Diet and Eating Practices among Adolescent Girls

in Low- and Middle-Income Countries

A Systematic Review

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Diet and Eating Practices among Adolescent Girls in Low- and Middle-Income Countries

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ABSTRACT

Adolescent girls in low-and middle-income countries (LMIC) have poor nutrition profiles, including high risks for undernutrition, overweight/obesity, and micronutrient deficiencies. To better understand the current dietary intake and practices of adolescents in LMIC, we undertook a large-scale systematic review. We identified 288 studies which passed the inclusion and exclusion criteria. Foods were grouped according to an adapted version of the Food and Nutrition Technical Assistance (FANTA III) *Minimum Dietary Diversity Guide for Women*. We found that the diet quality of adolescent girls in LMIC is generally poor. Fruit and vegetable intake is vastly inadequate, and girls are consuming high-fat and calorie-rich foods that are likely to be contributing to the rise in overweight and obesity, especially among younger adolescents (10–14 years). In South Asia and Africa, protein intake is inadequate and fat intake is low—factors which may contribute to the prevalence of underweight in these regions. Overall, breakfast skipping and snacking are highly prevalent among adolescent girls of all ages. Along with obesity prevention initiatives, school-based policies should be mandated to limit the availability of unhealthy foods throughout the day. School meal programs should be considered for vulnerable or low-income populations.

KEY MESSAGES*

- A slightly higher proportion of younger adolescents (10–14 years) are overweight or obese compared to older adolescents (15–19 years).
- For most regions, with the exception of South Asia and Europe and Central Asia, overweight and obesity prevalence surpasses that of underweight.
- Energy-dense foods, including sweet and salty items, sugar sweetened beverages, and fast foods, are widely consumed
- Significant differences exist among adolescent girls in different regions. For example:
    - 90 percent of adolescent girls in South Asia do not consume an adequate diet of fruits or vegetables
    - 40 percent of adolescent girls in Latin America and the Caribbean consume fast/convenient foods daily.
- Protein intake is inadequate among older adolescents in Africa
- Energy intake is lowest for urban poor populations.
- 50 percent of adolescent girls in LMIC do not eat 3 meals per day; most skip breakfast.
- Snacking (eating/drinking between meals) is common, and takes place during school hours.
- Lunch is consumed away from the home; compared to younger adolescents, older adolescents are more likely to eat away from home on a daily basis.

**Note: All findings pertain to adolescent girls. Boys were not included in this review.*

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ACRONYMS

AA-HA!	Global Accelerated Action for the Health of Adolescents
AI	adequate intake
BMI	body mass index
FANTA	Food and Nutrition Technical Assistance
FFQ	food frequency questionnaire
GBD	Global Burden of Disease
GII	Gender Inequality Index
HIC	high-income country
IAP	Independent Accountability Panel
IOM	Institute of Medicine
IOTF	International Obesity Task Force
IQR	interquartile range
LMIC	low- and middle-income countries
NCD	noncommunicable disease
NIH	National Institutes of Health
RCT	randomized controlled trials
RDA	recommended daily allowance
SD	standard deviation
SE	standard error
SSB	sugar-sweetened beverages
WHO	World Health Organization

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STUDY OVERVIEW

Adolescence marks a critical period of biological and psychosocial growth and development that is unique among phases in the life cycle. The nutrient needs of adolescents are higher than those of prepubescent children and adults.[1] Given the increasing autonomy in diet and eating habits that adolescents experience as parental control lessens, adolescence can be a key entry point for interventions that will underlie good health practices in adulthood. The 2013 *Lancet* series on maternal and child undernutrition highlighted adolescence as a priority on the global health agenda and underscored the need for a life-cycle approach that promotes nutrition-related policies, programming, and interventions for this group specifically.[2]

Adolescent girls in low- and middle-income countries (LMIC) have poorer nutritional profiles compared to their counterparts in high-income countries (HICs), including greater risks for undernutrition, overweight/obesity, and micronutrient deficiencies.[3-5] In many LMICs, the prevalence of overweight/obesity surpasses that of underweight, aligning with the nutrition transition that is now sweeping the globe.[6, 7] Moreover, poor diet is a key risk factor for noncommunicable diseases (NCDs), which have been of growing concern in many LMIC.[6] Additionally, given the high number of pregnancies among adolescent girls, combatting malnutrition is important to improve reproductive and birth outcomes. Undernutrition in adolescent mothers, also has an intergeneration effect[1]. Often represented by stunting, undernutrition can lead to fetal growth restriction, low birthweight, and preterm birth, which, in turn, increase the chances of childhood stunting.[3, 8, 9] Additionally, maternal overweight and obesity has been shown to increase the risk of infants developing obesity and metabolic diseases later in life.[10, 11] Both points highlight the role that adolescent nutrition plays in perpetuating an intergenerational cycle of malnutrition.

Adolescents comprise one in six of the global population today;[12] the health and wellbeing of this population is critical to achieving the Sustainable Development Goals (SDGs). A recent report from the United Nation's Independent Accountability Panel (IAP) for the 2015 Global Strategy for Women's, Children's, and Adolescents' Health—a group appointed to provide an independent assessment of progress and challenges in implementing this strategy—focused on the importance of improving accountability for adolescents to achieve the SDGs.[12] The IAP provided specific recommendations, including improving the visibility of adolescents, ensuring universal health care reaches them, and fostering government accountability to combat chronic conditions, such as malnutrition and NCDs, in adolescent girls.[12] The IAP acknowledges that investing in adolescents now will have enormous impact for generations to come.

However, the nutrition status of adolescents has been neglected. Evidence syntheses on diets and eating practices of adolescents are very limited and are mostly based on adolescents living in high-income settings. Therefore, the objectives of this review are to summarize the current dietary intake, patterns, and practices of adolescent girls in LMIC.

OBJECTIVES

The aim of this systematic review is to summarize current dietary intakes, patterns, and practices of adolescent girls (ages 10–19 years) in LMIC. The objectives are to—

1. synthesize and critically appraise current literature on dietary intake (e.g., types of foods consumed, quality of food), eating practices (e.g., time, place, and frequency of consumption) and patterns (e.g., snacking, skipping meals) of adolescent girls in LMIC.
2. summarize available information to develop a call to action and key recommendations for policies, programming, advocacy, or further action.

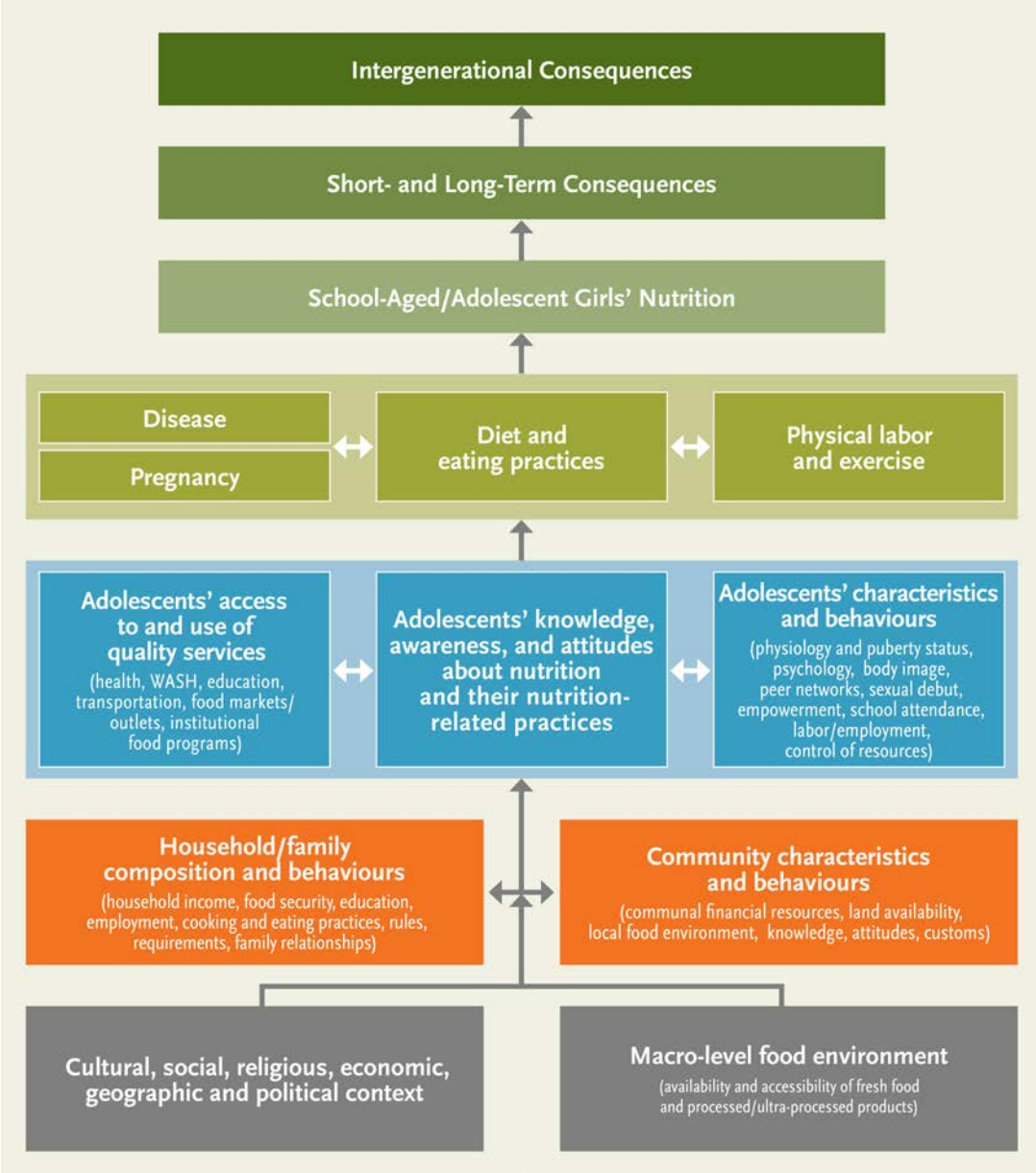
CONCEPTUAL FRAMEWORK

The conceptual framework for adolescent girls' nutrition (figure 1) is an overarching guide developed to understand the determinants of adolescent girls' dietary intake, and the short-term, long-term, and intergenerational impacts of diet and eating practices. The framework was developed by the review authors and a technical advisory group formed by the United States Agency for International Development (USAID)-funded Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) project.

The most distal determinants are macro-level factors [grey boxes] that can impact food choices and food security, and may include circumstances such as conflict and displacement—two situations that can significantly affect a food system. Other underlying determinants include country-level policies, agriculture and food production, cultural beliefs, and economics relating to food systems. Next are factors at the community and the household/family level [orange boxes], such as household income, gender equity, emotional and physical safety, engagement in learning, family cohesion, and other such socio-economic factors that influence cooking and eating practices. Each of these factors comprises the household/community food environment that will impact an individual's food choices. Finally, there are factors that are specific to adolescents [blue boxes], including physiological and psychosocial characteristics, such as puberty status, social networks, sense of wellbeing, and decision-making skills, in addition to access to quality services. Determinants at each of these levels potentially influence adolescents' diet and eating practices. The framework also highlights

factors that interact directly with diet and eating practices, including disease or pregnancy, and physical labor/exercise.

Figure 1. Conceptual Framework for Adolescent Girls' Nutrition



This review specifically addresses several components of the conceptual framework, namely the current dietary intake and eating practices of adolescent girls. We have partially addressed adolescents' characteristics by examining the current BMI status of adolescent girls. We have also partially addressed more distal determinants that feed into adolescent girls' nutrition by examining country/study context (urban/rural residence, income level, and level of gender inequality) as it relates to the macronutrient and energy intake of adolescent girls.

OUTCOMES OF INTEREST

Primary Outcomes:

- Types of food consumed
- Frequency of consumption
- Place of consumption
- Meal patterns
- Macronutrient intake
- Energy intake

Secondary Outcomes:

- BMI status

METHODS

Search Strategy

We used an adapted PICO methodology (Appendix I, table 1) to transform our research question into a searchable query. For the “intervention” bracket, we specified, “diet and eating practices/patterns,” to capture the main content of the review. We did not restrict our search by outcome to broaden the scope of evidence retrieved. Using the search strategy and terms outlined in table 2 of the Appendix, we adapted and ran the search in seven databases: Medline, Embase, CAB Abstracts, CINAHL, Cochrane (CENTRAL Register of Controlled Trials and Database of Systematic Reviews), 3ie Databases of Impact Evaluations, WHO regional databases (WHOLIS). The date of the last search was March 31, 2017 for Medline, Embase, CAB, and CINAHL, and April 27, 2017 for all remaining databases.

Study Selection

All titles and abstracts were independently screened, applying the specific inclusion/exclusion criteria outline below (table 1). All full-text screening and data abstraction were completed in duplicate.

Table 1. Inclusion and Exclusion Criteria

INCLUSION
☐ Low- or middle-income country setting
☐ Must include, but is not restricted to, an adolescent population (10–19 completed years)
☐ Reports on one of the following: • Types of food consumed • Food composition • Dietary diversity • Meal patterns • Place consumed (e.g., school, home, community center) • Frequency of consumption • Energy or macronutrient intake • Micronutrient intake
☐ Relevant study types/designs: • Observational studies (e.g., cross-sectional, cohort, case-control) • Randomized controlled trials (RCT) with a control arm or baseline nutritional data • Surveys • Program evaluations • Qualitative research studies • Descriptive program/government documents
☐ Data collection in 2007 or later
EXCLUSION
☐ High income setting
☐ Population includes boys only; or the study does not disaggregate outcome data by sex
☐ Unhealthy study population (e.g., populations with chronic or genetic diseases such as HIV, TB, or metabolic disorders)
☐ Experimental study designs (e.g., RCT) that do not have a “standard of care” or “usual practices” arm
☐ Data collection prior to 2007
☐ Non-English language

Data Synthesis and Analysis

For each outcome of interest, data were synthesized and results were presented in qualitative (descriptive) or quantitative (tables of weighted means/prevalence) format. All analyses were weighted by sample size to account for varying study sizes. Where reporting of estimates was not uniform across studies, conversions were made to pool data (e.g., median [IQR] converted to mean [SD]).[13] For individual studies that reported results by subgroup only (i.e., no aggregate estimate provided), we calculated one weighted estimate for use in our analysis. Our pooled results were disaggregated by discrete age bands (10–14, 15–19) and by region (according to World Bank 2017 classifications), where the sample

was large enough to provide meaningful results. To categorize adolescents into either the 10–14 or 15–19 age groups, the mean participant age of the study sample must have fallen within that bracket. If the mean age was not provided, we assumed a normal distribution of the study sample and determined the age grouping based on the majority of ages (by year) that were represented in the study population. For example, a study population that was 12–15 years would be re-categorized as 10–14, and a sample that was 13–18 years would be placed in the 15–19 category. If there was an even split of participants by age (e.g., 13–16 years), then this study was analyzed in the overall (10–19) group only. Consolidated totals were provided at the bottom of every table to reflect outcomes for adolescents across all regions. A summary table, including details of study design, study population, and outcomes available per study, can be found in Appendix II - Summary of Study Characteristics.

BMI Status

For our analysis of BMI status, all BMI data were converted and categorized according to WHO, Extended International Obesity Task Force (IOTF), or Centers for Disease Control (CDC) cutoff points, depending on how the study data were presented. Using the WHO BMI-for-age growth chart for girls ages 5 to 19 years,[14] proportions of severely underweight (<-3 SD), underweight (<-2 SD), normal weight, overweight (>+1 SD, equivalent to BMI 25 kg/m^2 at 19 years), and obese (>+2 SD, equivalent to BMI 30 kg/m^2 at 19 years) were determined for each study.

IOTF uses age and sex specific cutoffs to determine BMI for girls 2–18 years. The revised cutoffs equivalent to BMI at 18 years were categorized as follows: underweight (<16 kg/m^2), normal weight, overweight (>25 kg/m^2) and obese (>30 kg/m^2).

For studies that reported weight status according to the CDC BMI-for-age percentiles for girls, status was categorized as follows: underweight: <5th percentile; normal weight: 5th–85th percentile; overweight: 85th–95th percentile; and obese: >95th percentile.

Some studies reported the proportion of sample by weight category (e.g., proportion of girls who were overweight). Study estimates were then weighted by sample size to produce an average proportion by age band and region. Where overweight and obesity prevalence were grouped together (i.e., data could not be disaggregated), data were excluded from analysis. Additionally, where data allowed, we determined mean BMI by age and region.

To evaluate the hypothesis that intake of fast foods is associated with increased BMI in adolescent girls, we pulled out studies that reported on both outcomes. We then ran ordinary least squares regression on the x (fast food intake) and y (mean BMI) variables to estimate the line of best fit and determine the associated beta coefficient. The same analysis was conducted to determine the association between fast food intake and the proportion of adolescents who are overweight and obese.

Energy and Macronutrient Intake

All energy intake data were reported as kcal per day, and presented as weighted means. Macronutrient intakes are reported for carbohydrate, fat, and protein. Data on both energy and macronutrient intake were classified as being adequate or inadequate based on guidelines outlined by the Institute of Medicine (IOM), which are age and sex-specific.[15] The recommended dietary allowance (RDA) for carbohydrates for adolescent girls ages 9–19 years is 130 g/d.[15] The RDA for protein differs for younger and older adolescents and is set at 34 g/d (for girls 9–13 years) and 46 g/d (for girls 14–19 years).[15] Currently, there is no Adequate Intake (AI), Estimated Average Requirement (EAR), or RDA for fat intake. However, the Acceptable Macronutrient Distribution Range (AMDR) for adolescents 10–18 years is 25–35 percent and for age 19 years is 20–35 percent of total energy coming from fat.[15]

Dietary Intake

Food items were categorized according to an adapted version of FANTA's *Minimum Dietary Diversity for Women: A Guide for Measurement*.[16] These categories included 1) grains, white roots, tubers, and plantains; 2) pulses (beans, peas, lentils); 3) nuts and seeds; 4) dairy; 5) meat, poultry, and fish; 6) eggs; 7) oils and fats; 8) fruits; 9) vegetables; 10) condiments and seasonings; 11) snack foods; 12) sugar-sweetened beverages (SSB); and 13) alcohol. We omitted categories for green leafy vegetables and vitamin A-rich fruits and vegetables because of data limitations. "Snack foods" were subdivided into two categories to capture their variation and to help distinguish snack foods from snacking as a meal pattern. These categories were 11a) sweet food items (including confectionary) and 11b) salty and fried food items.[17] We also added a category specific to fast food, which included foods that are typically low in quality and nutritional value. Common examples include burgers (hamburger, chicken burger), fried chicken, french fries, and pizza. Additional terms that authors may have used to describe fast foods were "junk foods" or "high fat foods." We made assumptions about fast foods where items were grouped with similar products. For example, if hamburger, chicken burger, pizza, and spring roll were grouped together and beef, fish, lamb, and chicken were grouped separately, we would assume the former to be fast foods. Such assumptions were made only when distinctions were clear.

