years in Islamabad. Median age of first birth was higher in urban areas (23.0 years) compared to rural areas (21.8 years), among more highly educated mothers (24.2 years) compared to those without education (21.1 years), and among mothers in the highest wealth quintile (24.1 years) compared to those in the lowest quintile (20.8 years).

The proportion of women 15-19 years who had begun childbearing at the time of the [2012-13 DHS](#) was 8%, with higher proportions among older girls (zero at 15 years, 0.9% at 16 years, 8% at 17 years, 13% at 18 years and 17% at 19 years) (National Institute of Population Studies (NIPS) & ICF International, 2013). Prevalence was much more common in rural areas (9%) compared to urban areas (6%), among girls in the lowest wealth quintile (12%) compared to those in the highest (3.3%) (Figure 22), and among girls with no education (13%) when compared to those with higher education (3.2%) (Figure 23).

Encouragingly, the proportion of ever-married adolescent girls 15-19 years who have begun childbearing decreased between the 2006-07 and the 2012-13 DHS surveys (Figure 24).

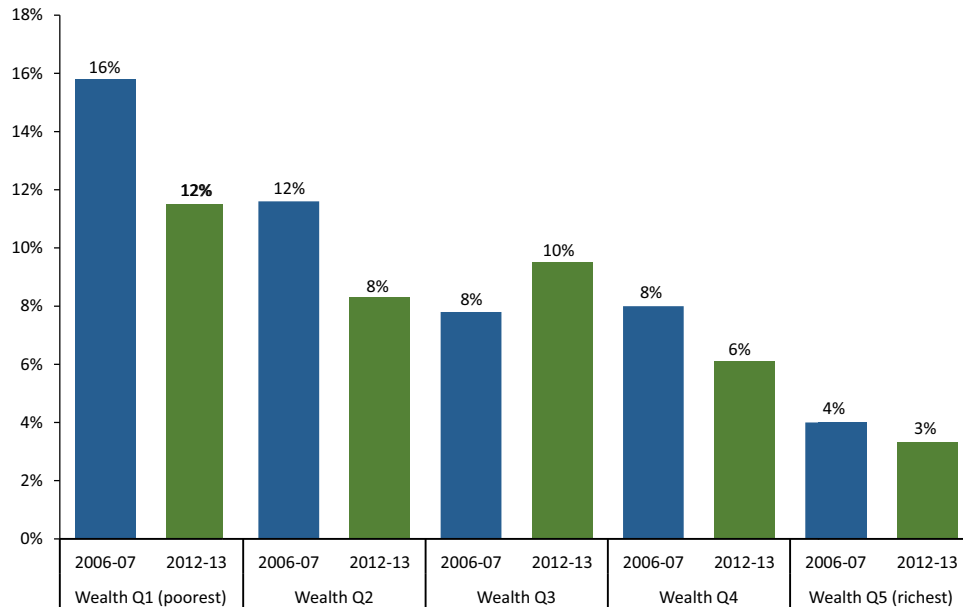


FIGURE 22: PROPORTION OF PAKISTANI EVER-MARRIED ADOLESCENT GIRLS 15-19 YEARS WHO HAVE BEGUN CHILDBEARING BY YEAR AND WEALTH QUINTILE.

Sources: Pakistan Demographic and Health Survey (DHS) 2006-07 and 2012-13 (National Institute of Population Studies (NIPS) & ICF International, 2007, 2013).