When a food item was reported as "consumed with" another food item (e.g., lentils eaten with bread), the proportion was applied to both food groups (i.e., grains and pulses). To determine the main ingredient of any unfamiliar food (e.g., traditional dishes) we performed a Google search using the name of the food/meal and the country in which the study was conducted.

Dietary intake was measured and reported variably across all studies. We analyzed and presented consumption data in two categories: mean general consumption (for all studies) and frequency of consumption (for the subset of studies that reported frequency data). Both are presented in one table, per food group. For example, one study may have reported that 46 percent of adolescent

girls consumed fast food. Another study may have reported that 70 percent of adolescent girls consumed fast food within the last 7 days and, of this 70 percent, 6 percent consumed it daily, 24 percent consumed it two to three times per week, and 65 percent consumed it weekly. These two measures of consumption (with and without frequency data) were not pooled. Due to the inconsistent use of frequencies across studies, we standardized categories into: daily, two to three times per week, four to six times per week, weekly, or monthly.

In addition to reporting mean general consumption and frequency of consumption for fruits and vegetables, we also determined whether consumption could be considered adequate for these food groups. To be included in this analysis, a study must have reported daily intake of fruits and vegetables, along with serving size data (i.e., daily intake in grams/day). We utilized WHO recommendations of >400 grams of fruits and vegetables daily (based on five servings per day of 80 grams each), which is equivalent to two servings of fruit and three servings of vegetables per day.[18] Where studies reported fruit and vegetable consumption without associated serving size data, we could not determine adequacy.

For other food groups, comparisons to daily adequacy recommendations were not reported, due to the lack of available information specific to adolescents per region.

A sensitivity analysis was conducted to determine whether the method of primary data collection had an impact on dietary intake results. To do this, we re-analyzed mean general consumption of grains, dairy products, flesh foods, fruits and vegetables disaggregated by method of data collection (food frequency questionnaire, 24-hour recall, food records, or other non-validated tools). We chose these food groups based on their robust sample sizes for consumption data.

Meal Patterns

Breakfast skipping was defined as anything other than daily consumption of breakfast. Where a frequency was not reported (e.g., the respondent stated only “I don’t eat breakfast”), we assumed these estimates to represent frequent breakfast skipping and included them in our analysis.

We defined “snacking” as eating between meals, whether mid-morning, mid-afternoon, or evening. We excluded studies where authors defined snacking based on the type of food being consumed (e.g., chips, biscuits, fruit) rather than as a meal pattern. To be included, data must have indicated that foods were consumed between meals or as a meal replacement.

Underlying Determinants

The underlying determinants of the conceptual framework were examined by disaggregating the macronutrient and energy intake data by country-level socioeconomic status, based on national income levels specified by the World Bank as of September 2017. Data were also disaggregated by urban/rural residence. If details regarding residence of the study population were not

provided, the study was excluded from this analysis. Lastly, macronutrient and energy intake were stratified by country-level gender inequality, based on the UNDP's Gender Inequality Index (GII).[19] Considering the importance of social constructs regarding the position of young women and how they play into dietary intake and practices in many LMIC, we wanted to examine a composite measure of gender equality to determine if diet patterns changed among countries that ranked low versus high on the index. To form the index, the GII combines three main areas of human development: 1) reproductive health (measured by maternal mortality ratio and adolescent birth rates); 2) empowerment (measured by the proportion of parliamentary seats occupied by females and the proportion of adult (≥25 years) males and females who have secondary education); and 3) economic status (measured by the labor market participation rates between males and females aged 15 years or older)[1,9] Higher GII values indicate greater disparities and inequalities between genders in that country. For our analysis, countries were divided into quintiles based on their GII ranking and macronutrient intake was determined per age group and per quintile.

Quality Assessment

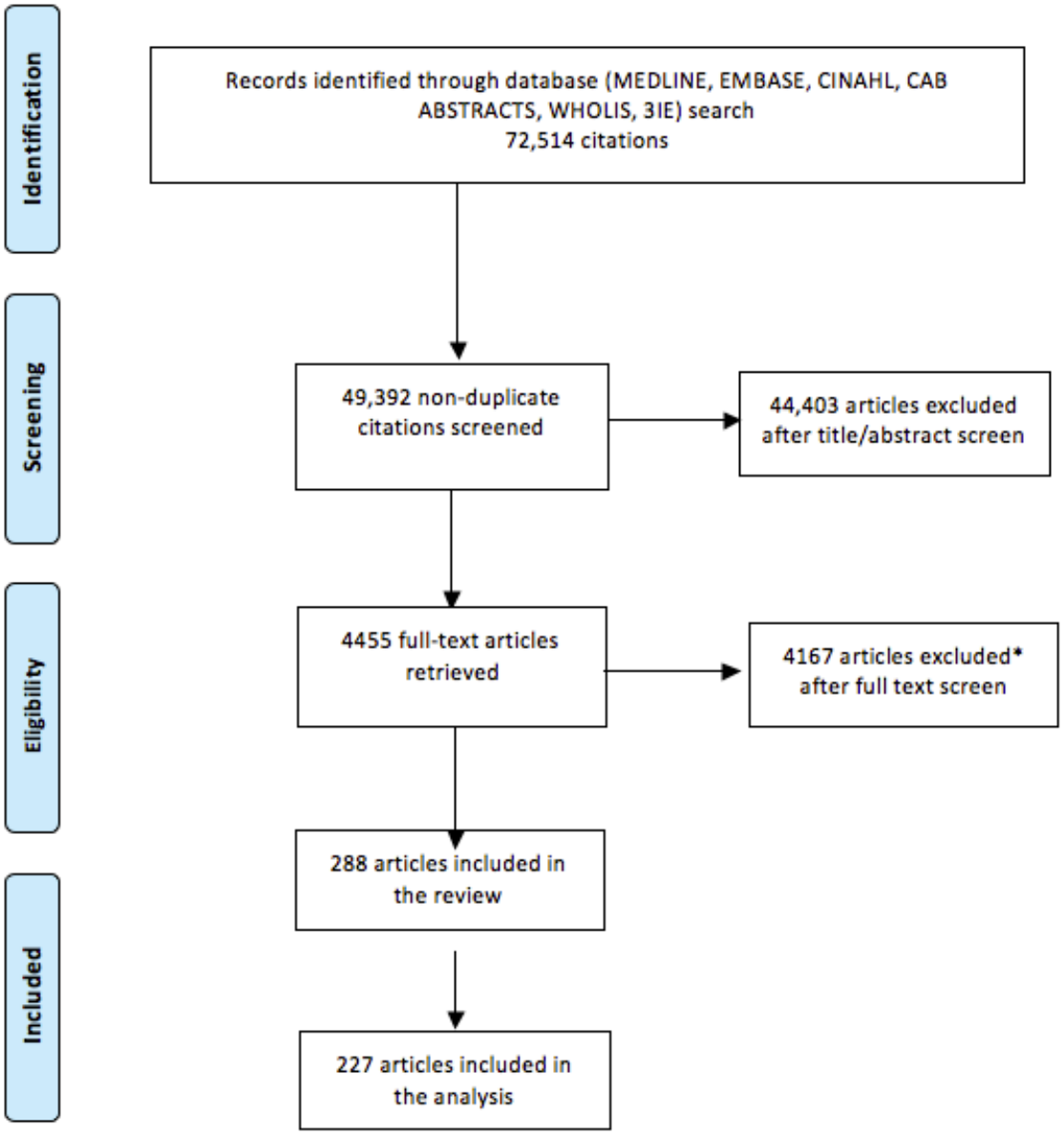
Individual studies were critically appraised according to a set of criteria based on study type, using the Cochrane Guidelines and the National Institutes of Health quality assessment tools.[20, 21] For randomized controlled trials, non-randomized controlled trials, and controlled before-after studies, we considered the following domains: sequence generation, allocation sequence concealment, blinding, incomplete outcome data, selective outcome reporting, and other sources of bias. For all study types, we considered the domains listed above (where applicable), and assessed the risk of bias due to confounding, attrition, and reverse causality. We considered whether the study population had been clearly defined (e.g., age range of population provided), the representatives of the population (e.g., what selection criteria were used), whether the study methods were clearly defined (e.g., was a validated tool used for dietary intake data), completeness of data collection, and validity of data collected (e.g., were height and weight measured or reported). Study quality was used to perform an additional sensitivity analysis, whereby all low-quality studies were removed and dietary intake data (for grains, dairy products, flesh floods, fruits and vegetables) were re-analyzed. Additionally, we have linked sample size to each of our results statements. The majority of studies were low quality (64 percent) or medium quality (35 percent), based on small sample size, cross-sectional study design, purposive sampling, and completeness and validity of data collected.

RESULTS

The search produced 49,392 unique records, after removal of duplicates (figure 1). Following title and abstract screening, 44,403 records were excluded, leaving 4,455 articles to be assessed for eligibility through full text screening. Six hundred and twenty-six (626) studies met the inclusion and exclusion criteria, and of these, 338 studies (54 percent) did not disaggregate their data by sex. In

total, 288 studies were eligible for inclusion and 227 were included in our analysis. Studies were excluded from analysis for the following reasons: 1) sample size was not disaggregated by gender (if the study population was mixed); 2) no sample size was provided for the outcome of interest; 3) no standard deviation (SD) or standard error (SE) was given; 4) data consisted of dietary diversity scores only; or 5) only continuous data were reported.

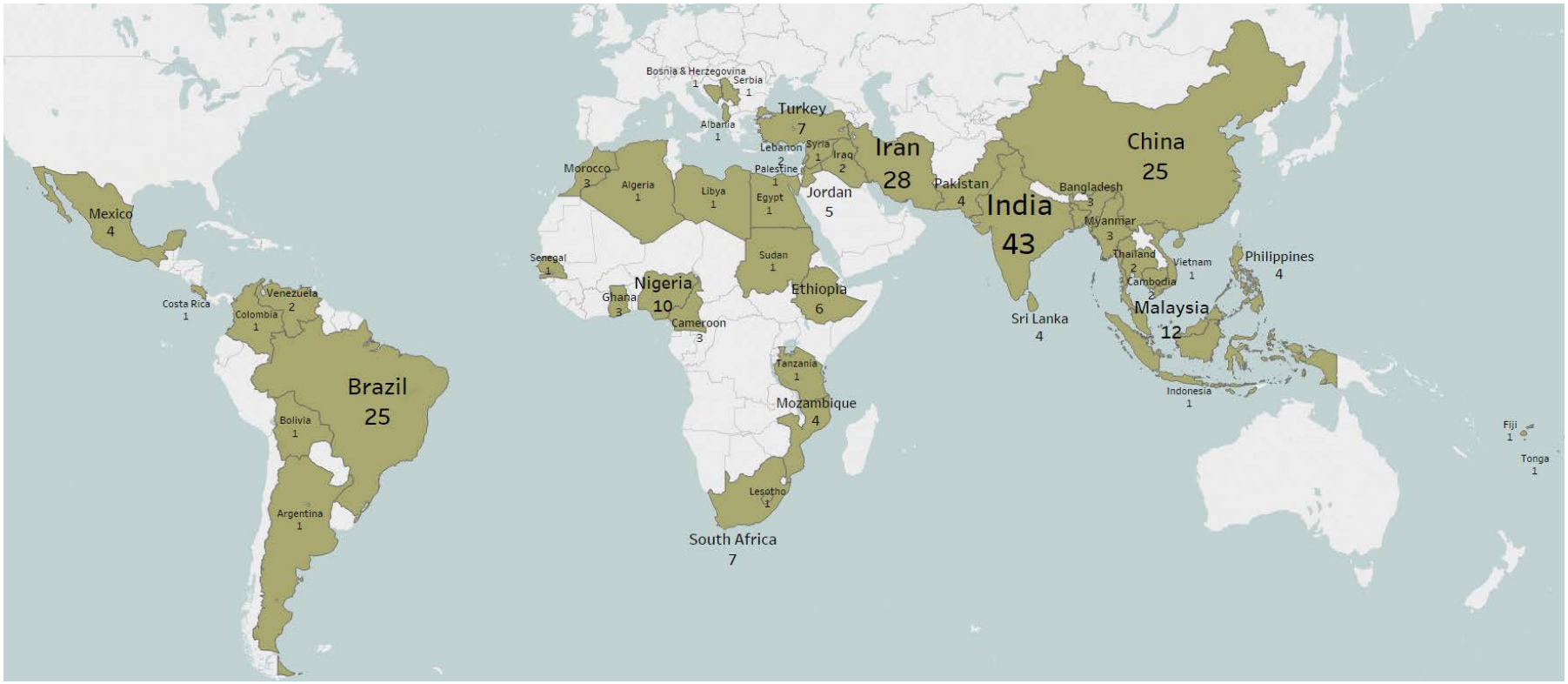
Figure 2. PRISMA Flow Diagram for Study Selection



*Reasons for exclusion: Data unavailable for adolescent age group (N=1106); no outcome of interest (N=874); irrelevant topic (N=519); data collection before 2007 (N=498); abstract only (N=342); study setting not LMIC (N=282); wrong study design (N=205); no adolescent population (N=224); non-English study (N=79); un-healthy participants (N=25); duplicate article (N=13).

Figure 3 shows the various geographies that are represented by our included studies, including the number of studies per country (e.g., 4 studies took place in Mexico, 10 were conducted in Nigeria, and 12 in Malaysia). There are several countries that are vastly overrepresented: India (N=43), Iran (N=28), China (N=25) and Brazil (N=25). The most underrepresented region is Europe and Central Asia, with just 9 studies, most of which came from Turkey (N=7). Table 2 is an abridged version of our summary of findings table (Appendix II – Summary of Study Characteristics). Here you can find each of the countries represented within a region, and summaries of study setting, residence (urban/rural), study design, and sample size (total and range). The vast majority of the studies included within our analysis were cross-sectional, school-based studies of adolescents in urban populations.

Figure 3. Countries Represented by Our Included Studies (N=number of studies)



Note: Shading of a country does not indicate nationally representative data. It signifies that we have included a study (or studies) within our review that has taken place in that country.

Table 2. Abridged Summary Table of Study Demographics

World Region	Study Setting			Study Design	Sample Size
	Country	Study Setting	Urban/Rural		
AFRICA **N=35**	Ethiopia (n=6) Sudan (n=1) Mozambique (n=4) Nigeria (n=10) Tanzania (n=1) Cameroon (n=2) Ghana (n=3) Lesotho (n=1) South Africa (n=6) Senegal (n=1)	Community: n=7 Regional: n=4 School-Based: n=25	Urban: n=16 Rural: n=6 Mixed: n=11 Semi-Urban: n = 1 Not reported: n=2	Cross Sectional: n=33 Cohort: n=3	Total N: 15,433 Range: 47 to 2097
***EAST ASIA & PACIFIC** **N=47**	Cambodia (n=2) Indonesia (n=1) Vietnam (n=1) Tonga (n=1) China (n=25) Malaysia (n=12) Thailand (n=2) Myanmar (n=3) Philippines (n=4) Fiji (n=1)	Community: n=2 National: n=4 Regional: n=4 School-Based: n=37	Urban: n=24 Rural: n=6 Mixed: n=14 Semi-Urban: n = 1 Not reported: n=2	Cohort: n=5 Cross Sectional: n=39 Mixed Design: n=1 RCT: n=1 Twin Study: n=1	Total N: 57,820 Range: 10 to 15,430
***EUROPE AND CENTRAL ASIA** **N=9**	Turkey (n=7) Albania (n=1) Serbia (n=1) Bosnia & Herzegovina (n=1)	Community: n=1 School-Based: n=8	Urban: n=8 Mixed: n=1	Cross Sectional: n=9	Total N: 4162 Range: 41 to 1121

World Region	Study Setting			Study Design	Sample Size
	Country	Study Setting	Urban/Rural		
LATIN AMERICA AND THE CARIBBEAN N=35	Bolivia (n=1) Brazil (n=25) Costa Rica (n=1) Mexico (n=4) Argentina (n=1) Venezuela (n=2) Colombia (n=1)	Community: n=2 National: n=5 Regional: n=4 School-Based: n=24	Urban: n=18 Rural: n=1 Mixed: n=11 Peri-Urban: n=2 Not reported: n=3	Cohort: n=2 Case Study: n=1 Cross Sectional: n=26 Longitudinal: n=1 Qualitative: n=2 RCT: n=3	Total N: 119,112 Range: 6 to 57,089
MIDDLE EAST AND NORTH AFRICA N=46	Iran (n=28) Gaza (n=1) Morocco (n=3) Syria (n=1) Iraq (n=2) Jordan (n=5) Algeria (n=1) Libya (n=1) Egypt (n=1) Lebanon (n=2) Palestine (n=1)	National: n=1 Regional: n=2 School-Based: n=43	Urban: n=33 Rural: n=1 Mixed: n=10 Not reported: n=2	Cross Sectional: n=42 Qualitative: n=1 Quasi-Experimental: n=3	Total N: 46,470 Range: 26 to 6640
SOUTH ASIA N=55	India (n=43) Bangladesh (n=3) Pakistan (n=5) Sri Lanka (n=4)	Community: n=10 Regional: n=3 School- Based: n=41	Urban: n=35 Rural: n=7 Mixed: n=8 Not reported: n=4	Case Control: n=2 Cross Sectional: n=50 RCT: n=2	Total N: 17,921 Range: 10 to 1446

*Note: Sum of studies under “countries” is greater than the total because of the inclusion of multi-country studies

BMI Status

To understand current BMI status among adolescent girls in LMIC, we looked at mean BMI (kg/m^2) and the proportion of girls who fell into each BMI status category (severely thin, thin, normal weight, overweight, or obese). Our analysis of mean BMI showed varying results by geography (figure 4 and Appendix I, table 3).[22-95] For most regions, mean BMI was lower among younger (10–14) adolescents than older (15–19) ones. However, in Africa and the Middle East and North Africa, mean BMI was similar for both age groups. Surprisingly, in Latin America and the Caribbean, mean BMI for girls ages 10–14 years was 22.3 (SD=3.7), while for girls ages 15–19 years it was 18.9 (SD=3.8). Regionally, mean BMI was lowest in South Asia for both younger and older girls.

We used the WHO BMI-for-age cutoffs (severely thin = <-3 SD; thin = <-2 SD; overweight = >+1SD; obese = >+2SD from the mean) to determine the proportion of younger and older adolescents who fell into each weight category, by region (figures 5a-b and Appendix I, table 3).[25, 27-29, 38-49, 51-54, 56-60, 67-77, 79, 85, 87, 88, 91-94, 96-139] For adolescents (10–19) across all regions, 65 percent (n=24399) fell into the normal weight range, while 11 percent (n=4328) were underweight, 16 percent (n=6036) were overweight, and 7 percent (n=2739) were classified as obese (figure 5a). Disaggregating data by younger and older age group indicates that the proportions of underweight are similar, though both overweight and obesity are more common in younger adolescents (Appendix I, table 3). When examining results by region, we found that the East Asia and Pacific region had the highest prevalence of overweight (22 percent; n=1636) and obesity (11 percent; n=840) for all adolescents combined (10–19) (figure 5b and Appendix I, table 3). We saw that more than 10 percent of younger adolescents in the Middle East and North Africa, Latin America and the Caribbean, and East Asia and the Pacific were obese. Overweight was even more common; a striking 50 percent of adolescents ages 10–14 years were classified as overweight in Latin America and the Caribbean. In contrast, underweight, or thinness, was extraordinarily high in South Asia, where 43 percent and 39 percent of younger and older adolescents, respectively, were classified as thin. Additionally, close to 10 percent of girls ages 10–14 in South Asia were classified as severely thin.

Figure 4. Mean BMI for Adolescents (10–19), by Region

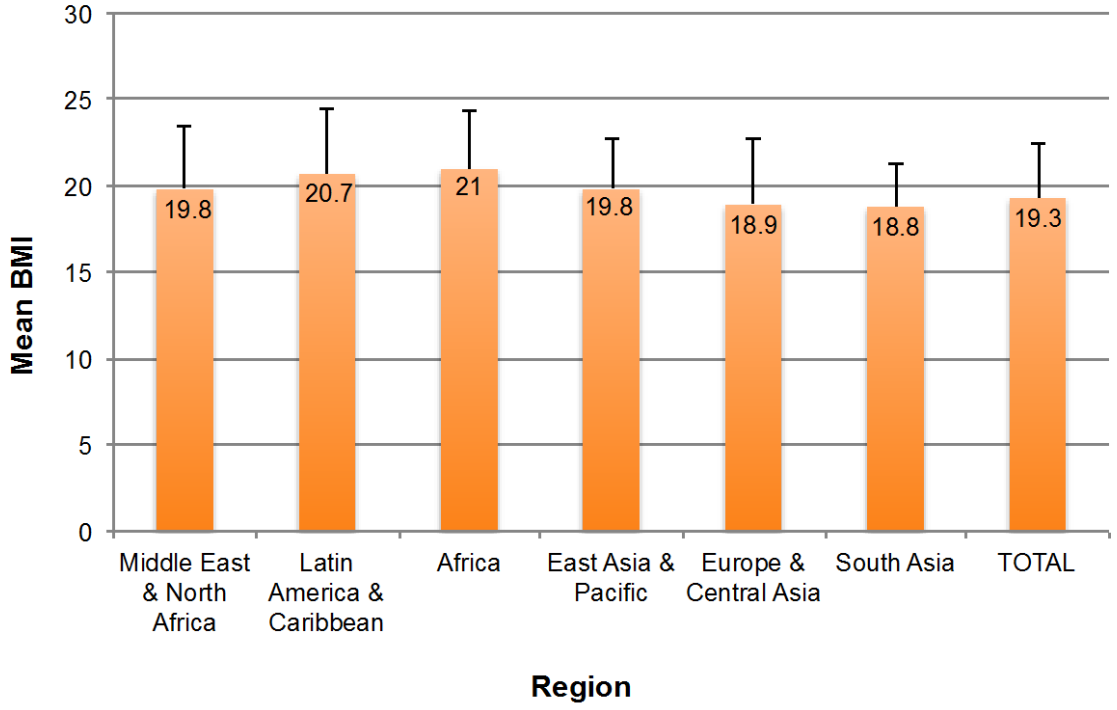


Figure 5a. BMI Status for Adolescents (10–19)

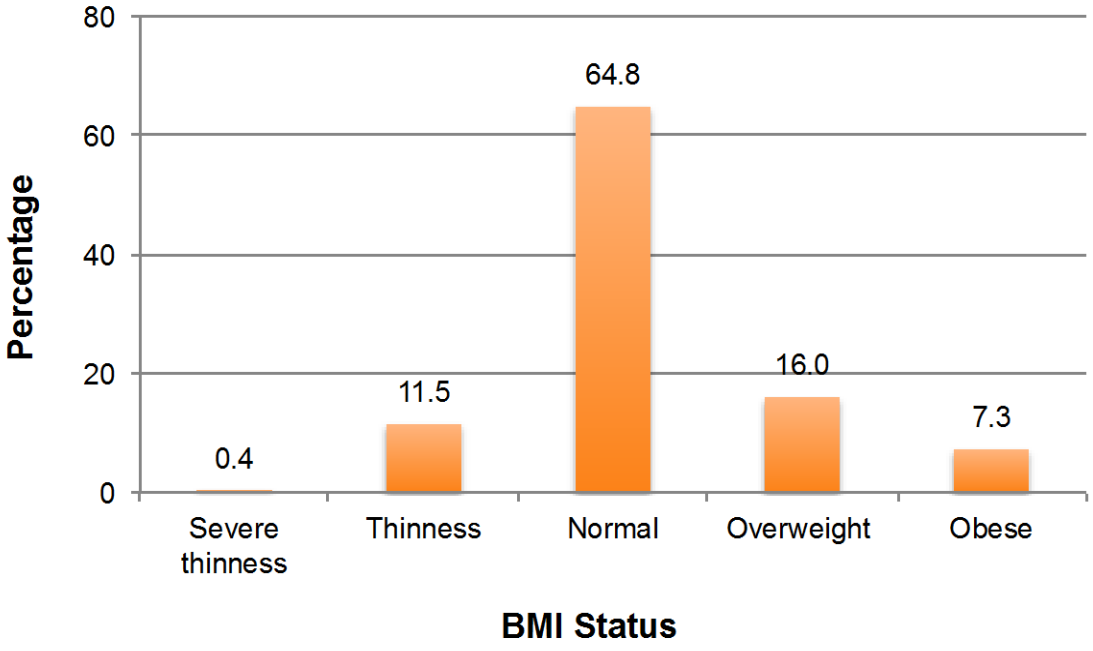
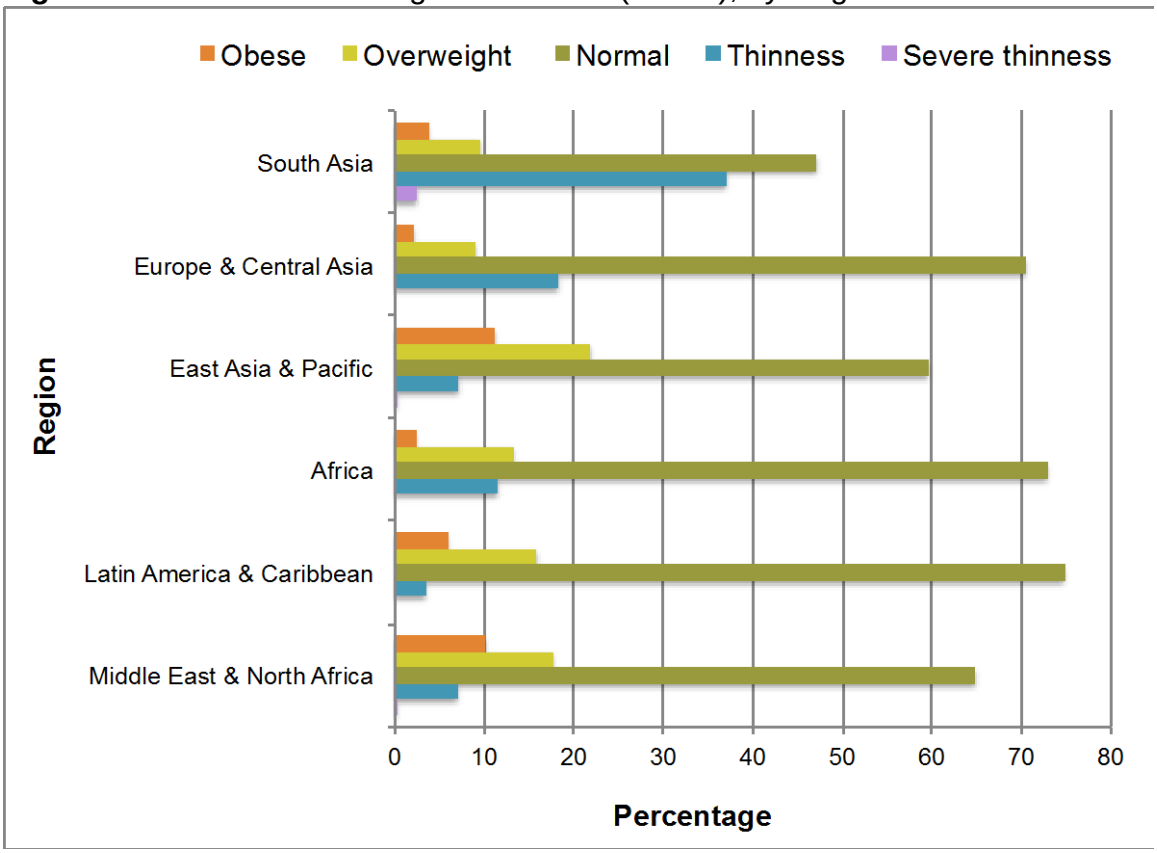


Figure 5b. BMI Status among Adolescents (10–19), by Region



We also examined the association between dietary intake and BMI, specifically setting out to validate the hypothesis that increased consumption of energy-dense foods, such as fast foods, would lead to higher BMI. While we saw a trend in that direction (Appendix I, figure 1), the association was not significant (p-value=0.2). We found that for every 1 percent increase in fast or convenient food intake among adolescent girls, BMI increases by 0.06 kg/m^2 (Appendix I, figure 1). We also tested the association using BMI as a categorical variable (Appendix I, figure 2) and saw similar results. For every 1 percent increase in fast or convenient food intake, the proportion of girls who are overweight or obese increases by 0.2 percent (p-value=0.2).

Dietary Intake and Eating Practices

Macronutrient Status

Here we report intake of protein, fat, and carbohydrates for adolescent girls, by region. The IOM guidelines were used as reference for adequate and inadequate intakes.

In total, 63 studies reported on protein intake among adolescent girls (table 3).[22-24, 29, 31, 33, 34, 41, 45, 53, 57, 61-63, 68, 69, 71-73, 75, 76, 80-87, 89, 91, 92, 95, 97, 101, 102, 104, 108, 111, 114, 125, 131, 140-160] The weighted mean ±SD of protein intake in grams per day was 58 ±17 for all adolescents. When disaggregating by age, we found that daily intake was higher among younger adolescents (61 ±19 grams/day) compared to older adolescents (58 ±26 grams/day) (Appendix I; table 4). Significant differences were noted across regions. For both age groups, intake was extremely high in Latin America and the Caribbean and East Asia and the Pacific. Additionally, for girls ages 10–14 years in the Middle East and North Africa and Africa, daily intake reached 74 ±18 grams and 76 ±24 grams, respectively; these estimates varied dramatically from average intakes among 15–19 year-old girls from the same regions, potentially indicating a dietary transition. Protein intake was considered adequate for both younger and older girls in South Asia, though it was considerably lower in this region compared to all others. According to IOM standards (RDA of 34 grams/day for younger and 46 grams/day for older adolescents), daily intake was adequate for all adolescents except for girls ages 15–19 living in Africa (39 ±3 grams/day).

Table 3. Protein Intake (grams/day) for Adolescents (10–19), by Region

Middle East and North Africa (N=14) Algeria (1 urban), Iran (10 urban), Libya (1 urban), Morocco (1 urban, 1 mixed)	
N studies	14
n participants	4108
Urban/Rural/Mixed	13 urban, 1 mixed
Weighted Mean ±SD	61 ±15
Latin America and the Caribbean (N=6) Bolivia (1 urban), Brazil (1 urban), Mexico (1 urban, 1 rural, 1 mixed), Venezuela (1 peri-urban)	
N studies	6
n participants	4785
Urban/Rural/Mixed	2 urban, 2 mixed, 1 rural, 1 peri-urban
Weighted Mean ±SD	72 ±27
Africa (N=10) Cameroon (1 urban, 1 rural), Ethiopia (1 rural) Mozambique (3 mixed), Nigeria (1 rural), Senegal (1 urban), South Africa (2 urban)	
N studies	10

n participants	1910
Urban/Rural/Mixed	4 urban, 3 mixed, 3 rural
Weighted Mean ±SD	45 ±4
Europe and Central Asia (N=2) Turkey (2 urban)	
N studies	2
n participants	329
Urban/Rural/Mixed	2 urban
Weighted Mean ±SD	49 ±22
South Asia (N=19) Bangladesh (1 urban, 1 mixed), India (8 urban, 2 rural, 2 urban slum, 1 mixed), Pakistan (3 urban), Sri Lanka (1 mixed)	
N studies	19
n participants	4900
Urban/Rural/Mixed	12 urban, 3 mixed, 2 rural, 2 urban slum
Weighted Mean ±SD	40 ±11
East Asia & Pacific (N=12) China (4 urban, 1 mixed), Malaysia (1 urban, 3 mixed), Myanmar (1 peri-urban), Philippines (1 urban), Thailand (1 rural)	
N studies	12
n participants	3842
Urban/Rural/Mixed	6 urban, 4 mixed, 1 peri- urban, 1 rural
Weighted Mean ±SD	70 ±22
Total (N=63)	
N studies	63
n participants	19911
Urban/Rural/Mixed	39 urban, 13 mixed, 7 rural, 2 urban slum, 2 peri-urban,
Weighted Mean ±SD	58 ±17

51 studies reported on fat intake among adolescent girls.[22-24, 29, 31, 33, 34, 41, 45, 46, 53, 57, 61-63, 68, 69, 72, 73, 75, 76, 80-82, 85, 86, 89, 91, 92, 101, 104, 111, 114, 125, 141-156, 160] For all regions (total), fat intake among adolescent girls (10–19) was 57 ±20 grams per day (table 4), and intake was higher among younger girls (64 ±21 grams/day) compared to older girls (53 ±21 grams/day) (Appendix I, table 5). This trend held when looking at daily fat intake by region. Although only two studies (both urban populations in Turkey) comprised the analysis for Europe and Central Asia, we found that fat intake among younger adolescents reached 106 ±11 grams per day in this region. Daily intake was 79 ±24 grams and 76 ±24 grams among girls 10–14 in the Middle East and North Africa and Africa, respectively. In comparison, girls aged 15–19 years in the same regions consumed 55 ±23 grams/day and 28 ±3 grams/day, respectively, indicating a prominent shift in dietary trends among younger girls. Similar to protein, lowest intake was noted for older girls in South Asia (24 ±4 grams/day) and Africa (28 ±3 grams/day). Currently, IOM has no RDA for fat intake (25–35 percent of total energy is considered adequate).

Table 4. Fat Intake (grams/day) for Adolescents (10–19), by Region

Middle East and North Africa (N=13) Iran (10 urban), Libya (1 urban), Morocco (1 urban, 1 mixed)	
N studies	13
n participants	3734
Urban/Rural/Mixed	12 urban, 1 mixed
Weighted Mean ±SD	68 ±23
Latin America and the Caribbean (N=6) Bolivia (1 urban), Brazil (1 urban), Mexico (1 urban, 1 rural, 1 mixed), Venezuela (1 peri-urban)	
N studies	6
n participants	4785
Urban/Rural/Mixed	2 urban, 2 mixed, 1 rural, 1 peri-urban
Weighted Mean ±SD	61 ±24
Africa (N=7) Cameroon (1 urban), Mozambique (3 mixed), Nigeria (1 rural), Senegal (1 urban), South Africa (1 urban)	
N studies	7
n participants	1563
Urban/Rural/Mixed	3 mixed, 3 urban, 1 rural
Weighted Mean ±SD	36 ±6
Europe and Central Asia (N=2) Turkey (2 urban)	
N studies	2
n participants	329
Urban/Rural/Mixed	2 urban
Weighted Mean ±SD	67 ±34
South Asia (n=11) Bangladesh (1 urban, 1 mixed), India (3 urban, 2 urban slum, 1 rural, 1 mixed), Pakistan (2 urban)	
N studies	11
n participants	2027
Urban/Rural/Mixed	6 urban, 2 mixed, 2 urban slum, 1 rural
Weighted Mean ±SD	41 ±11
East Asia & Pacific (N=12) China (4 urban, 2 mixed), Malaysia (1 urban, 3 mixed), Philippines (1 urban), Thailand (1 rural)	
N studies	12
n participants	3741
Urban/Rural/Mixed	6 urban, 5 mixed, 1 rural
Weighted Mean ±SD	59 ±21
Total (N=51)	
N studies	51
n participants	16179

Urban/Rural/Mixed	31 urban, 13 mixed, 4 rural, 2 urban slum, 1 peri urban
Weighted Mean ±SD	57 ±20

In total, 45 studies reported carbohydrate intake.[22-24, 29, 31, 33, 34, 41, 45, 53, 57, 61-63, 68, 69, 71-73, 75, 76, 82, 85, 91, 97, 101, 104, 111, 114, 125, 141-150, 152-154, 160, 161] Across all regions (total), the weighted mean intake ±SD of carbohydrates in grams per day for all adolescents (10–19) was 248 ±73 (table 5), while intake was 249 ±85 for younger adolescents and 253 ±77 for older adolescents (Appendix I, table 6). Total intake (10–19) was highest in the Middle East and North Africa (266 ±59 grams/day) and Latin America and the Caribbean (264 ±84 grams/day), and lowest in East Asia and the Pacific (220 ±101 grams/day) and Africa (223 ±16 grams/day). We saw higher carbohydrate intake for younger adolescents compared to older ones in the Middle East and North Africa, Africa, and Europe and Central Asia. Based on IOM (RDA of 130 grams/day), carbohydrate intake was adequate and high among all adolescents.