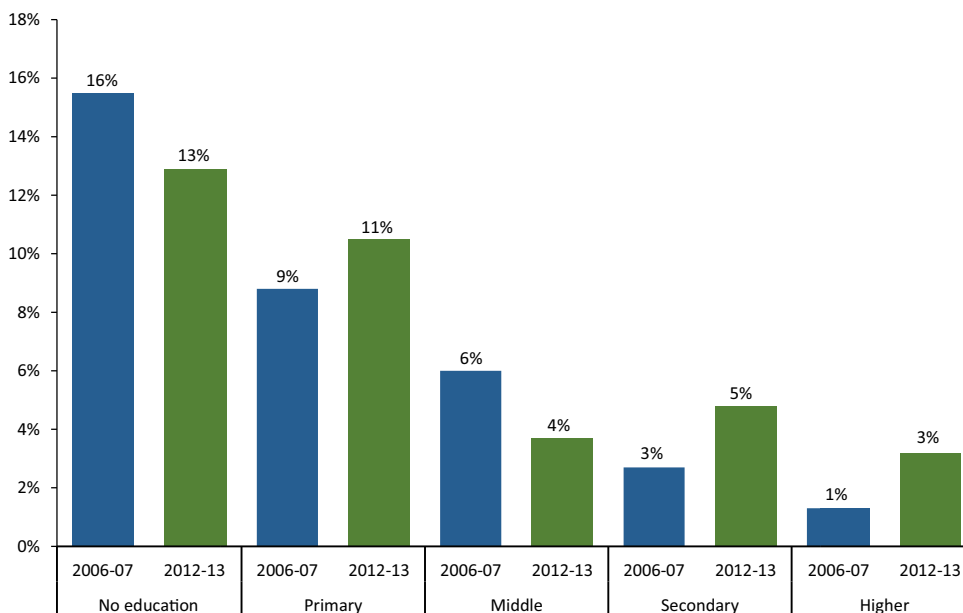


FIGURE 23: PROPORTION OF PAKISTANI EVER-MARRIED ADOLESCENT GIRLS 15-19 YEARS WHO HAVE BEGUN CHILDBEARING BY YEAR AND EDUCATION LEVEL.

Note: in 2012-13, the sample size in the higher education group was between 25-50 observations. Sources: Pakistan Demographic and Health Survey (DHS) 2006-07 and 2012-13 (National Institute of Population Studies (NIPS) & ICF International, 2007, 2013).

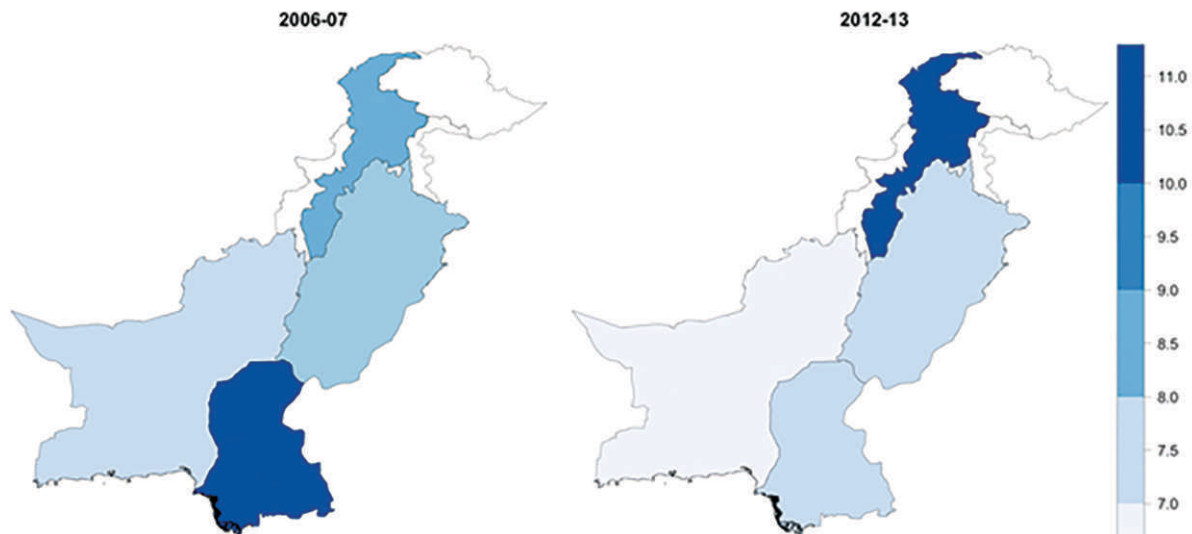


FIGURE 24: PERCENTAGE OF EVER-MARRIED ADOLESCENT GIRLS 15-19 YEARS WHO HAVE BEGUN CHILDBEARING BY YEAR AND PROVINCE IN PAKISTAN.

Note: As the survey was based on an ever-married sample, the number of women was increased using a factor based on all de facto women listed in the household who had never been married. The “all women” factors were based on age in the household and background information available at the household level. Sources: Pakistan Demographic and Health Survey 2006-07 and 2012-13 (National Institute of Population Studies (NIPS) & ICF International, 2007, 2013).

3.4 Adolescent Access to Health Services in Pakistan

3.4.1 Sexual and Reproductive Health

In Pakistan, many adolescents lack information regarding sexual and reproductive health issues and rights, partly due to social and religious taboos. Various surveys highlight the need for improved availability and accessibility to contraception and family planning services for young married women and girls across the country. They also highlight barriers towards access to reproductive health services in Pakistan.