Table 5. Carbohydrate Intake (grams/day) for All Adolescents (10–19), by Region

Middle East and North Africa (N=13) Algeria (1 urban), Iran (9 urban), Libya (1 urban), Morocco (1 urban, 1 mixed)	
N studies	13
n participants	3903
Urban/Rural/Mixed	12 urban, 1 mixed
Weighted Mean ±SD	266 ±59
Latin America and the Caribbean (N=6) Bolivia (1 urban), Brazil (1 urban), Mexico (1 urban, 1 rural, 1 mixed), Venezuela (1 peri-urban)	
N studies	6
n participants	4785
Urban/Rural/Mixed	2 urban, 2 mixed, 1 rural, 1 peri-urban
Weighted Mean ±SD	264 ±84
Africa (N=8) Cameroon (1 urban), Mozambique (3 mixed), Nigeria (1 Rural), Senegal (1 urban), South Africa (2 urban)	
N studies	8
n participants	1624
Urban/Rural/Mixed	4 urban, 3 mixed, 1 rural
Weighted Mean ±SD	223 ±16
Europe and Central Asia (N=2) Turkey (2 urban)	
N studies	2
n participants	329
Urban/Rural/Mixed	2 urban

Weighted Mean ±SD	231 ±86
South Asia (N=4) Bangladesh (1 urban, 1 mixed), India (1 urban), Pakistan (1 urban)	
N studies	4
n participants	1064
Urban/Rural/Mixed	3 urban, 1 mixed
Weighted Mean ±SD	247 ±49
East Asia & Pacific (N=12) China (4 urban, 2 mixed), Malaysia (1 urban, 3 mixed), Philippines (1 urban), Thailand (1 rural)	
N studies	12
n participants	3901
Urban/Rural/Mixed	6 urban, 5 mixed, 1 rural
Weighted Mean ±SD	220 ±101
Total (N=45)	
N studies	45
n participants	15643
Urban/Rural/Mixed	29 urban, 12 mixed, 3 rural, 1 peri urban
Weighted Mean ±SD	248 ±73

Energy Intake

Seventy-seven studies reported on energy intake among adolescent girls (table 6).[22-24, 29, 31-34, 36, 40, 41, 45, 46, 48, 53, 56, 57, 60-63, 68, 69, 71-73, 75, 76, 80-89, 91, 95, 97, 101, 102, 104, 108, 111, 112, 114, 120, 125, 131, 140, 142-157, 159-167] Energy intake for all adolescents was 1809 ±507 kcal/day In line with our protein and fat analysis, we found that calories per day were slightly higher for younger (1844 ±578 kcal/day) than older (1834 ±496) girls across all regions (Appendix I, table 7). Our findings also show that significant regional variations exist. Energy intake for adolescent girls (10–19 years) was lowest in South Asia (1494 ±384 kcal/day) and highest in Latin America and the Caribbean (1989 ±608 kcal/day). In some populations, daily caloric intake of younger girls vastly exceeds that of older girls. For example, in urban populations in the Middle East and North Africa (mostly Iran), kcal/day for younger adolescents was 2276 ±484, while for older adolescents it was 1498 ±434. Similarly, in Africa, mean energy intake was 2248 ±534 kcal/day for girls ages 10–14 compared to 1598 ±315 kcal/day for older girls.

We stratified energy intake by urban and rural residence (table 7) and, although rural regions were underrepresented, we saw some differences emerge between urban and rural areas. Overall, energy intake was lowest for urban slum populations (1512 kcal/day; n=292), though only two studies from India comprised this analysis. Rural populations had lower mean intakes than urban (1614 kcal/day versus 1908 kcal/day), a finding that was reflected in each regional analysis except for East Asia and the Pacific. Across all regions, the lowest energy intake was for rural populations in South Asia (1420 kcal/day;

n=1044) while the highest energy intake was for urban populations of Latin America and the Caribbean (2226 kcal/day; n=1624).

Table 6. Energy Intake (kcal/day) for Adolescents (10–19), by Region

Middle East and North Africa (N=15) Algeria (1 urban), Iran (11 urban), Libya (1 urban) Morocco (1 urban, 1 mixed)	
N studies	15
n participants	4349
Urban/Rural/Mixed	14 urban, 1 mixed
Weighted Mean ±SD	1905.5 ±422.8
Latin America and the Caribbean (N=10) Bolivia (1 urban), Brazil (3 urban, 1 mixed), Mexico (1 urban, 1 rural, 1 mixed, 1 NR), Venezuela (1 peri-urban)	
N studies	10
n participants	5513
Urban/Rural/Mixed	5 urban, 2 mixed, 1 rural, 1 peri-urban, 1 NR
Weighted Mean ±SD	1987.4 ±527.0
Africa (N=11) Cameroon (1 urban, 1 rural), Ethiopia (1 rural), Mozambique (3 mixed), Nigeria (2 rural), South Africa (3 urban)	
N studies	11
n participants	1881
Urban/Rural/Mixed	4 urban, 4 rural, 3 mixed
Weighted Mean ±SD	1585.4 ±297.9
Europe and Central Asia (N=2) Turkey (2 urban)	
N studies	2
n participants	323
Urban/Rural/Mixed	2 urban
Weighted Mean ±SD	1763.2 ±775.1
South Asia (N=19) Bangladesh (1 urban, 1 mixed), India (7 urban, 3 rural, 1 mixed, 2 urban slum), Pakistan (2 urban), Sri Lanka (1 mixed, 1 NR)	
N studies	19
n participants	4748
Urban/Rural/Mixed	10 urban, 4 rural, 2 mixed, 2 urban slum, 1 NR
Weighted Mean ±SD	1526.4 ±380.9
East Asia & Pacific (N=20) Cambodia (1 urban), China (7 urban, 4 mixed), Malaysia (3 mixed, 1 urban, 1 rural), Myanmar (1 peri-urban), Philippines (1 urban), Thailand (1 rural)	
N studies	20
n participants	7798

Urban/Rural/Mixed	10 urban, 7 mixed, 2 rural, 1 peri-urban
Weighted Mean ±SD	1880.3 ±597.0
Total (N=77)	
N studies	78
n participants	24785
Urban/Rural/Mixed	47 urban, 15 mixed, 11 rural, 2 peri-urban, 1 NR, 1 urban slum
Weighted Mean ±SD	1809.1 ±506.7

Table 7. Energy Intake (kcal/day) for Adolescents (10–19) by Urban/Rural Residence

	Urban	Urban slum	Peri-urban	Rural	Mixed
Middle East and North Africa (N=15) Algeria (1 urban), Iran (11 urban), Libya (1 urban) Morocco (1 urban, 1 mixed)					
N studies	14	0	0	0	1
n participants	4157	0	0	0	192
Weighted Mean ±SD	1905 ±421	N/A	N/A	N/A	1918 ±471
Latin America and the Caribbean (N=10)[1*] Bolivia (1 urban), Brazil (3 urban, 1 mixed), Mexico (1 urban, 1 rural, 1 mixed, 1 NR), Venezuela (1 peri-urban)					
N studies	6	0	1	2	1
n participants	1624	0	63	363	3377
Weighted Mean ±SD	2226 ±467	N/A	2353 ±1004	1980 ±46	1884 ±609
Africa (N=11) Cameroon (1 urban, 1 rural), Ethiopia (1 rural), Mozambique (3 mixed), Nigeria (2 rural), South Africa (3 urban)					
N studies	4	0	0	4	3
n participants	460	0	0	463	958
Weighted Mean ±SD	2004 ±446	N/A	N/A	1738 ±451	1311 ±153
Europe and Central Asia (N=2) Turkey (2 urban)					
N studies	2	0	0	0	0
n participants	323	0	0	0	0
Weighted Mean ±SD	1763 ±775	N/A	N/A	N/A	N/A
South Asia (N=19)[1] Bangladesh (1 urban, 1 mixed), India (7 urban, 3 rural, 2 urban slum, 1 mixed), Pakistan (2 urban), Sri Lanka (1 mixed, 1 NR)					
N studies	12	2	0	5	1
n participants	2953	292	0	1044	259
Weighted Mean ±SD	1522 ±428	1512 ±404	N/A	1420 ±230	1589 ±432
East Asia & Pacific (N=20) Cambodia (1 urban), China (7 urban, 4 mixed), Malaysia (3 mixed, 1 urban, 1 rural),					

Myanmar (1 peri-urban), Philippines (1 urban), Thailand (1 rural)					
N studies	10	0	1	2	7
n participants	4765	0	391	189	2453
Weighted Mean ±SD	1988 ±494	N/A	1778 ±83	2016 ±507	1676 ±885
Total (N=78)[2]					
N studies	45	2	2	12	15
n participants	13371	292	454	1911	6734
Weighted Mean ±SD	1908 ±468	1512 ±404	1858 ±211	1614 ±349	1683 ±579

[1]One study excluded from analysis, as urban/rural was not reported
[2]Two studies in total were excluded
[*]One study stratifies data by urban and rural residence

Dietary Intake of All Food Groups

Note: Consumption data was summarized into one table per food group. Within each table, consumption is broken down by mean general consumption (for all studies) and frequency of consumption (for the subset of studies that reported frequency data).

Note: These results are not regionally representative. They are representative only of the populations captured within each analysis.

Intake of Grains, Roots, Tubers and Plantains (Grains)

This food group is otherwise referred to as "starchy staples" and is largely comprised of foods derived from cereal crops. These foods provide energy and can be a good source of B vitamins, depending on the grain.[16] Common examples include staple products, such as bread, porridge, noodles, rice, and potatoes. Plantains (a fruit) are included in this group because of their similar nutrient composition to starchy staples. However, items such as biscuits, cakes, and other nutrient-poor, sugary starches are not.

In total, 31 studies (n=53066) reported on grain consumption (table 8).[40, 48, 52, 79, 80, 90, 97, 99, 102, 103, 106, 116, 132, 133, 151, 154, 168-182] We found that the mean general consumption for all adolescent girls (10–19) was 51 percent (n=27277). According to the studies that reported frequency data, 76 percent (n=4397) of adolescents consumed grains daily. Across all regions (total), general consumption was similar for younger (10–14) and older (15–19) adolescents (Appendix I, table 8). However, of adolescent girls who consumed grains, younger ones are more likely to consume them daily (81 percent; n=1879 versus 71 percent; n=2282). This result was largely derived from studies in Africa, where consumption among younger girls was significantly higher than in older girls. Frequency data by region and by age was too sparse to draw any additional conclusions. We found significant regional variation in grain consumption. In the Middle East and North Africa, 100 percent (n=972) of adolescents (10–19) consumed grains; however, this regional analysis was comprised only of three studies, two of which were from Iran and all of which were from urban populations. High consumption was also noted for Africa (76 percent; n=3734) and South Asia (75 percent; n=1795).

Table 8. Consumption of Grains, Roots, Tubers, and Plantains

Middle East and North Africa (N=3) Iran (2 urban), Jordan (1 urban)	
General consumption pattern	
N studies	3
n participants	972
Consumption % (n)	100% (972)
Frequency	
N studies	2
n participants	466
n consumers	466
Urban/Rural/Mixed	2 urban
Daily	56% (261)
Weekly	44% (205)
Latin America and the Caribbean (N=3)[1] Brazil (1 urban, 1 mixed, 1 NR)	
General consumption pattern	
N studies	4
n participants	40375
Consumption % (n)	46% (18727)
Frequency	
N studies	1
n participants	287
n consumers	236
Urban/Rural/Mixed	1 urban
Daily	82% (236)
Africa (N=8) Ethiopia (1 urban, 1 rural, 1 mixed), Nigeria (1 urban, 1 semi-urban, 1 rural), South Africa (2 urban)	
General consumption pattern	
N studies	8
n participants	4878
Consumption % (n)	76% (3734)
Frequency	
N studies	3
n participants	2985
n consumers	2694
Urban/Rural/Mixed	2 urban, 1 rural
Daily	72% (1949)
2–3 times/week	12% (329)
4–6 times/week	12% (333)
Weekly	2% (47)
Monthly	1% (36)
Europe and Central Asia (N=3) Bosnia & Herzegovina (1 mixed), Serbia (1 urban), Turkey (1 urban)	
General consumption pattern	
N studies	3

n participants	1142
Consumption % (n)	28% (326)
Frequency	
N studies	NR
South Asia (N=9) Bangladesh (1 urban, 1 mixed), India (6 urban), Sri Lanka (1 rural)	
General consumption pattern	
N studies	9
n participants	2384
Consumption % (n)	75% (1795)
Frequency	
N studies	6
n participants	1720
n consumers	924
Urban/Rural/Mixed	5 urban, 1 mixed
Daily	63% (765)
2–3 times/week	14% (235)
4–6 times/week	10% (173)
Weekly	3% (33)
East Asia & Pacific (N=5) China (1 urban, 1 rural), Malaysia (1 urban, 2 mixed)	
General consumption pattern	
N studies	5
n participants	3315
Consumption % (n)	52% (1723)
Frequency	
N studies	1
n participants	1186
n consumers	1186
Urban/Rural/Mixed	1 urban
Daily	100% (1186)
Total (N=31)	
General consumption pattern	
N studies	31
n participants	53066
Consumption % (n)	51% (27277)
Frequency	
N studies	13
n participants	6644
n consumers	5506
Urban/Rural/Mixed	11 urban, 1 rural, 1 mixed
Daily	76% (4397)
2–3 times/week	10% (564)
4–6 times/week	10% (506)
Weekly	5% (285)
Monthly	1% (36)

Intake of Pulses

Pulses are high in protein and B vitamins, and reflect an important plant-based source of protein for vegetarians or where animal-source foods are not commonly consumed.[16] Common examples from this group include beans (black, kidney, pinto), chickpea, lentil, soybean/soybean products, and other legume products.

In total, 22 studies (n=105987) reported on intake of pulses (table 9).[28, 30, 31, 39, 48, 89, 90, 97, 102, 103, 132, 133, 168-170, 173, 177, 179-181, 183, 184] Overall, 63 percent (n=67075) of all adolescent girls consumed pulses. Of girls who reported consuming pulses, 76 percent (n=2310) consumed them daily. Across all regions (total), there appears to be little difference between younger and older adolescents (Appendix I, table 9), with general consumption being 63 percent (n=45028) and 65 percent (n=21808), respectively. No studies reported on pulse consumption in the Middle East and North Africa or Europe and Central Asia. For all adolescents (10–19), general consumption appears to be highest for those residing in Africa (68 percent; n=2004) and lowest in China (39 percent; n=1559). Two studies in mixed populations of Brazil indicated that consumption was similar for adolescents ages 10–14 and 15–19 years. However, in studies from Africa, South Asia, and China, general consumption was higher in older than younger adolescents. In South Asia and China, daily consumption was more frequent than weekly or monthly consumption, especially for older girls.

Table 9. Consumption of Pulses (Beans, Peas, and Lentils)

Middle East and North Africa (N=0)	
Latin America and the Caribbean (n=2)[1] Brazil (2 mixed)	
General consumption pattern	
N studies	2
n participants	97001
Consumption % (n)	64% (62611)
Frequency	
N studies	NR
Africa (N=8) Ethiopia (1 urban, 1 rural, 1 mixed), Mozambique (1 mixed), Nigeria (1 semi-urban, 1 rural), South Africa (1 urban), Sudan (1 urban)	
General consumption pattern	
N studies	8
n participants	2933
Consumption % (n)	68% (2004)
Frequency	
N studies	3
n participants	949

n consumers	864
Urban/Rural/Mixed	2 urban, 1 rural
Daily	36% (312)
Weekly	32% (280)
Monthly	31% (272)
Europe and Central Asia (N=0)	
South Asia (N=7) Bangladesh (1 urban), India (5 urban), Sri Lanka (1 rural)	
General consumption pattern	
N studies	7
n participants	2090
Consumption % (n)	43% (901)
Frequency	
N studies	6
n participants	2030
n consumers	849
Urban/Rural/Mixed	5 urban, 1 rural
Daily	84% (718)
2–3 times/week	13% (110)
Weekly	2% (21)
East Asia & Pacific (N=5) China (4 urban, 1 rural)	
General consumption pattern	
N studies	5
n participants	3963
Consumption % (n)	39% (1559)
Frequency	
N studies	2
n participants	2155
n consumers	1328
Urban/Rural/Mixed	2 urban
Daily	96% (1280)
Weekly	3% (36)
Monthly	0.9% (12)
Total (N=22)	
General consumption pattern	
N studies	22
n participants	105987
Consumption % (n)	63% (67075)
Frequency	
N studies	10
n participants	5134
n consumers	3041
Urban/Rural/Mixed	9 urban, 1 rural
Daily	76% (2310)
2–3 times/week	4% (110)
Weekly	11% (337)
Monthly	9% (284)

Intake of Nuts and Seeds

The nuts and seeds group includes tree nuts, groundnut (peanut), and seeds when they are consumed in substantial quantities (i.e., they comprise one of the main ingredients of a meal or a snack). Nut and seed "butters," such as peanut butter, cashew paste, and tahini, are also included in this group. Nuts and certain seeds typically have a high fat content. They are also rich in vegetable protein, fiber, and minerals.[16] Common examples of tree nuts include almonds, walnuts, cashews, and Brazil nuts. Common examples of seeds include sesame, sunflower, and pine nuts.

Only four studies reported on intake of nuts and seeds.[28, 171, 182, 185] Two studies were from Africa (South Africa and Sudan), one study was from the Middle East and North Africa (Syria), and the remaining study was from South Asia (India). All were from urban populations; only the Indian study included younger adolescent girls. Overall, 48 percent (n=738) of all adolescent girls consumed nuts and seeds. The proportion of older adolescent girls who consumed nuts and seeds two to three times per week was similar in Syria and Sudan: 75 percent (n=140) and 74 percent (n=324), respectively. In India, only 27 percent (n=53) of younger adolescents consumed nuts and seeds two to three times per week. No frequency data was reported for the study in South Africa.