The 2012-13 DHS shows that only 13% of married adolescents 15-19 years used some type of traditional or modern family planning, with traditional methods such as rhythm (0.3%) and withdrawal (7%) and use of modern methods such as use of condoms (6%) as preferred methods, illustrating challenges in accessing family planning services and products (National Institute of Population Studies (NIPS) & ICF International, 2013). Adolescent girls also had lower exposure to family planning methods through media or health services, compared with older women and adolescent boys. They were less likely to know their local health service provider or health worker, or receive services from them than older women (National Institute of Population Studies (NIPS) & ICF International, 2013).

In 2013, Care International and RAF conducted research on the knowledge and practices of reproductive and sexual health needs of adolescent girls and young mothers 15-24 years, including their priority needs and the barriers impeding their access to maternal-newborn health and sexual reproductive services (CARE International Pakistan & Research and Advocacy Fund (RAF), 2013). The findings reveal that the use of government health facilities for maternal care, sexual reproductive health counselling and family planning services is low when compared

to the utilization of such services from the private sector. The main underlying factors identified during focus group discussions included lack of awareness of these services within public health facilities; poor accessibility regarding distance and time of travel; the 'non-cordial attitude' of public health staff; over-crowding and long waiting times; and cost. In terms of cost, respondents reported concern for the expense of traveling to the hospital service, rather than the cost of the service itself.

Similarly, the [United Nations Population Fund \(UNFPA\)](#) identified that lack of knowledge about services, feeling shy, or fear of community judgment were the reasons why adolescent girls chose not to seek reproductive health services (United Nations Population Fund, 2016).

A qualitative study among more than 500 girls 10–19 years—representing the poorest and most vulnerable of their communities across 14 countries, including Pakistan—created a platform for girls to voice their unique insights, opinions, and ideas (Warner et al., 2013). Several themes were identified and categorized into identity, environment, assets, and opportunities. Key issues raised in Pakistan were that girls feel their behaviour is restricted both to preserve family reputation and to ensure their safety and the burden of household chores, limiting their access to education and job opportunities. Pakistani girls also felt that many decisions were beyond their control, such as the decision to continue their education, find a job, move around the community, or choose their own spouse. Girls talked about their fears regarding forced or arranged marriages: One girl said, “Parents think that children are their property. Even if a girl is not in agreement, they force her to give consent for marriage”. Another girl described the lack of respect she felt girls received in her community compared to boys by saying, “I wish I were a boy so that I could live freely like boys and not be restricted like girls”. In terms of access to health services, Pakistani girls, in particular, felt that they lacked access to support and people they could trust within their communities. They often felt helpless to make the right choices or to effect change. One girl stated that “people gossip if a girl visits a doctor, so parents tend to avoid it”. Furthermore, girls worried about the cost of transportation to health services, saying, “after paying for transport to get there, there's no money left to pay the doctor”.

A small cross-sectional study among students 11-19 years in both government and private institutions in the Peshawar District shows that about half the adolescents had 'moderate' awareness regarding adolescent health and about half had a 'good' level of awareness, with better knowledge among girls than boys. Government schools had a stronger influence than private schools, and the role of friends was much more important than parents and teachers. teachers (Iftikhar et al., 2016).

3.4.2 Antenatal Care and Birth Attendance

The 2012-13 DHS shows that one-fifth (24%) of women aged 15-49 years did not receive antenatal care (ANC) visits¹⁶, 13% received one visit, 26% received two to three visits, and 37% received four visits or more (National Institute of Population Studies (NIPS) & ICF International, 2013). There was a wide disparity in the proportion of women receiving four or more ANC visits between locality and wealth quintiles. As shown in Figure 25, nearly one-third of rural women 15-49 years did not receive any ANC visits, and two-thirds of urban women compared to one-quarter of rural women received at least four ANC visits.

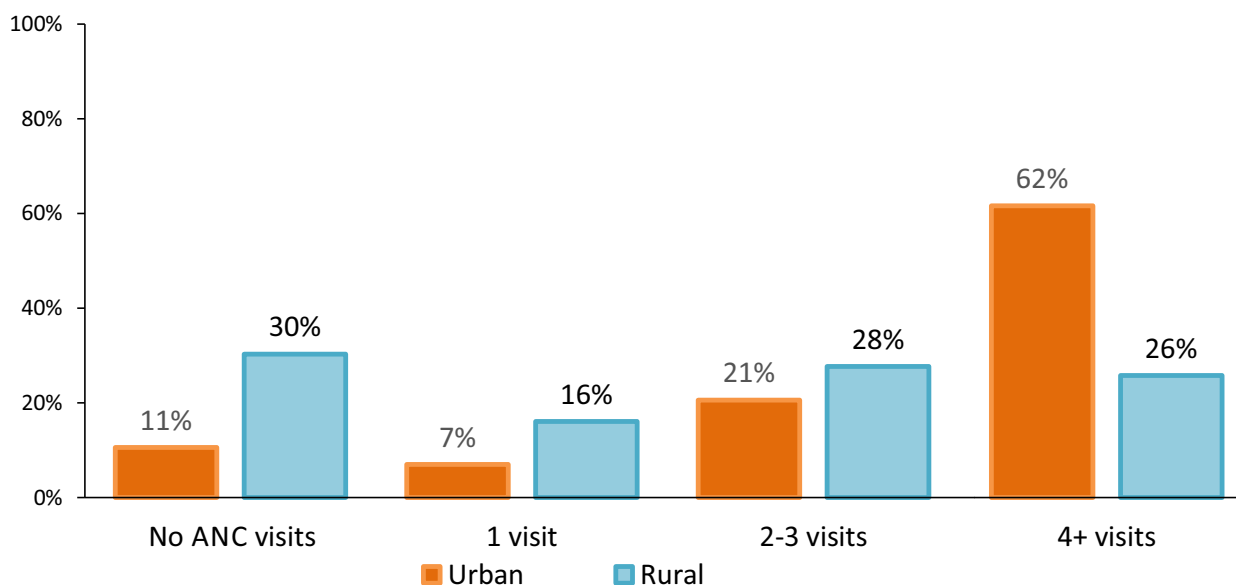


FIGURE 25: NUMBER OF ANTENATAL CARE (ANC) VISITS AMONG WOMEN 15-49 YEARS WHO HAD A LIVE BIRTH IN THE LAST 5 YEARS IN 2012-13 BY LOCALITY.

Source: Pakistan Demographic and Health Survey (DHS) 2012-13 (National Institute of Population Studies (NIPS) & ICF International, 2013).

The 2012-13 DHS shows that 21% of married adolescent girls 15-19 years did not receive ANC visits, and 76% received antenatal care from a skilled provider¹⁷(National Institute of Population Studies (NIPS) & ICF International, 2013). Analysis of DHS data for adolescent performed by Salam et al (2014) shows that only 35% of pregnant girls in 15-19 years age group received four ANC visits, ranging from 18% for the poorest quintile to 73% for the richest quintile(Salam et al., 2014).

The 2012-13 DHS shows that 55% of women aged 15-19 years gave birth with a skilled provider, with large discrepancies between wealth quintiles and geography. Skilled birth attendance for deliveries in this age group increased from 37% in 2006-07 to 55% in 2012-13(National Institute of Population Studies (NIPS) & ICF International, 2007, 2013). The proportion of women 15-19 years delivering low-birth-weight¹⁸ infants, which is an important determinant of their survival chances, was around 29%. Two-thirds (59%) of women aged <20 years brought their babies for post-natal check-ups in the first two days after birth, whereas more than one-third (38%) did not receive a check-up within 40 days of birth.

¹⁶ Among women who had a live birth in the last 5 years.

¹⁷ Skilled provider includes doctor, nurse, midwife, and lady health visitor.

¹⁸ Defined as < 2.5 kg.

3.4.3 Use of Supplements and Deworming Medication

The 2012-13 DHS collected data on the use of vitamin A and iron-folic acid supplements among women 15-49 years with a child born in the past five years, as well as the use of deworming medication during the last pregnancy. Among adolescents aged 15-19 years with a child born in the past five years, 12% received a vitamin A dose postpartum. However, the WHO no longer recommends high-dose vitamin A supplementation postpartum. Use of iron tablets or syrup was low. Over half (53%) of women did not take any and only one-fifth (22%) took iron supplements for more than 90 days, as recommended. Use of deworming medication during the last pregnancy was very rare among all women, including adolescent girls 15-19 years (1.0%).

3.5 Physical Activity

The 2009 GSHS provides self-reported frequency of physical activities for school-going adolescent boys and girls primarily 13-15 years (WHO, 2009). As shown in **Figure 26**, boys were more active than girls, with a higher proportion active for at least one hour five days a week, walking or biking to school, and participating in physical education at school at least three times a week.