Intake of Dairy Products

Almost all milk products from cows, goats, buffalo, sheep, and camel are considered dairy. These foods are an important source of protein, calcium, potassium, vitamin B12, and other micronutrients.[16] Common foods include milk, soft and hard cheeses, yogurt, and kefir. (Butter, cream, and sour cream are included in the "fats and oils" group because of their high fat content.) Additionally, items such as ice cream and flavored milk are categorized as sweet food items and SSB, respectively, because they are typically high in sugar and low in dairy content.

Altogether, 42 studies (n=127709) reported on consumption of dairy.[28, 39, 40, 42, 48, 52, 55, 64, 67, 70, 74, 77, 79, 82, 90, 92, 97, 99, 102, 103, 106, 109, 122, 124, 133, 154, 166, 168, 169, 173-175, 177-180, 183, 185-189] Overall, less than half (41 percent; n=52139) of adolescent girls consumed dairy (table 10). For the subset of girls who reported consuming dairy, we found that daily intake reached 60 percent (n=2442) for older adolescent girls, and only 10 percent (n=3167) for the younger group (Appendix I, table 10). Dairy consumption was highest among adolescents (10–19) in Africa (74 percent; n=3314) and South Asia (72 percent; n=1895) and lowest in Latin America and the Caribbean (37 percent; n=36271), especially for girls 15–19 (21 percent; n=6020). There was no consistent pattern when looking at consumption by age and by region. For example, in urban and rural settings in Africa (Ethiopia, Nigeria, Sudan, and South Africa), general consumption is much higher among younger than older adolescents. The opposite is true for adolescents residing in both urban and rural settings in East Asia and the Pacific (China and Malaysia).

Table 10. Consumption of Dairy Products

Middle East and North Africa (N=13) Egypt (1 mixed), Iran (4 urban, 1 mixed), Iraq (1 urban), Jordan (2 urban), Lebanon (1 NR), Morocco (1 urban), Palestine (1 rural), Syria (1 urban)	
General consumption pattern	
N studies	13
n participants	17227
Consumption % (n)	47% (8131)
Frequency	
N studies	9
n participants	9356
n consumers	4745
Urban/Rural/Mixed	5 urban, 1 rural, 2 mixed, 1 NR
Daily	75% (3580)
2–3 times/week	4% (201)
4–6 times/week	2% (114)
Weekly	8% (372)
Monthly	10% (478)
Latin America and the Caribbean (N=3)[1] Brazil (2 mixed), Argentina (1 mixed)	
General consumption pattern	
N studies	3
n participants	97,191
Consumption % (n)	37% (36271)
Frequency	
N studies	2
n participants	57,279
n consumers	27,892
Urban/Rural/Mixed	2 mixed
Daily	0.4% (101)
4–6 times/week	99% (27,791)
Africa (N=7) Ethiopia (1 urban, 1 rural, 1 mixed), Nigeria (1 urban, 1 rural), South Africa (1 urban), Sudan (1 urban)	
General consumption pattern	
N studies	7
n participants	4465
Consumption % (n)	74% (3314)
Frequency	
N studies	4
n participants	3423
n consumers	3055
Urban/Rural/Mixed	3 urban, 1 rural
Daily	6% (171)
2–3 times/week	73% (2244)
4–6 times/week	19% (574)

Weekly	1% (30)
Monthly	1% (36)
Europe and Central Asia (N=3) Bosnia & Herzegovina (1 mixed), Serbia (1 urban), Turkey (1 urban)	
General consumption pattern	
N studies	3
n participants	1142
Consumption % (n)	40% (457)
Frequency	
N studies	NR
South Asia (N=9) Bangladesh (2 urban, 1 mixed), India (3 urban, 1 mixed, 1 NR), Pakistan (1 urban)	
General consumption pattern	
N studies	9
n participants	2618
Consumption % (n)	72% (1895)
Frequency	
N studies	8
n participants	2472
n consumers	1483
Urban/Rural/Mixed	6 urban, 2 mixed
Daily	71% (1250)
2–3 times/week	20% (355)
4–6 times/week	6% (112)
Weekly	3% (48)
East Asia & Pacific (N=7) China (3 urban, 2 rural), Malaysia (1 urban, 1 rural)	
General consumption pattern	
N studies	7
n participants	5066
Consumption % (n)	41% (2071)
Frequency	
N studies	3
n participants	2733
n consumers	1365
Urban/Rural/Mixed	1 urban, 2 rural
Daily	88% (1205)
4–6 times/week	12% (160)
Total (N=42)	
General consumption pattern	
N studies	42
n participants	127709
Consumption % (n)	41% (52139)
Frequency	
N studies	26
n participants	75,263
n consumers	38,540
Urban/Rural/Mixed	15 urban, 5 rural, 5 mixed, 1 NR

Daily	16% (6307)
2–3 times/week	7% (2800)
4–6 times/week	74% (28751)
Weekly	1% (450)
Monthly	1% (514)

Intake of Meat, Poultry, and Fish

Sometimes called "flesh foods," the meat, poultry, and fish group includes all meats, organ meats, poultry and other birds, fish, seafood/shellfish, other wild birds and mammals ("bush meat"), frogs and other reptiles or amphibians. Flesh foods provide an important source of high quality protein and bioavailable iron, zinc, and vitamin B12.[16] Consumption of flesh foods tends to vary considerably by setting; in some instances consumption is too low to fulfill dietary requirements, whereas in other settings it is consumed in excess.[16] Excessive consumption is often linked specifically to red meats and processed/fatty meats. (Many processed/fatty meat items have been captured within the fast food category; e.g., fried chicken, hamburger, hot dog.)

Thirty-four studies (n=55782) reported on intake of flesh foods.[28, 30, 39, 48, 50, 70, 79, 82, 85, 90, 92, 97, 99, 102, 103, 113, 132-134, 154, 168-171, 173-175, 177-180, 184, 185, 190] Overall, 76 percent (n=42378) of all adolescent girls consumed flesh foods and, of them, 46 percent (n=3700) consumed them daily (table 11). Daily consumption was higher for older adolescents (50 percent; n=1790) than younger adolescents (33 percent; n=1155) across all regions (Appendix I, table 11). For all adolescents (10–19 years), general consumption was highest in Latin America and the Caribbean (84 percent; n=33447), though this region is represented only by one large study in Brazil. Consumption of flesh foods was lowest in South Asia (43 percent, n=1252), indicating that risks for iron deficiencies may be greater in this region. Daily intake was highest for adolescents in Europe and Central Asia (53 percent; n=755) and East Asia and the Pacific (45 percent; n=1696), though there was no comparable frequency data reported for the Brazilian study. Trends by age group were difficult to compare across regions. However, in Africa (which had comparable sample sizes for the 10–14 and 15–19 groups) there was significantly higher consumption of meats, poultry, and fish among younger girls (91 percent; n=2169) than older girls (43 percent; n=1260).

Table 11. Consumption of Meat, Poultry, and Fish

Middle East and North Africa (N=4) Iran (1 urban), Jordan (2 urban), Syria (1 urban)	
General consumption pattern	
N studies	4
n participants	1105
Consumption % (n)	56% (622)
Frequency	
N studies	3

n participants	599
n consumers	511
Urban/Rural/Mixed	3 urban
Daily	1% (7)
2–3 times/week	53% (270)
4–6 times/week	13% (68)
Weekly	32% (166)
Latin America and the Caribbean (N=1)[1] Brazil (1 mixed)	
General consumption pattern	
N studies	1
n participants	39912
Consumption % (n)	84% (33447)
Frequency	
N studies	NR
Africa (N=10) Ethiopia (1 urban, 1 rural, 1 mixed), Mozambique (1 mixed), Nigeria (1 urban, 1 semi-urban, 1 rural), South Africa (2 urban), Sudan (1 urban)	
General consumption pattern	
N studies	10
n participants	5867
Consumption % (n)	61% (3594)
Frequency	
N studies	6
n participants	4215
n consumers	3068
Urban/Rural/Mixed	6 urban
Daily	13% (400)
2–3 times/week	52% (1591)
4–6 times/week	33% (1014)
Weekly	1% (48)
Monthly	0.5% (15)
Europe and Central Asia (N=4)[1] Serbia (1 urban), Turkey (2 urban), multi-country (Turkey & Albania, 1 mixed)	
General consumption pattern	
N studies	4
n participants	2116
Consumption % (n)	66% (1400)
Frequency	
N studies	2
n participants	1427
n consumers	1206
Urban/Rural/Mixed	1 urban, 1 mixed
Daily	63% (755)
2–3 times/week	16% (197)
Weekly	21% (254)
South Asia N=11) Bangladesh (2 urban, 1 mixed), India (4 urban, 1 NR, 1 urban slum), Pakistan (1	

urban), Sri Lanka (1 rural)	
General consumption pattern	
N studies	11
n participants	2931
Consumption % (n)	43% (1252)
Frequency	
N studies	10
n participants	2678
n consumers	1236
Urban/Rural/Mixed	7 urban, 1 urban slum, 1 mixed, 1 rural
Daily	68% (842)
2–3 times/week	18% (220)
4–6 times/week	13% (167)
Monthly	0.6% (7)
East Asia & Pacific (N=4) China (3 urban, 1 rural)	
General consumption pattern	
N studies	4
n participants	3851
Consumption % (n)	54% (2063)
Frequency	
N studies	3
n participants	3754
n consumers	2054
Urban/Rural/Mixed	3 urban
Daily	83% (1696)
Weekly	17% (358)
Total (N=34)	
General consumption pattern	
N studies	34
n participants	55782
Consumption % (n)	76% (42378)
Frequency	
N studies	24
n participants	12673
n consumers	8075
Urban/Rural/Mixed	20 urban, 2 mixed, 1 rural, 1 urban slum
Daily	46% (3700)
2–3 times/week	28% (2278)
4–6 times/week	15% (1249)
Weekly	10% (826)
Monthly	0.3% (22)

Intake of Eggs

All types of poultry and wild bird eggs (e.g., chicken, quail, duck) were included in this group. As with other animal-source products, eggs are high in protein, vitamin B12, and micronutrients.[16]

A total of 13 studies reported on egg consumption in adolescent girls.[48, 79, 82, 90, 97, 102, 103, 134, 154, 160, 168, 175, 182] Of these, five came from Africa [Ethiopia (n=3), Mozambique (n=1), and South Africa (n=1)] and five came from South Asia [India (n=2) and Bangladesh (n=3)]; populations were a mixture of urban and rural. Overall, we found that 54 percent (n=2832) of all adolescents consumed eggs; 61 percent (n=2584) of older adolescents consumed eggs compared to 41 percent (n=207) of younger adolescents. Frequency data was limited. In Bangladesh, daily egg consumption was 19 percent (n=94).

Intake of Fats and Oils

This category includes all solid and liquid oils and fats originating from plant or animal sources. Common examples include butter, ghee, lard, mayonnaise, olive oil, and sesame oil. These items have a high fat content.

Consumption of fats and oils was reported in only two studies: a large-scale national survey from Brazil[177] and a small cross-sectional study in rural Ethiopia.[102] In Brazil, nearly a quarter of younger and older adolescent girls sampled consumed fats and oils. In Ethiopia, close to 50 percent (n=93) of girls ages 15–19 consumed fats and oils daily, 32 percent (n=60) consumed them weekly, and 16 percent (n=30) consumed them on a monthly basis.

Intake of Fruits

Fruits can be an excellent source of vitamin A, vitamin C, folate, and other essential micronutrients.[16] Ripe, fresh, or dried yellow and orange non-citrus fruits, such as mangoes, papaya, red palm fruit, and apricots are rich in vitamin A.[16] Other fruits (i.e., those that are not classified as vitamin A-rich) can also be found in this category. All fruits are health promoting through their provision of various nutrients and bioactive compounds, such as phytochemicals, vitamins, minerals, and fibers,[191] and the potential synergy of these components with other whole foods in the diet.

In total, 48 studies (n=153429) reported on fruit consumption.[28, 39, 42, 48, 52, 54, 64, 67, 70, 74, 79, 82, 85, 90, 92, 93, 97, 102, 105, 106, 115, 116, 122, 124, 132, 133, 154, 164, 169, 173, 176-179, 183, 185, 187, 192-202] Overall, fruit consumption was low: 43 percent (n=65627) of adolescent girls consumed fruits and, of those, only 44 percent (n=16095) consumed them daily (table 12). Across all regions, fruit consumption was slightly higher among older adolescents (56 percent; n=20659) compared to younger adolescents (32 percent; n=42461), and daily consumption followed a similar pattern (Appendix I, table 12). For all adolescents (10–19) general consumption of fruits was highest in Europe and Central Asia, (81 percent; n=878) [though only two studies from Turkey and Serbia comprised this analysis] and the Middle East and North Africa (73 percent; n=11716). The vast majority of populations sampled in these regions were urban. In comparison, only 28 percent (n=8381) of girls in East Asia and the Pacific consumed fruits (daily). When comparing younger and older adolescents within each region, we found that less than 30 percent of younger girls in East Asia and the Pacific, Africa, and Brazil (four studies in Brazil comprised the Latin America and Caribbean regional analysis) consumed fruits.

Table 12. Consumption of Fruits

Middle East and North Africa (N=11) Iran (2 mixed, 2 urban), Iraq (1 urban), Jordan (3 urban), Morocco (1 urban), Palestine (1 rural), Syria (1 urban)	
General consumption pattern	
N studies	11
n participants	16015
Consumption % (n)	73% (11716)
Frequency	
N studies	9
n participants	8869
n consumers	6508
Urban/Rural/Mixed	7 urban, 1 rural, 1 mixed
Daily	90% (5869)
2–3 times/week	4% (240)
4–6 times/week	2% (165)
Monthly	4% (234)
Latin America and the Caribbean (N=7)[1] Brazil (4 urban, 2 mixed, 1 NR)	
General consumption pattern	
N studies	7
n participants	100404
Consumption % (n)	41% (40922)
Frequency	
N studies	5
n participants	60315
n consumers	19759
Urban/Rural/Mixed	4 urban, 1 mixed
Daily	9% (1731)
2–3 times/week	2% (450)
4–6 times/week	89% (17578)
Monthly	NR
Africa (N=7) Ethiopia (1 rural), Ghana (1 urban, 1 mixed), Nigeria (1 urban, 1 semi-urban), South Africa (1 urban), Sudan (1 urban)	
General consumption pattern	
N studies	7
n participants	2128
Consumption % (n)	60% (1269)
Frequency	
N studies	7
n participants	2128
n consumers	60% (1269)
Urban/Rural/Mixed	7
Daily	2128
2–3 times/week	60% (1269)
4–6 times/week	7

Weekly	2128
Monthly	60% (1269)
Europe and Central Asia (N=2) Serbia (1 urban), Turkey (1 urban)	
General consumption pattern	
N studies	2
n participants	1090
Consumption % (n)	81% (878)
Frequency	
N studies	NR
South Asia (N=11) Bangladesh (2 urban, 1 mixed), India (5 urban, 1 urban slum), Pakistan (1 urban), Sri Lanka (1 rural)	
General consumption pattern	
N studies	11
n participants	3835
Consumption % (n)	64% (2461)
Frequency	
N studies	10
n participants	3654
n consumers	2376
Urban/Rural/Mixed	7 urban, 1 urban slum, 1 mixed, 1 rural
Daily	59% (1396)
2–3 times/week	21% (500)
4–6 times/week	17% (407)
Monthly	3% (73)
East Asia & Pacific (N=10) China (4 urban, 2 rural), Malaysia (1 urban), Philippines (1 mixed), Tonga (1 mixed), multi-country (Cambodia, Indonesia, Malaysia, Myanmar, Philippines & Vietnam = 1 mixed)	
General consumption pattern	
N studies	10
n participants	29957
Consumption % (n)	28% (8381)
Frequency	
N studies	8
n participants	28438
n consumers	7136
Urban/Rural/Mixed	4 urban, 2 mixed, 2 rural
Daily	99% (7091)
Weekly	0.6% (45)
Total (N=48)	
General consumption pattern	
N studies	48
n participants	153429
Consumption % (n)	43% (65627)
Frequency	
N studies	36

n participants	103776
n consumers	36583
Urban/Rural/Mixed	25 urban, 5 rural, 5 mixed, 1 urban slum
Daily	44% (16095)
2–3 times/week	4% (1486)
4–6 times/week	50% (18292)
Weekly	0.3% (124)
Monthly	2% (586)

Intake of Vegetables

Any medium to dark green leafy vegetable is considered vitamin A-rich.[16] These vegetables typically also contain folate and other essential micronutrients.[16] Along with leafy greens, other vitamin A-rich vegetables include orange-fleshed sweet potato, carrot, pumpkin, and yellow/orange fleshed squash. High vegetable consumption has been linked to several positive health outcomes, including a reduced risk of cancer at several sites, due to high intake of micronutrients, as well as proanthocyanidins, flavonoids, and fiber.[191, 203]

Forty-seven studies (n=151407) reported on vegetable consumption in adolescent girls.[25, 28, 39, 42, 48, 50, 52, 54, 64, 67, 70, 74, 79, 82, 90, 92, 102, 115, 116, 122, 124, 133, 154, 164, 168, 169, 173, 176-180, 182-185, 187, 189, 192, 194, 196, 198-202] As with fruits, vegetable consumption was low. Half of all adolescents (53 percent; n=80716) consumed vegetables, and only 37 percent (n=15561) consumed them daily (table 13). We found that, among girls who consumed vegetables, daily vegetable consumption was higher among the older girls (53 percent, n=2422 versus 33 percent, n=11557) (Appendix I, table 13). For all adolescents (10–19), consumption was highest in South Asia (80 percent; n=3032) and lowest in East Asia and the Pacific (34 percent, n=9622). There were significant variations in daily vegetable consumption by region: 82 percent (n=3571) of adolescents in the Middle East and North Africa and 72 percent (n=2064) of adolescents in South Asia consumed vegetables daily, while 5 percent (n=40) and 1 percent (n=287) of girls in Africa and Latin America and the Caribbean, respectively, demonstrated daily intake. There was no frequency data reported for Europe and Central Asia. Mean general consumption was higher among older adolescents than the younger group for all regions except Latin America and the Caribbean, where differences were negligible.