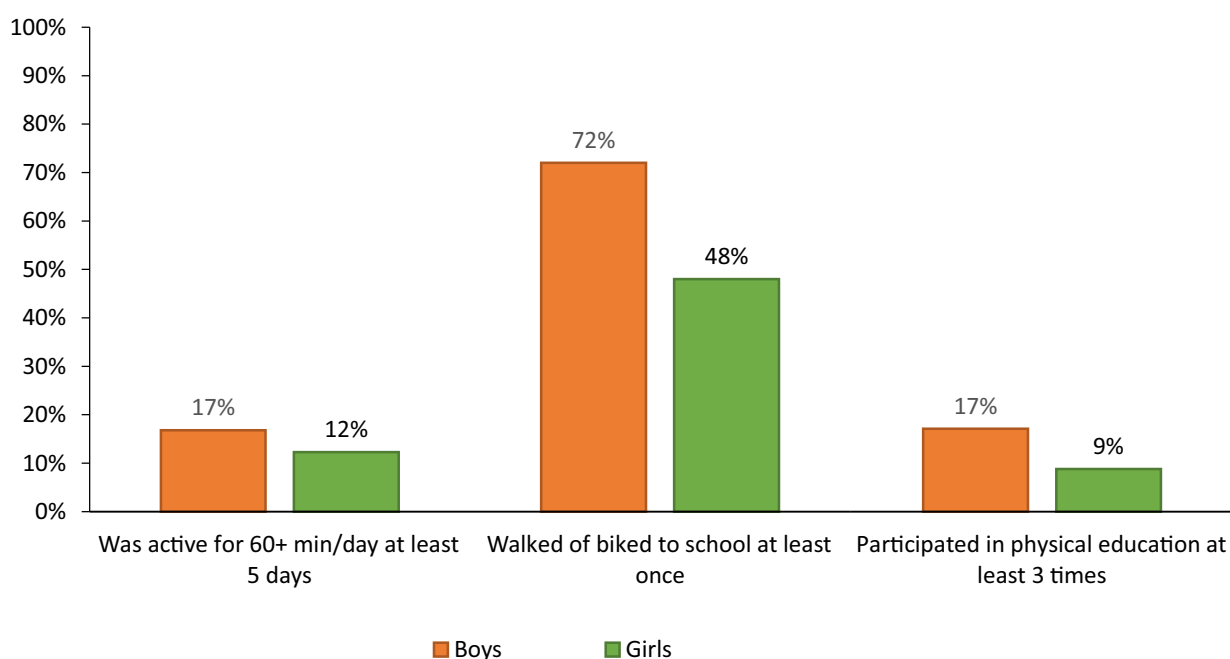


FIGURE 26: REPORTED PHYSICAL ACTIVITY IN THE PREVIOUS 7 DAYS AMONG SCHOOL-GOING BOYS AND GIRLS PRIMARILY 13-15 YEARS.

Data source: 2009 Global School-Based Student Health Survey (GSHS)(WHO, 2009).

Several small-scale, observational studies among Pakistani adolescents, describe low physical activity (Aziz et al., 2009; Ishaque et al., 2012; Mushtaq, Gull, Mushtaq, et al., 2011; Rizwan et al., 2011), poor self-rated athletic ability (Ahmed et al., 2013), and increased screen time (Ishaque et al., 2012) as determinants for overweight/obesity.

4 Conclusion

4.1 Summary of Findings on Nutritional Status and its Determinants

Data on adolescent nutrition in Pakistan exists but is limited in scope and quality. While it is not possible to paint a complete picture, there are many findings that provide clear guidance for programs and reveal knowledge gaps urgently needing attention. Both undernutrition and overweight/obesity are highly concerning in adolescent boys and girls. It is difficult to discern clear trends over time from existing data, but there appears to be little progress in nutritional status overall: Some markers have improved while others deteriorated. However, determinants of malnutrition seem to be improving, which suggests future nutritional data may show progress.

Based on limited data on school-going adolescents 13-15 years, girls appear to have a higher burden of stunting and overweight/obesity than boys, while boys have a marginally higher burden of thinness. However, these trends may not hold for all adolescent age groups or those out of school. Or they may be more severe. The high uncertainty and limited age ranges of existing data do not allow for identifying which anthropometric indicators most are concerning for adolescents. There are clear patterns of thinness and overweight/obesity by locality for older adolescent girls and women, and these likely hold for younger adolescent girls and adolescent boys of all ages: Thinness is much higher in rural than urban areas and overweight/obesity higher in urban than rural areas. Anthropometric data on adolescents is not powered to detect differences between geographies or wealth quintiles.