Table 13. Consumption of Vegetables

Middle East and North Africa (N=11) Iran (2 mixed, 2 urban), Iraq (1 urban), Jordan (3 urban), Morocco (1 urban), Palestine (1 rural), Syria (1 urban)	
General consumption pattern	
N studies	11
n participants	16015
Consumption % (n)	46% (7436)

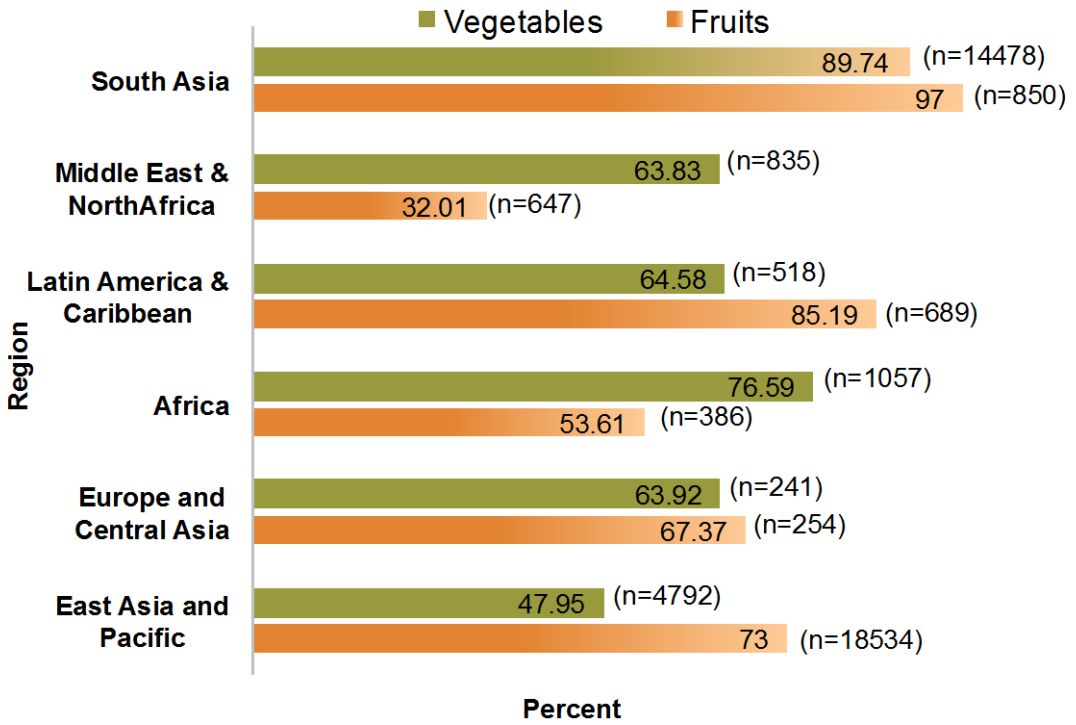
Frequency	
N studies	9
n participants	8869
n consumers	4343
Urban/Rural/Mixed	7 urban, 1 mixed, 1 rural
Daily	82% (3571)
2–3 times/week	6% (273)
4–6 times/week	4% (195)
Monthly	7% (303)
Latin America and the Caribbean (N=6)[1] Brazil (3 urban, 2 mixed, 1 NR)	
General consumption pattern	
N studies	6
n participants	98350
Consumption % (n)	40% (38922)
Frequency	
N studies	4
n participants	58261
n consumers	24299
Urban/Rural/Mixed	3 urban, 1 mixed
Daily	1% (287)
2–3 times/week	2% (492)
4–6 times/week	97% (23520)
Africa (N=8) Ethiopia (2 mixed, 1 rural), Ghana (1 mixed), Mozambique (1 mixed), Nigeria (1 urban, 1 semi-urban), Sudan (1 urban)	
General consumption pattern	
N studies	8
n participants	3491
Consumption % (n)	51% (1792)
Frequency	
N studies	3
n participants	1286
n consumers	788
Urban/Rural/Mixed	1 urban, 1 rural, 1 mixed
Daily	5% (40)
2–3 times/week	22% (173)
4–6 times/week	34% (265)
Weekly	35% (280)
Monthly	4% (30)
Europe and Central Asia (N=3)[1] Serbia (1 urban), Turkey (1 urban), multi-country (Turkey & Albania= 1 mixed)	
General consumption pattern	
N studies	3
n participants	1320
Consumption % (n)	76% (999)
Frequency	
N studies	NR

South Asia (N=11) Bangladesh (2 urban, 1 mixed), India (6 urban, 1 mixed), Pakistan (1 urban)	
General consumption pattern	
N studies	11
n participants	3793
Consumption % (n)	80% (3032)
Frequency	
N studies	10
n participants	3612
n consumers	2878
Urban/Rural/Mixed	7 urban, 2 mixed, 1 NR
Daily	72% (2064)
2–3 times/week	9% (248)
4–6 times/week	17% (495)
Weekly	1% (31)
Monthly	1% (40)
East Asia & Pacific (N=8) China (3 urban, 2 rural), Philippines (1 mixed), Tonga (1 mixed), multi-country (Cambodia, Indonesia, Malaysia, Myanmar, Philippines & Vietnam = 1 mixed)	
General consumption pattern	
N studies	8
n participants	28438
Consumption % (n)	34% (9622)
Frequency	
N studies	8
n participants	28535
n consumers	9622
Urban/Rural/Mixed	4 urban, 2 mixed, 2 rural
Daily	100% (9599)
Weekly	0.2% (23)
Total (N=47)	
General consumption pattern	
N studies	47
n participants	151407
Consumption % (n)	53% (80716)
Frequency	
N studies	34
n participants	100563
n consumers	41930
Urban/Rural/Mixed	22 urban, 7 mixed, 4 rural
Daily	37% (15561)
2–3 times/week	3% (1186)
4–6 times/week	58% (24475)
Weekly	0.7% (334)
Monthly	0.8% (373)

Adequacy of Fruit and Vegetable Consumption

Twenty-five studies were included in our analysis of adequacy.[25, 31, 33, 37, 48, 52, 54, 58, 60, 69, 85, 89, 97, 105, 116, 143, 159, 164, 166, 192, 194, 197, 201, 204, 205] We determined if adolescent girls had adequate intake of fruits and vegetables using WHO recommendations of over 400 grams per day (equivalent to two servings of fruit and three servings of vegetables that are 80 grams each). In contrast to the above analyses that used discrete data to determine the proportion of adolescents who consumed fruits and vegetables, studies comprising this analysis must have reported continuous serving size data (i.e., daily intake of fruits or vegetables in grams per day). We found that inadequate intake of both fruits and vegetables is widespread (figure 6). Inadequate fruit intake was highest in South Asia (97 percent; n=850) and lowest in the Middle East and North Africa (32 percent; n=647). It should be noted that all South Asian studies looking at servings of daily fruit took place in India. Inadequate vegetable intake ranged from 48 percent (n=4792) in East Asia and the Pacific to 90 percent (n=14478) in South Asia. The South Asian analysis also comprised a large, multi-country study.

Figure 6. Prevalence of Inadequate Fruit and Vegetable Consumption among Adolescent Girls (10–19)



Intake of Condiments and Seasonings

Condiments and seasonings are typically added to meals for flavor or garnish. They may be incorporated at any stage of cooking or when serving food, and include items such as salt, herbs, chili peppers, bouillon cubes, and soy sauce. Condiments and seasonings are generally consumed in very small quantities. However, they are included in FANTA's food groups for methodological reasons, because studies have shown that exclusion of these small quantity items falsely inflates a woman's dietary diversity (by strengthening the association between micronutrient adequacy and improved dietary diversity).[16]

Only one study reported on consumption of condiments and seasonings.[182] This study took place in India, and found that 34 percent (n=65) of adolescents ages 10–14 consumed condiments or seasonings two to three times per week.

Intake of Sweet Food Items

Categories for sweet and salty/fried items were included to better understand consumption of foods that are generally energy-dense and nutrient-poor. Sweet items are typically high in fat, sugar, and simple carbohydrates and include foods such as cakes, cookies, jelly, doughnuts and other sweet pastries, ice cream, and condensed milk.[16] Confectionary and chocolate are included in this category.

Thirty-six studies reported on sweet items.[26, 28, 40, 42, 52, 54, 64, 67, 70, 74, 77, 80, 97, 99, 103, 105, 106, 115, 124, 133, 168, 171, 177, 178, 180, 182, 183, 185, 187, 195, 206-211] Overall, consumption of these foods among adolescents was high (58 percent; n=109040) (table 14). Of girls who reported consuming sweet items, only 4 percent (n=3767) ate them on a daily basis while 63 percent (n=58316) ate them four to six times per week. There were significant differences in daily consumption of sweet items between younger and older adolescents, with almost 75 percent (n=2751) of girls ages 10–14 eating them daily compared to 30 percent (n=749) of older girls (Appendix I, table 14). The lowest general consumption was found among adolescents in Europe and Central Asia (10 percent; n=106), though studies from this region were lacking. The highest general consumption was found in South Asia (66 percent; n=1130) based on a regional analysis comprised mostly of urban populations in India. We saw no clear pattern when comparing younger and older adolescents by region. In the Middle East and North Africa and Africa, older adolescents consumed more sweet foods than younger adolescents, though in Europe and Central Asia, South Asia, and East Asia and the Pacific the reverse was true.

Table 14. Consumption of Sweet Food Items

Middle East and North Africa (N=9) Iran (2 mixed), Iraq (1 urban), Jordan (3 urban), Lebanon (1 NR), Morocco (1 urban), Syria (1 urban)	
General consumption pattern	
N studies	9
n participants	15913
Consumption % (n)	43% (6795)

Frequency	
N studies	6
n participants	8580
n consumers	4024
Urban/Rural/Mixed	7 urban, 1 mixed
Daily	64% (2594)
2–3 times/week	15% (603)
4–6 times/week	21% (827)
Latin America and the Caribbean (N=5)[1] Brazil (2 urban, 3 mixed)	
General consumption pattern	
N studies	5
n participants	159077
Consumption % (n)	61% (97591)
Frequency	
N studies	4
n participants	159077
n consumers	85,504
Urban/Rural/Mixed	2 urban, 2 mixed
2–3 times/week	33% (28623)
4–6 times/week	67% (56881)
Africa (N=9) Ethiopia (1 rural, 1 mixed), Ghana (1 urban), Nigeria (2 urban), South Africa (3 urban), Sudan (1 urban)	
General consumption pattern	
N studies	9
n participants	6227
Consumption % (n)	37% (2284)
Frequency	
N studies	4
n participants	1852
n consumers	1303
Urban/Rural/Mixed	3 urban, 1 rural
Daily	34% (437)
2–3 times/week	35% (458)
4–6 times/week	31% (408)
Europe and Central Asia (N=2) Serbia (1 urban), Turkey (1 urban)	
General consumption pattern	
N studies	2
n participants	1090
Consumption % (n)	10% (106)
Frequency	
N studies	NR
South Asia (N=6) India (5 urban), Pakistan (1 urban)	
General consumption pattern	
N studies	6

n participants	1710
Consumption % (n)	66% (1130)
Frequency	
N studies	3
n participants	1377
n consumers	1064
Urban/Rural/Mixed	3 urban
Daily	38% (401)
2–3 times/week	44% (463)
4–6 times/week	19% (200)
East Asia & Pacific (N=5) China (1 urban, 1 rural), Malaysia (1 urban), Thailand (1 urban), Tonga (1 Mixed)	
General consumption pattern	
N studies	5
n participants	3563
Consumption % (n)	32% (1134)
Frequency	
N studies	1
n participants	1450
n consumers	335
Urban/Rural/Mixed	1 rural
Daily	100% (335)
Total (N=36)	
General consumption pattern	
N studies	36
n participants	187580
Consumption % (n)	58% (109040)
Frequency	
N studies	18
n participants	132424
n consumers	92230
Urban/Rural/Mixed	16 urban, 3 mixed, 2 rural
Daily	4% (3767)
2–3 times/week	33% (30147)
4–6 times/week	63% (58316)

Intake of Salty/Fried Food Items

Like sweet foods, salty and fried items are typically high in fat and simple carbohydrates, and they are also laden with salt.[16] This category includes foods such as chips, crisps, puffs, and other low-cost items. It also includes fried foods that are more substantial, such as french fries, instant noodles, samosas, and other "street foods."

Fewer studies (N=20) reported on salty/fried food items.[30, 52, 54, 64, 67, 74, 77, 80, 97, 105, 106, 124, 151, 168, 171, 177, 180, 183, 187, 206] Overall, consumption of salty or fried items was 20 percent (n=24005) (table 15). We found the same pattern that was noted for sweet food items, whereby daily consumption was low (8 percent; n=1004), but

consumption four to six times per week was high (78 percent; n=9903). Additionally, we found that daily consumption for younger adolescents was significantly higher than for older adolescents (49 percent; n=997 versus 1 percent; n=3) (Appendix I, table 15). By region, intake was highest for girls living in urban areas of South Asia (India and Pakistan) and East Asia and the Pacific (China, Thailand, and Tonga). Frequency data was reported inconsistently, so we could not accurately compare habits among younger and older adolescents by region.

Table 15. Consumption of Salty/Fried Food Items

Middle East and North Africa (N=7) Iran (1 urban, 2 mixed), Iraq (1 urban), Jordan (1 urban), Lebanon (1 NR), Morocco (1 urban)	
General consumption pattern	
N studies	7
n participants	15,519
Consumption % (n)	23% (3526)
Frequency	
N studies	5
n participants	8535
n consumers	2466
Urban/Rural/Mixed	4 urban, 1 mixed
Daily	37% (917)
2–3 times/week	31% (777)
4–6 times/week	27% (681)
Weekly	4% (91)
Latin America and the Caribbean (N=2)[1] Brazil (2 mixed)	
General consumption pattern	
N studies	2
n participants	97,001
Consumption % (n)	12% (11,592)
Frequency	
N studies	1
n participants	57,089
n consumers	9222
Urban/Rural/Mixed	1 mixed
4–6 times/week	100% (9222)
Africa (N=3) Ethiopia (1 mixed), South Africa (2 urban)	
General consumption pattern	
N studies	3
n participants	1620
Consumption % (n)	20% (329)
Frequency	
N studies	1
n participants	61
n consumers	3

Urban/Rural/Mixed	1 urban
Daily	100% (3)
Europe and Central Asia (N=2) Serbia (1 urban), Turkey (1 urban)	
General consumption pattern	
N studies	2
n participants	1090
Consumption % (n)	22% (237)
Frequency	
N studies	NR
South Asia (N=3) India (2 urban), Pakistan (1 urban)	
General consumption pattern	
N studies	3
n participants	278
Consumption % (n)	57% (158)
Frequency	
N studies	1
n participants	138
n consumers	84
Urban/Rural/Mixed	1 urban
Daily	100% (84)
East Asia & Pacific (N=3) China (1 urban), Thailand (1 urban), Tonga (1 mixed)	
General consumption pattern	
N studies	3
n participants	2488
Consumption % (n)	56% (1440)
Frequency	
N studies	1
n participants	969
n consumers	848
Urban/Rural/Mixed	1 urban
Weekly	100% (848)
Total (N=20)	
General consumption pattern	
N studies	20
n participants	117996
Consumption % (n)	20% (24005)
Frequency	
N studies	9
n participants	66792
n consumers	12623
Urban/Rural/Mixed	7 urban, 2 mixed
Daily	8% (1004)
2–3 times/week	6% (777)
4–6 times/week	78% (9903)
Weekly	7% (939)

Intake of Fast Foods

Fast foods are meals purchased outside of the home, often as pre-prepared or "take-away" items from fast food restaurants, bars, or vendors. These foods contribute substantial amounts to daily energy intake, often have poor nutrient content, and are typically largely portioned and highly processed.[212, 213] Studies in high-income countries have shown fast foods to be high in sugar, sodium, unsaturated fat and total fat, and low in health promoting micronutrients.[214, 215] These foods have been implicated in the rising global rates of obesity and associated noncommunicable diseases.[18] Common fast food items include burgers (beef, vegetarian, chicken, fish), fried chicken, french fries, chicken wings, pizza, and tacos.

Fifty studies (n=152424) reported on the intake of fast foods.[26, 28, 39, 50, 52, 64, 67, 70, 74, 75, 77, 79, 80, 93, 96, 97, 99, 103, 113, 115, 118, 124, 133, 134, 137, 138, 159, 168, 169, 171, 174, 177-180, 183, 185, 187, 189, 192, 198, 199, 201, 207, 210, 216-220] Overall, 21 percent (n=32685) of all adolescent girls consumed these items, and 20 percent (n=2617) consumed them daily (table 16). Across all regions (total), there appears to be some differences between younger and older adolescents, with general consumption at 15 percent (n=16037) and 29 percent (n=12905), respectively (Appendix I, table 16). However, daily intake is far greater among girls ages 10–14 than 15–19. (24 percent; n=1174 versus 8 percent; n=369). For all adolescents (10–19 years), general consumption appears to be highest for those residing in South Asia (84 percent; n=6060) and Africa (52 percent; n=3108) and lowest in East Asia and the Pacific (8 percent; n=1452). However, in Latin America and the Caribbean daily consumption was greatest, reaching nearly 40 percent (n=487). All studies comprising the regional analysis for South Asia took place in India, with the clear majority representing urban areas. Additionally, only two studies contributed to the East Asia and Pacific regional analysis, and both were in younger adolescents.

Table 16. Consumption of Fast Foods

Middle East and North Africa (N=13) Iran (3 urban, 2 mixed), Iraq (1 mixed), Jordan (2 urban), Lebanon (1 NR), Morocco (1 urban)	
General consumption pattern	
N studies	13
n participants	18458
Consumption % (n)	16% (3014)
Frequency	
N studies	8
n participants	9273
n consumers	1880
Urban/Rural/Mixed	6 urban, 1 mixed, 1 NR
Daily	8% (153)
2–3 times/week	67% (1259)
4–6 times/week	18% (342)

Weekly	7% (126)
Latin America and the Caribbean (N=7)[1] Brazil (4 urban, 2 mixed), Costa Rica (1 mixed)	
General consumption pattern	
N studies	8
n participants	101544
Consumption % (n)	18% (18,426)
Frequency	
N studies	4
n participants	2578
n consumers	1240
Urban/Rural/Mixed	3 urban, 1 mixed
Daily	39% (487)
2–3 times/week	2% (20)
4–6 times/week	46% (576)
Weekly	2% (21)
Monthly	11% (136)
Africa (N=9) Ethiopia (1 urban, 1 mixed), Nigeria (1 semi-urban, 1 rural), South Africa (4 urban), Sudan (1 urban)	
General consumption pattern	
N studies	9
n participants	5996
Consumption % (n)	52% (3108)
Frequency	
N studies	5
n participants	4223
n consumers	3141
Urban/Rural/Mixed	5 urban
Daily	21% (675)
2–3 times/week	37% (1166)
4–6 times/week	41% (1300)
Europe and Central Asia (N=4)[1] Turkey and Albania (1 urban), Turkey (2 urban), Serbia (1 urban)	
General consumption pattern	
N studies	5
n participants	2187
Consumption % (n)	28% (625)
Frequency	
N studies	1
n participants	459
n consumers	459
Urban/Rural/Mixed	1 urban
Daily	10% (44)
2–3 times/week	NR
4–6 times/week	33% (153)
Weekly	27% (125)

Monthly	30% (137)
South Asia (N=15) India (12 urban, 2 mixed, 1 NR)	
General consumption pattern	
N studies	15
n participants	7210
Consumption % (n)	84% (6060)
Frequency	
N studies	11
n participants	5653
n consumers	4934
Urban/Rural/Mixed	11 urban
Daily	25% (1258)
2–3 times/week	37% (1805)
4–6 times/week	13% (656)
Weekly	13% (643)
Monthly	12% (572)
East Asia & Pacific (N=2) Cambodia, (1 mixed), China (1 urban)	
General consumption pattern	
N studies	2
n participants	17029
Consumption % (n)	8% (1452)
Frequency	
N studies	2
n participants	17029
n consumers	1452
Urban/Rural/Mixed	1 urban, 1 mixed
Weekly	100% (1452)
Total (N=50)	
General consumption pattern	
N studies	50
n participants	152424
Consumption % (n)	21% (32685)
Frequency	
N studies	31
n participants	39215
n consumers	13106
Urban/Rural/Mixed	27 urban, 3 Mixed, 1 NR
Daily	20% (2617)
2–3 times/week	32% (4250)
4–6 times/week	23% (3027)
Weekly	18% (2367)
Monthly	6% (845)

Intake of Sugar Sweetened Beverages

As their name indicates, SSBs are drinks that have added sugar (e.g., soda, sweetened coffee and tea, chocolate drinks, fruit juices, and energy drinks). High consumption of SSBs has been linked with poor health outcomes in several studies.[221, 222]

Forty-eight studies reported on SSB consumption.[26, 28, 30, 40, 42, 46, 50, 52, 54, 59, 64, 67, 70, 74, 77, 80, 92, 97, 99, 105, 106, 109, 113, 115, 117, 119, 122, 124, 137, 171, 174, 177, 178, 183, 185, 187, 195, 198, 199, 201, 206, 209-211, 223-226] Overall intake was high, reaching 51 percent (n=106690) for all adolescents (table 17). Of girls who consumed these drinks, 49 percent (n=43868) consumed them four to six times per week and 46 percent (n=41471) consumed them two to three times per week. When disaggregated by age, we found that older girls consumed more SSBs than younger girls (35 percent, n=12597 versus 21 percent, n=9615) (Appendix I, table 17). SSB consumption among adolescents was highest in Africa and Latin America and the Caribbean (63 percent; n=3038 and 59 percent; n=95890), according to an analysis that was comprised mostly of studies in urban Brazil. The lowest consumption of SSB was reported for adolescents living in East Asia and the Pacific (14 percent n=2440). For most regions, intake was greater for girls ages 15–19 years. In South Asia, girls who consume SSBs consume them daily.

Table 17. Consumption of Sugar-Sweetened Beverages

Middle East and North Africa (N=10) Iran (2 mixed), Iraq (1 urban), Jordan (3 urban), Lebanon (1 NR), Morocco (1 urban), Palestine (1 rural), Syria (1 urban)	
General consumption pattern	
N studies	10
n participants	16,270
Consumption % (n)	22% (3530)
Frequency	
N studies	9
n participants	9630
n consumers	2361
Urban/Rural/Mixed	6 urban,1 rural, 1 mixed, 1 NR
Daily	33% (774)
2–3 times/week	28% (658)
4–6 times/week	34% (802)
Monthly	5% (127)
Latin America and the Caribbean (N=9)[1] Brazil (4 urban, 4 mixed), Columbia (1 NR)	
General consumption pattern	
N studies	9
n participants	162968
Consumption % (n)	59% (95890)
Frequency	
N studies	8

n participants	123056
n consumers	82873
Urban/Rural/Mixed	4 urban, 3 mixed, 1 NR
Daily	1% (1262)
2–3 times/week	49% (40183)
4–6 times/week	49% (41045)
Weekly	1% (383)
Africa (N=7) Ghana (1 urban), Nigeria (1 urban, 1 NR), South Africa (3 urban), Sudan (1 urban)	
General consumption pattern	
N studies	7
n participants	4814
Consumption % (n)	63% (3038)
Frequency	
N studies	3
n participants	2870
n consumers	2705
Urban/Rural/Mixed	3 urban
Daily	7% (203)
2–3 times/week	17% (502)
4–6 times/week	68% (1942)
Weekly	7% (210)
Europe and Central Asia (N=5)[1] Turkey and Albania (1 urban), Turkey (3 urban), Serbia (1 urban)	
General consumption pattern	
N studies	5
n participants	2990
Consumption % (n)	27% (783)
Frequency	
N studies	NR
South Asia (N=7) India (5 urban), Pakistan (1 urban), Sri Lanka (1 NR)	
General consumption pattern	
N studies	7
n participants	2085
Consumption % (n)	48% (1009)
Frequency	
N studies	6
n participants	2005
n consumers	959
Urban/Rural/Mixed	5 urban, 1 NR
Daily	94% (899)
2–3 times/week	1% (11)
4–6 times/week	1% (10)
Weekly	4% (39)
East Asia & Pacific (N=10) Cambodia, (1 mixed), China (3 urban, 1 rural, 1 mixed), Malaysia (1 rural, 1 mixed), Thailand (1 urban), Tonga (1 mixed)	

General consumption pattern	
N studies	10
n participants	17374
Consumption % (n)	14% (2440)
Frequency	
N studies	4
n participants	3089
n consumers	1112
Urban/Rural/Mixed	2 urban, 1 rural, 1 mixed
Daily	17% (193)
2–3 times/week	10% (117)
4–6 times/week	6% (68)
Weekly	61% (685)
Monthly	6% (69)
Total (N=48)	
General consumption pattern	
N studies	48
n participants	206411
Consumption % (n)	52% (106690)
Frequency	
N studies	30
n participants	140650
n consumers	90010
Urban/Rural/Mixed	20 urban, 2 rural, 5 mixed, 2 NR
Daily	4% (3331)
2–3 times/week	46% (41471)
4–6 times/week	49% (43867)
Weekly	1% (1317)
Monthly	0.2% (196)

Intake of Alcohol

Fifteen studies reported on alcohol consumption in adolescent girls.[35, 42, 52, 98, 104, 116, 118, 190, 194, 197, 200, 201, 205, 210, 226] These studies took place in Brazil (N=5), Ghana, Nigeria, Serbia, India, Cambodia, China (N=3), Malaysia, and Philippines. Overall, consumption was 15 percent (n=4548) and was greater in older (20 percent; n=1079) than younger adolescents (13 percent; n=3229). Alcohol intake was significantly higher in urban populations of Brazil, reaching 28 percent (n=833) for younger girls and 35 percent (n=887) for older girls. Interestingly, in East Asia and the Pacific, consumption was higher among younger adolescents.

Sub-Analysis of Dietary Intake

Using a good quality study with a nationally-representative population of adolescent girls in Brazil, a sub-analysis of dietary intake was conducted in order to compare our overall results on intake to the findings from this study. See: Souza, Ade M., Barufaldi, LA., Abreu, Gde A., et al. ERICA: intake of macro and

micronutrients of Brazilian adolescents. Revista de Saude Publica. 2016;50(Suppl 1).:5s.

Population:

Non-pregnant adolescent girls ages 12 to 17 years from public and private schools in 124 cities in Brazil.
Method of data collection:

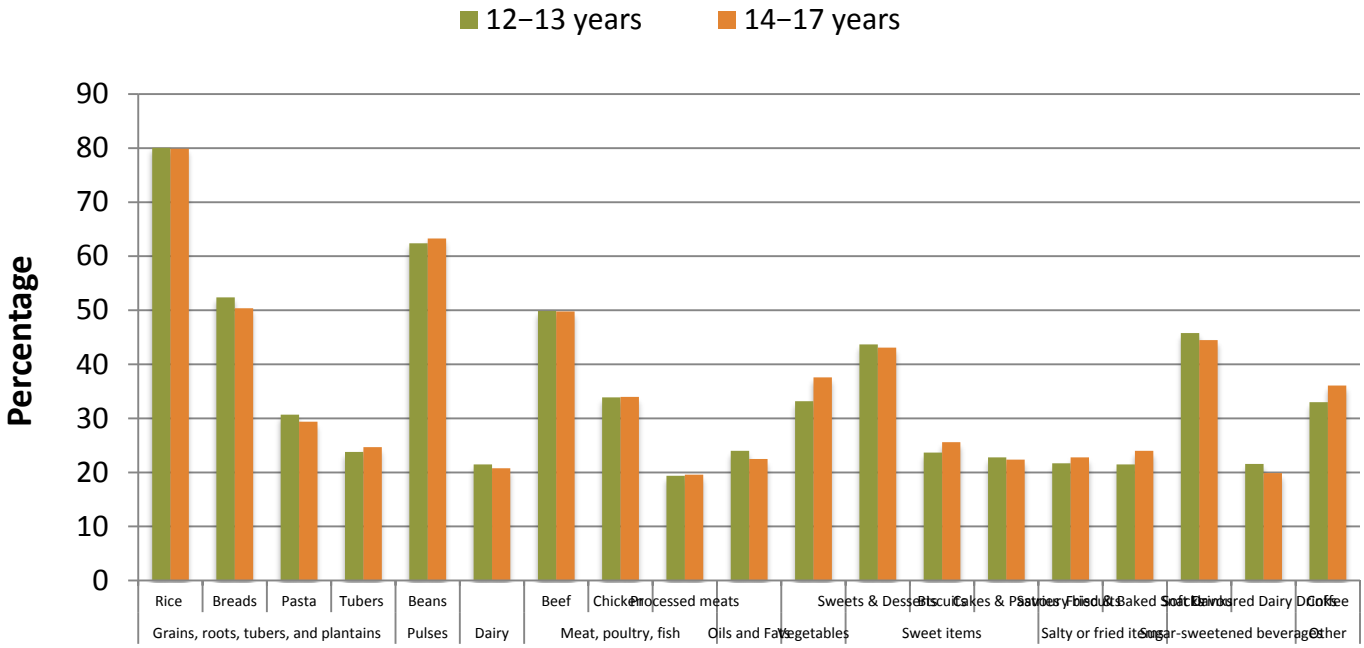
The Brazilian Study of Cardiovascular Risks in Adolescents (ERICA), a national school-based survey that included a 24-hour dietary recall (24-HDR). 7 percent of the sample completed a second 24-HDR for variance estimation.

Results:

There were few differences in consumption habits between younger (12–13 years) and older (14–17 years) adolescent girls* (see figure). For all girls, rice and pulses are the most commonly consumed foods, followed by bread, beef, and sugar-sweetened beverages. Fruit juice consumption is also high (53 percent for both age groups), but because the survey did not distinguish between fresh and processed (sugary) fruit juices, we excluded fruit juice from further analysis. Vegetable consumption is slightly higher for older adolescents, though still under 40 percent, and fruit consumption is too low to appear on this list of the 20 most consumed foods. Among Brazilian adolescents, sweet items are more popular than salty/fried items, with over 40 percent of girls reporting consumption of “sweets and desserts.” Other energy-dense foods and drinks, including processed meats, sweet and savoury biscuits, cakes and pastries, fried and baked snacks, and flavored dairy drinks, are consumed by about 20 percent of the population. Consumption of fast food was not captured by this survey.

*Age groups do not precisely match our categorization of younger (10–14 years) and older (15–19 years) adolescents.

Figure 7. Common Foods Consumed by Brazilian Adolescent Girls (Ages 12-17 Years)



Dietary Intake Summary

We have found that adolescent girls in LMIC have varying consumption habits that largely depend on context, region, and age. Figure 8 shows the proportion of adolescents (10–19) who consumed each food, along with the prevalence of daily consumption (for those who reported consuming the food). Overall, dietary diversity is lacking among adolescents. Consumption was highest for the meat, poultry, and fish category, though just over 40 percent consumed meat daily. Less than 55 percent of girls consumed grains, dairy, fruits, and vegetables. While daily grain intake was high, daily consumption of fruits, vegetables, and especially dairy was low, indicating that micronutrient adequacy is lacking for most girls. In contrast, consumption of sweet items reached almost 60 percent, surpassing that of fruits, vegetables, dairy, and grains. Half of adolescent girls now consume SSBs, though only 5 percent consume them on a daily basis, and 20 percent of adolescents consume both salty/fried items and fast foods. Of adolescents who reported consuming fast foods, a staggering 20 percent consume them daily. When looking at frequency of consumption of energy-dense foods specifically (figure 9), one can see that these foods are being consumed often. Salty/fried and sweet food items were eaten four to six times per week by close to 80 percent and 65 percent of the girls sampled, respectively, and over 40 percent of girls drink SSBs anywhere from two to six times per week. Taken together, these results underscore a nutrition transition in LMIC that is largely impacting younger girls.

Figure 8. Proportion of Adolescents (10–19) Consuming Various Foods and Daily Consumption (of Those Who Reported Consuming the Food)

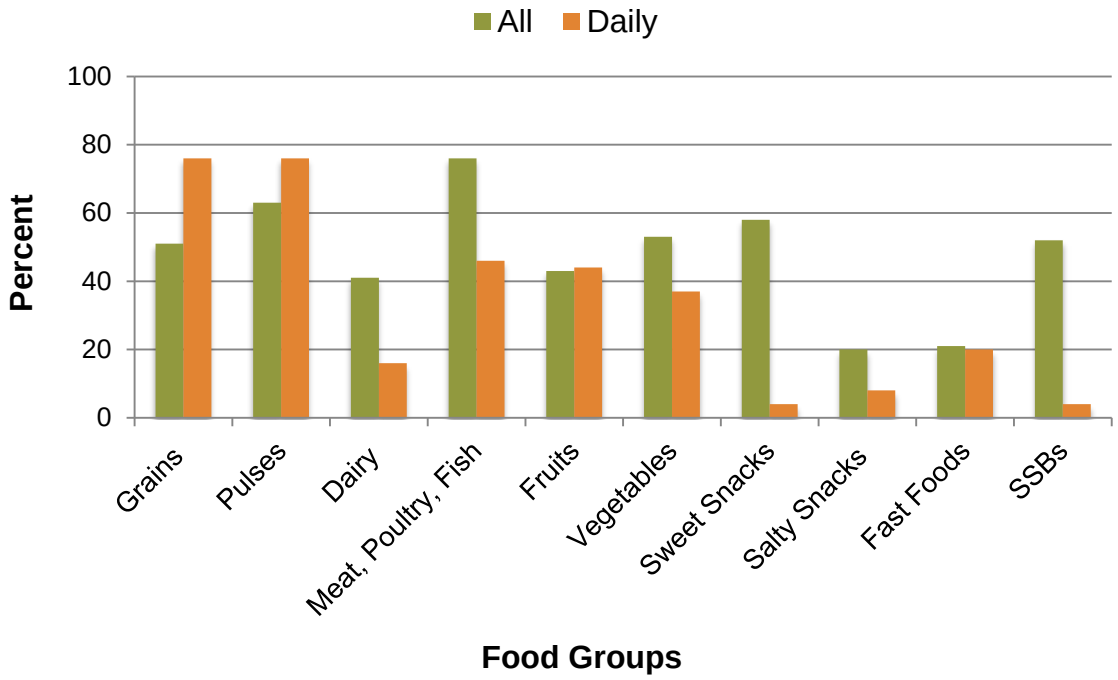
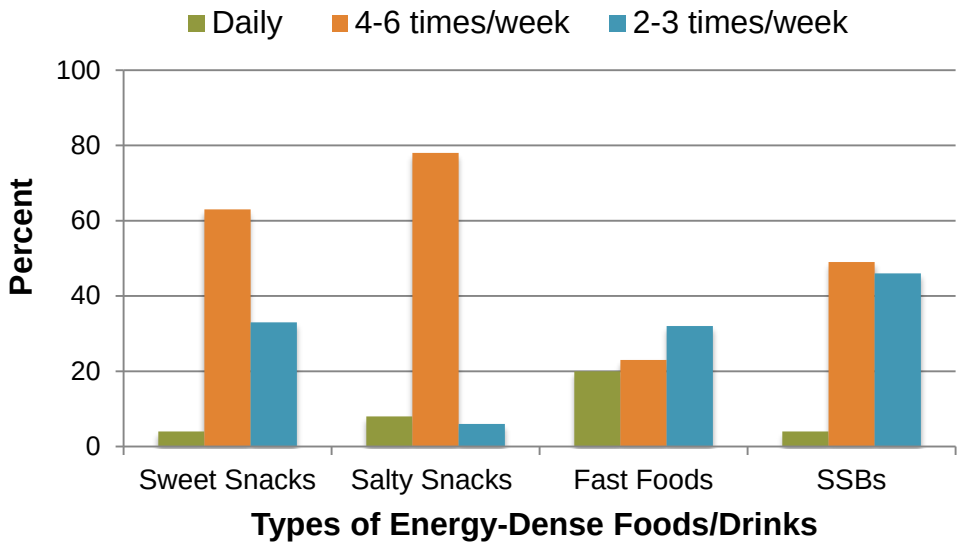


Figure 9. Frequency of Consumption of Energy-Dense Foods among Adolescents (10–19)



Because methods for primary collection of dietary data vary depending on the nature of the study, we performed a sensitivity analysis to look at consumption of grains (Appendix I, table 18a), dairy products (Appendix I, table 18b), flesh foods (Appendix I, table 18c), fruits (Appendix I, table 18d), and vegetables (Appendix I, table 18e) among all adolescents (10–19) when disaggregated by method of

data collection. Overall, consumption tended to vary by region and we found no consistent pattern when comparing results by food frequency questionnaire (FFQ), 24-hour recall, food records, or other non-validated tools. For example, grain consumption in Africa was highest using 24-hour recall (92 percent; n=933), followed by non-validated tools (74 percent; n=2106), followed by FFQ (67 percent; n=695). In contrast, grain consumption in South Asia was highest using 24-hour recall (82 percent; n=769), followed by FFQ (96 percent; n=1265), followed by non-validated tools (56 percent; n=226). Similar findings were noted for the other food groups examined, allowing us to infer that one method did not systematically over- or underrepresent results. As such, we can assume that it was acceptable to pool dietary intake data from all diet measurement sources.