Micronutrient deficiencies and related diseases among adolescents remain high, but evidence is limited to biochemical data from a small, underpowered sample of older adolescent girls. Based on this data, anaemia and deficiencies in folic acid, zinc, and vitamin A are alarming. When including the larger sample of women of reproductive age, deficiencies in iodine, calcium, and vitamin D are also alarming. Night blindness is surprisingly high in women of reproductive age and appears to be increasing.

The primary causes of malnutrition in adolescence include malnutrition during childhood, inadequate diets, low physical activity, and infections. In Pakistan, many contextual factors influence these immediate causes, including wealth, education, geography, food security, nutritional knowledge, and access to health services. Childhood malnutrition in Pakistan is exceptionally high, so when children enter adolescence, many are already fighting an uphill battle.

Adolescent diets in Pakistan are generally poor, inadequately diverse, consisting overwhelmingly of wheat and low in fruits, vegetables, pulses, potatoes, meat, and eggs. While they consume dairy regularly, which is generally healthy, they also consume high amounts of unhealthy foods, such as sweetened soft drinks, fast foods, and energy-dense snacks. Based on limited data, it appears that mothers are the primary decision-makers regarding the purchase of packaged foods, and their nutritional knowledge is lacking. Food is increasingly being consumed outside the home.

There are many important distal determinants that impact adolescent nutrition through dietary or other pathways in Pakistan. School attendance has increased but is still very low, especially in poor households, rural areas, and Balochistan. Literacy is highly dependent on wealth, and boys are far more likely to be literate than girls, especially in Balochistan. Child marriage and

adolescent pregnancy are declining but still common in girls from low-income, rural, and poorly educated households. Adolescents have low access to sexual and reproductive health as well as antenatal care services, particularly in low-income, rural, and poorly educated households. Adolescent boys are more physically active than girls, but many boys and girls fail to obtain adequate exercise.

4.2 Knowledge Gaps

There is very little nutritional data that is based on surveys that were designed and powered for adolescents in Pakistan, especially nationally representative data. The data that do exist are often only on a subgroup of adolescents, usually older adolescent girls. The recent uptick in concern for adolescent nutrition globally and in Pakistan provides an opportunity to modify regularly conducted nationally representative surveys to include the entire adolescent age group of girls and boys 10-19 years. The MoNHSRC shared that district-based gender segregated information on adolescent nutrition will be available at the population level through both quantitative and qualitative assessments in the upcoming NNS 2018. The information on adolescent nutrition will be captured in the next NNS 2018 for the first time with segregated data on nutritional status of adolescents (height, weight, MUAC), anaemia, and goitre (clinical examination). Additionally, the information on minimum dietary diversity will be collected from women of reproductive age (15-49 years). The qualitative section will include focus group discussions with adolescent girls and boys.

Box 2: Large datasets and gaps for adolescent nutrition

Existing Large and Small Scale Data/Surveys				
Data Source	Theme	Subgroups with Existing Data	Limitations	Data gaps
GSHS, 2009 (WHO, 2009)	Anthropometry	· School-going boys and girls (primarily 13-15 years)	· Does not include adolescents out of school · Age by year instead of month	· School-going boys and girls 10-12 years and 16-19 years · Data on adolescents 10-19 years not in school
	Anaemia And Micronutrient Deficiencies	· NA	· NA	
	Dietary Intake	· School-going boys and girls (primarily 13-15 years)	· Self-reported data from written down measurements · Based on frequency per week or month · Lack of indicator for nutrient adequacy such as minimum dietary diversity · No information on quantities consumed	
DHS, 2012-2013 ¹⁹ (National Institute of Population Studies (NIPS) & ICF International, 2007, 2013)	Anthropometry	· Ever-married Pakistani adolescent girls 15-19 years	· Very small sample size, not powered or stratified for adolescents	· Non- ever-married Pakistani girls 15-19 years · Adolescent girls 10-14 years · Adolescent boys 10-19 years
	Anaemia And Micronutrient Deficiencies	· Ever-married Pakistani adolescent girls 15-19 years	· Very small sample size, not powered or stratified for adolescents	
	Dietary Intake	· NA	· NA	
NNS, 2011 (Aga Khan University & UNICEF, 2011)	Anthropometry	· Non-pregnant girls 15-19 years, married and unmarried	· Very small sample size, not powered or stratified for adolescents	· Adolescent girls 10-14 years · Adolescent boys 10-19 years
	Anaemia And Micronutrient Deficiencies	· Non-pregnant girls 15-19 years (anaemia, folic acid, zinc & vitamin A) · Women of reproductive age 15-19 years (iodine and zinc) · Non-pregnant mothers 15-19 years (anaemia, calcium, vitamins A & D, urinary iodine & night blindness)	· Very small sample size, not powered or stratified for adolescents · Data disaggregated by adolescents not publicly available	
	Dietary Intake	· Non-pregnant girls 15-19 years, married and unmarried	· Very small sample size, not powered or stratified for adolescents	

¹⁹ The PDHS 2017-18 also focuses on WRA (15-49 years). No separate information on adolescents.

Box 2: Large datasets and gaps for adolescent nutrition

Existing Large and Small Scale Data/Surveys				
Data Source	Theme	Subgroups with Existing Data	Limitations	Data gaps
NNS 2018 (in prog)	Anthropometry	· Adolescent boys and girls 10-19 years	· NA	<ul style="list-style-type: none"> · Lab assessment for anaemia in Adolescent boys 10-19 years · Minimum food diversity for girls 10-14 & boys 10-19 years
	Anaemia And Micronutrient Deficiencies for girls 15-19 Years	<ul style="list-style-type: none"> · Assessment of Clinical anaemia and goiter for boys and girls 10-19 years · Blood and urine assessment for girls 10-19 years 	· Lab assessment for anaemia and other micronutrient deficiencies not included	
	Dietary Intake	<ul style="list-style-type: none"> · Minimum food diversity for girls 15-19 years · Qualitative assessment on dietary habits, FGD Including boys and girls 	· Very small sample size not powered for adolescent girls and boys	
HIES 2015-16	Anthropometry	· NA	· NA	· NA
	Anaemia and Micronutrient Deficiencies	· NA	· NA	· NA
	Dietary Intake	· Food Consumption Survey	· The unit is household. Data is not available for individuals	· No specific data for sub group (age bracket)
Pakistan Rural Household Panel Survey (PRHPS) - 2014	Anthropometry	· NA	· NA	· NA
	Anaemia and Micronutrient Deficiencies	· NA	· NA	· NA
	Dietary Intake	· Dietary Diversity	· Only for rural households	· NA
FCS - 2014-2015 (Aga Khan University, 2015)	Anthropometry	· NA	· NA	<ul style="list-style-type: none"> · Nationally representative sample of adolescent girls 10-19 years · Adolescent boys 10-19 years
	Anaemia and Micronutrient Deficiencies	· NA	· NA	
	Dietary Intake	· Adolescent girls 10-19 years in two districts of Pakistan	<ul style="list-style-type: none"> · Lack of indicator for nutrient adequacy such as minimum dietary diversity · No information on quantities consumed 	

4.3 Prioritised Future Research Agenda

The methodological problems with anthropometric indicators discussed—and the consequential large difference in prevalence estimates between younger and older adolescents—suggests that collecting anthropometric data on the larger age group of 10-19 years will provide more representative estimates than select age groups of boys or girls. New surveys should also be designed specifically for adolescents to allow for regular monitoring of progress over time.

If feasible, anaemia and micronutrient status (biological samples) should also be regularly measured in adolescent boys and girls of all ages. Surveys on adolescents should be disaggregated by wealth, education, and geography to allow for better targeting of vulnerable groups.

Box 3: List of prioritized research areas for adolescents

Prioritized Research Areas for Adolescents

- Integrate adolescents (both boys and girls) in existing large-scale surveys.
- Develop national standards, including cutoff points for BMI. Devise standardized indicators and data collection tools for measuring, assessing, and monitoring health and nutrition.
- Study neglected micronutrient deficiencies (e.g., folate, zinc, calcium, and vitamin D) in adolescents.
- Explore and analyze in-depth the determinants of undernutrition in adolescents and their relative importance in various conditions, particularly among younger boys and girls (10-14 years).
- Determine the dietary patterns, minimum dietary diversity and dietary habits, including aspirations and motivations of adolescent boys and girls.
- Conduct longitudinal studies on the effect of multiple micronutrient supplementation and or food supplementation during adolescence on maternal nutrition outcomes.
- Conduct studies on identifying underlying causes of and potential policy responses to adolescent overweight and obesity.

There is also a need to collect more comprehensive data on the identified determinants of adolescent malnutrition that are capable of being disaggregated by key subgroups. Dietary data specific to adolescents across settings and representative of the general population is particularly needed. At the national level, only food availability and purchasing data exist, and data on adolescents is limited to small, context-specific studies of select age groups and foods. New dietary data should capture aspects of dietary quality such as nutrient adequacy and food consumption patterns. Collecting data on nutritional status and its determinants in the same surveys is essential to allow for statistical association analysis, which will improve our understanding of the importance of various determinants. This may also inform and allow for the tailoring of interventions to address determinants of particular concern to specific adolescent subgroups.

4.4 Implications for Policies and Programs

The presence of the double burden of malnutrition in Pakistani adolescents and their numerous interrelated determinants makes it challenging to identify clear interventions points that will have the greatest impact with the most efficient use of resources. Furthermore, nutrition and related data on Pakistani adolescents is limited to select subgroups and often not powered for adolescents. Therefore, inferences into programmatic guidance synthesized from incomplete data require some guesswork. The following programmatic recommendations are provided.

Box 4: Policy Implications.

Recommendations

- Collect more information on adolescents: Collect nationally representative data on adolescent health and nutrition.
- Take a life course approach: Address nutrition in women and children under 10 years, with a continued focus on the first 1,000 days and early childhood development, which influences adolescents.
- Invest in adolescents: In addition to the continued focus on younger children and mothers, investments should be made in adolescents specifically.
- Focus on adolescent girls: Reducing malnutrition in adolescent girls should be a priority, because they are socially and biologically vulnerable, and because their nutritional status has a large impact on future generations.
- Do not forget adolescent boys: They have a bigger growth spurt than girls and experience a high burden of malnutrition owing to increased nutrient requirements. Moreover, they are half the demographic, capable now and in the future of challenging gender norms and relations that inhibit the status and rights of women and girls.
- Provide iron and folic acid supplementation: Cater inside and outside the health system to fight the high prevalence of anemia among girls and boys.
- Run nutrition awareness programs for and with input from adolescents: Focus on age-appropriate, culturally-relevant information, using adolescent-friendly communication channels.
- Develop a multi-sectoral adolescent nutrition strategy and costed plan: Focus on school enrolment and literacy, reducing child marriage and early pregnancy, improving access to health services, WASH and livelihood interventions. Prioritize rural, low-income, and poorly-educated households. Such a strategy could supplement existing multi-sectoral nutrition strategies at the national and provincial level.
- Develop policies addressing dietary quality: Micronutrient density of the food supply must be substantially increased to meet requirements.

Nutrition in children under 10 years needs to be addressed, with a continued focus on the first 1,000 days and early childhood development. Children who enter adolescence with existing malnutrition are far more likely to experience malnutrition during adolescence. Programming should not be taken away from younger children and redirected to adolescents. Rather, additional investments should be made in adolescents specifically. Investing in adolescents provides more equitable distribution of nutritional benefits to multiple cohorts of children and the opportunity to reach those who were malnourished throughout early childhood. Reaching

adolescents is essential to curb the nutrition transition and halt increases in overweight/obesity and related non-communicable diseases seen in much higher numbers in adults.

Adolescent girls of all ages need to be prioritized to reduce undernutrition and overweight/obesity, since their burden of both appears to be higher than boys, and because their nutritional status has a larger impact on future generations. Iron and folic acid supplementation should be catered inside and outside the health system to fight the high prevalence of anaemia among girls and boys. Cultural gender norms facilitate a pattern for girls of low education and literacy, young marriage and childbearing, inadequate access to health services, and inadequate diet and physical activity. Programs to improve school enrolment and literacy, child marriage and pregnancy, and access to health services should prioritize rural, low-income, and poorly-educated households. Additionally, a conscious effort on education is needed in Balochistan.

Policies addressing dietary quality are essential: Micronutrient density of the food supply must be substantially increased to meet requirements without facilitating overconsumption. There is a need to reduce adolescent consumption of unhealthy junk foods and soda, especially in urban areas—the Provincial Food Authorities have begun regulating junk food and soda consumption in Punjab. It is important to limit access to these foods in and near schools, educate mothers on the harmful consequences of their consumption, and regulate marketing of these foods to children and adolescents. Undernutrition remains common, particularly in rural areas, and programs are still needed that improve access to nutritious foods so that vulnerable groups can obtain adequate energy, protein, and micronutrients. The Ministry of Planning, Development and Reforms has developed the “Pakistan Dietary Guidelines for Good Nutrition 2018,” which should guide future nutrition programming.

The focus on gender equity should not exclude adolescent boys from nutrition programs as they are future spouses and fathers, capable of challenging cultural norms and raising the status and rights of women. Furthermore, there is little data on the nutritional status of adolescent boys, who may also experience a high burden of malnutrition due to increased nutrient requirements. Collecting nutrition data on adolescent boys will allow for more informed decisions on which subgroups are most vulnerable.

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