Similarly, we performed a sensitivity analysis by study quality to assess whether the removal of low quality studies would significantly alter our dietary intake results (10–19 years) for grains (Appendix I, table 19a), dairy products (Appendix I, table 19b), flesh foods (Appendix I, table 19c), fruits (Appendix I, table 19d), and vegetables (Appendix I, table 19e). The proportion of adolescents who consumed fruits, vegetables, and flesh foods was lower for all regions, with the exception of Europe and Central Asia, after taking low quality studies out of the analysis. However, we found no consistent pattern for grains or dairy.

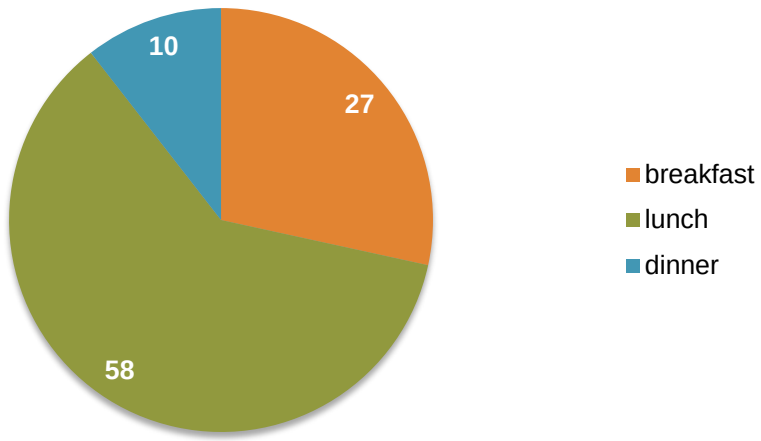
Place of Meal Consumption

We aimed to determine whether adolescent girls consume meals inside or outside of their homes, and which meal is more likely to be consumed elsewhere. Eight studies looked specifically at the proportion of girls who eat breakfast, lunch, and dinner away from the home.[26, 39, 40, 64, 105, 156, 196, 227] We found that the majority of adolescent girls across all regions consume lunch outside of their home (60 percent; n=2517), a finding that aligns with the notion that most of these studies were school-based (table 18 and figure 10). Two studies asked specifically about lunch box usage at school, one of which specified that data collection occurred during a time when meals were not provided to students.[26, 156] Authors found that 86 percent of girls in an urban center of South Africa used a lunchbox at school less than two times per week and almost 50 percent of girls in rural India never carried their lunch from home, indicating that most adolescent girls purchase their lunch at or near school. We found that over one quarter of all girls eat breakfast outside of the home (33 percent; n=1254), while dinner is more likely to be consumed inside the home (table 18 and figure 10).

Table 18. Proportion of Adolescent Girls (10–19) Who Eat Breakfast, Lunch, and Dinner Outside the Home

	Breakfast (N=6) Brazil (2 urban), China (1 urban) Tonga (1 mixed), Malaysia (1 rural), Morocco (1 urban)	Lunch (N=6) Brazil (2 urban), China (1 urban), India (1 rural), South Africa (1 urban) Tonga (1 mixed),	Dinner (N=3) Brazil (2 urban), China (1 urban)
N studies	6	6	3
n participants	3783	4189	2182
Urban/Rural/Mixed	4 urban, 1 rural, 1 mixed	4 urban, 1 rural, 1 mixed	3 urban
Weighted prevalence % (n)	33.1% (1254)	60.2% (2517)	22.8% (499)

Figure 10. Proportion of Girls (10–19) Who Eat Breakfast, Lunch, and Dinner Outside the Home



Fifteen studies reported on frequency of meal consumption outside of the home.[26, 105, 156, 227, 228, 39, 40, 96, 106, 110, 137, 159, 219, 220, 229] The majority of these studies were school-based (both private and public or government schools) and took place in urban populations. Overall, close to 20 percent (n=2993) of all adolescents consumed meals outside of the home (table 19). Eating outside the home was most commonly reported to be a monthly occurrence (27 percent; n=907), although 21 percent (n=763) reported eating out daily (table 19). Older girls (20 percent; n=357) were more likely to eat out daily than younger girls (11 percent; n=89) (Appendix I, table 20). Unsurprisingly, given the nature of the studies, the most frequently reported place of consumption was the school cafeteria or tuck shop. One study, conducted in northeastern India, stratified data

by rural, suburban, and urban populations. Of the rural group, about half of the girls were in school and half were out of school.[220] While proportions were less than those for the suburban and urban populations, 3 percent, 14 percent, and 41 percent of rural girls still reported eating outside the home daily, weekly, and monthly, respectively.

Three studies reported on the frequency of meal consumption at a fast food restaurant or outlet specifically[96, 106, 122]. Of these, two populations were school going, older adolescent girls in urban Malaysia and rural Palestine, respectively. The third study was not school-based, and likely included both in-school and out-of-school, older adolescents in the Soweto-Johannesburg region of South Africa. Pooled analysis shows that 3 percent of girls eat at a fast food restaurant daily, while 18 percent visit a fast food restaurant four to six times per week and 26 percent of girls eat meals there one to three times per week. When comparing results by region, it appears that girls in Malaysia frequent fast food restaurants less than girls in South Africa and Palestine (0.7 percent of girls eat at fast food restaurants four to six times per week compared to almost 40 percent in South Africa and 20 percent in Palestine).

Table 19. Proportion of Adolescent Girls (10–19) from All Regions Who Eat Meals Outside the Home (by Frequency)

Daily (N=7) India (1 urban, 1 mixed), Malaysia (1 urban, 1 rural, 1 NR), South Africa (1 urban)	
N studies	7
n participants	3174
Urban/Rural/Mixed	4 urban, 1 mixed, 1 NR, 1 rural
Weighted prevalence % (n)	23.8% (757)
1-3 times/week (N=7) India (2 urban), Malaysia (1 urban, 1 rural, 1 NR), Pakistan (1 mixed), South Africa (1 urban)	
N studies	7
n participants	3563
Urban/Rural/Mixed	4 urban, 1 rural, 1 mixed, 1 NR
Weighted prevalence % (n)	21.4% (763)
4–6 times/week (N=8) China (1 urban), India (2 urban), Malaysia (1 urban, 1 rural, 1 NR), Pakistan (1 mixed), South Africa (1 urban)	
N studies	9
n participants	5458
Urban/Rural/Mixed	5 urban, 2 rural, 1 mixed, 1 NR
Weighted prevalence % (n)	10.4% (568)
Monthly (N=5) India (2 urban, 1 mixed), Malaysia (1 urban, 1 NR)	
N studies	5
n participants	3313
Urban/Rural/Mixed	3 urban, 1 mixed, 1 NR

Weighted prevalence % (n)	27.4% (907)
Never (N=6) India (2 urban), Malaysia (1 urban, 1 NR), Pakistan (1 mixed), South Africa (1 urban)	
N studies	6
n participants	3927
Urban/Rural/Mixed	4 urban, 1 mixed, 1 NR
Weighted prevalence % (n)	24.5% (962)
Total[1]	
N studies	28
n participants	15508
Urban/Rural/Mixed	16 urban, 4 NR, 4 mixed, 4 rural
Weighted prevalence % (n)	19.3 (2993)

[1]Note that total eating out of the home does not include "never" category.

Meal Patterns

We looked at several meal patterns of adolescent girls, including the number of full meals consumed per day (whether two or less) and, more specifically, the prevalence of breakfast skipping. We also determined the prevalence of snacking, and the prevalence of vegetarian diets among adolescent girls.

All but three studies that investigated meal frequency were conducted in school-going adolescents.[25, 70, 80, 99, 106, 113, 123, 132, 156, 181, 195, 228-231] Public and private schools were evenly represented, based on the studies that provided such information. Overall, we found that almost half of adolescent girls consume two meals or less per day (40 percent, n=4010), and there are no differences between younger and older adolescents. Only four studies (n=3481) asked specifically about consumption of less than one of two meals per day. Three of these studies took place in the Middle East and North Africa (Gaza, Jordan, Iran) and one took place in Africa (Ghana). Pooled analyses revealed that 12 percent of all adolescents (10–19 years) sampled from these regions eat only one full meal per day. When comparing studies that specifically targeted adolescents coming from low- and high-income families, results differed. Half (50 percent) of girls in low-income and rural settings consumed two meals per day and 31 percent ate three meals per day. In comparison, only 11 percent of girls from wealthier, urban families ate two meals per day, while 38 percent ate three and the majority (51 percent) consumed four full meals per day. Another study by Kelishadi et al. found similar results when looking at the proportion of girls classified as low, medium, and high socio/economic status who consume ≤3 meals per day.[232]

Forty-two studies looked specifically at breakfast skipping, , of which 39 were school-based studies[28, 37-40, 42, 43, 47, 52, 70, 80, 99, 105, 106, 110, 115, 120, 122, 123, 126, 133, 156, 169, 173, 175, 178, 181, 195, 199, 208, 217, 218, 220, 227, 230, 233-239]. Most (N=19) did not report whether included school were public or private, though 13 studies were conducted in public schools, 2 in private schools, and 6 in both public and private

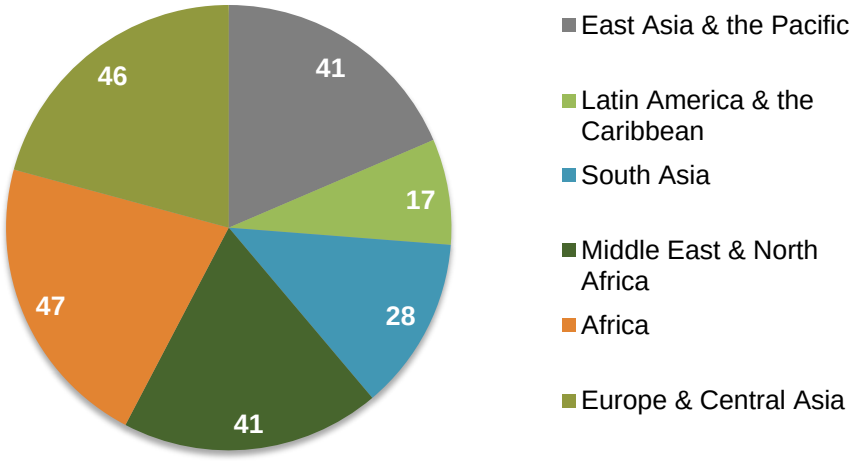
schools. In one study, taking place in Tarqumiyah, Palestine, there are no private schools. Five studies included technical/vocational schools within their sampling frame, and only one study in India mentioned an active school feeding programme that provided students free lunch at school. Overall, we found that 40 percent (n=18129) of adolescent girls skip breakfast (table 20).[239] We noted some regional differences in breakfast skipping; it is most common among adolescents residing in Africa (47 percent, n=1486) and East Asia and the Pacific (41 percent, n=8679), while only 17 percent (n=354) of girls in Latin America and the Caribbean skip the first meal of the day (figure 11). Additionally, there are significant differences within each region by age (Appendix I, table 21). For example, in Brazil, only 11 percent (n=193) of younger adolescents skip breakfast compared to 55 percent (n=161) of older adolescents. This situation contrasts with the situation in Africa (Ghana and Nigeria), where the prevalence of breakfast skipping was 66 percent (n=1481) and 21 percent (n=79) for younger and older girls, respectively. Several studies investigated the reasons for skipping breakfast among adolescent girls.[99, 122, 123, 218] Across all geographies where these studies took place (Nigeria, Gaza, Iraq, and Palestine), the reason most often cited was lack of appetite in the morning followed by lack of time. Dieting behaviors, unavailability of easy-to-prepare foods, and fasting for religious reasons were also cited. One study in urban and rural areas of Zhejiang province, China looked at the association of breakfast consumption with health-related behaviors and found that consumption of breakfast either daily or sometimes was significantly associated with consuming vegetables two or more times per day and protected against soft drink consumption one or more times per day.[233] Daily consumption was also shown to protect against consuming fast food two or more days per week. Similarly, a study in an urban center of southern Brazil identified certain unhealthy eating patterns (e.g., consumption of fried foods, sweets, and soft drinks) as being positively associated with skipping breakfast among adolescent girls.[196] Taken together, this underscores the importance of promoting healthy eating patterns alongside food choices.

Table 20. Prevalence of Breakfast Skipping among Adolescent Girls, by Region

Middle East and North Africa (N=10) Egypt (1 mixed), Iran (2 mixed, 1 urban), Iraq (1 urban, 1 mixed), Gaza (1 NR), Jordan (2 urban), Palestine (1 rural)	
N studies	10
n participants	15407
Urban/Rural/Mixed	4 urban, 4 mixed, 1 rural, 1 NR
Skipping % (n)	43.3% (6667)
Latin America and the Caribbean (N=4) Brazil (4 urban)	
N studies	4
n participants	2108
Urban/Rural/Mixed	4 urban
Skipping % (n)	16.8% (354)

Africa (N=5) Ghana (1 mixed, 1 NR), Nigeria (2 urban, 1 semi-urban)	
N studies	5
n participants	3147
Urban/Rural/Mixed	2 urban, 1 semi-urban, 1 mixed, 1 NR
Skipping % (n)	47.2% (1486)
Europe and Central Asia (N=2) Bosnia & Herzegovina (1 mixed), Serbia (1 urban)	
N studies	2
n participants	683
Urban/Rural/Mixed	1 urban, 1 mixed
Skipping % (n)	45.5% (311)
South Asia (N=8) India (6 urban, 1 rural, 1 mixed)	
N studies	8
n participants	2291
Urban/Rural/Mixed	6 urban, 1 rural, 1 mixed
Skipping % (n)	27.6% (632)
East Asia & Pacific (N=13) China (4 rural, 2 urban, 1 mixed), Fiji (1 mixed), Malaysia (2 urban, 1 rural, 1 NR), Tonga (1 mixed)	
N studies	13
n participants	21354
Urban/Rural/Mixed	5 rural, 4 urban, 3 mixed, 1 NR
Skipping % (n)	40.6% (8679)
Total (N=42)	
N studies	42
n participants	44990
Urban/Rural/Mixed	21 urban, 10 mixed, 7 rural, 3 NR, 1 semi-urban
Skipping % (n)	40.3% (18,129)

Figure 11. Proportion of Adolescent Girls (10–19 Years) Who Reported Skipping Breakfast, by Region



Twenty-four studies had dichotomous data on the snacking habits of adolescent girls.[31, 39, 43, 54, 65, 74, 77, 80, 105, 106, 120, 133, 134, 159, 169, 185, 190, 196, 208, 220, 227, 237, 240, 241]
We found that snacking, defined as consuming food or drinks between meals, is typical for about half of adolescent girls sampled (table 21). It is more common among older school-going girls (59 percent, n=3135) than younger ones (33 percent, n=1993), when combining data from all regions (Appendix I, table 22). Five studies (n=1121) reported continuous data for snacking.[31, 40, 44, 62, 242] Of these, we found that the mean number of snacks consumed per day was 2.5 ±1.9. Snacking is more common in the morning (between breakfast and lunch) or afternoon (between lunch and dinner), compared to the evening (table 22). Few studies assessed whether girls were replacing skipped meals with snacks. Of those who did, one study in Sao Paulo, Brazil found that 38 percent of older adolescent girls were replacing lunch with snacks, including foods such as cheese, bread, pastries, peanuts, chocolate, salty snack foods, fruit, and juice.[227] A second study in a semi-urban region of Nigeria showed that most adolescent girls ate afternoon snacks (47 percent) in place of lunch (4 percent), but did not indicate the types of foods consumed.[169] Another study in Iranian adolescents showed that snacking behavior (including both nutritious and unhealthy snack foods and drinks) was positively associated with meal skipping.[236]

Table 21. Prevalence of Snacking among Adolescents (10–19)

Snacking (N=24)[1] Brazil (3 urban), China (2 urban, 1 rural), Egypt (1 mixed), India (5 urban, 1 NR), Iran (1 urban), Lebanon (1 NR), Malaysia (1 urban), Myanmar (1 rural), Sudan (1 urban), Nigeria (1 urban, 1 semi-urban), Syria (1 urban), Tanzania (1 mixed), Tonga (1 mixed), Turkey (1 urban)	
N studies	24
n participants	12647

Urban/Rural/Mixed	16 urban, 3 mixed, 2 rural, 1 semi-urban, 2 NR
Consumption % (n)	48.5% (6134)

Table 22. Prevalence of Snacking, by Time of Day, Snack Taken, and Prevalence of Adolescents who Consume Snacks Daily

	Morning	**Afternoon**	**Evening**	**Daily**
Snacking (N=12)[1] Brazil (3 urban), China (1 urban), Egypt (1 mixed), India (1 urban), Malaysia (1 urban), Nigeria (1 semi-urban), Sudan (1 urban), Syria (1 urban), Tonga (1 mixed), Turkey (1 urban)				
N studies	7	6	5	6
n participants	3585	2438	2263	1901
Urban/Rural/Mixed	5 urban, 1 mixed, 1 semi-urban	5 urban, 1 semi-urban	4 urban, 1 semi-urban	6 urban
Consumption % (n)	64.1% (2298)	61.2% (1492)	33.3% (754)	25.9% (492)

[1]Some studies report multiple snacking patterns

Because morning and afternoon snacks are most common, adolescents are likely to be purchasing their snacks from school or near school grounds. Qualitative data from Tonga revealed that students purchased their morning snack from school, and these foods and drinks were typically unhealthy (e.g., deep-fried pancakes, dried noodles, and sweetened drinks).[105] Several studies investigated the relationship between snacking and the prevalence of overweight and obesity. One study in Delhi, India[159] found that snacking was much more common in overweight or obese girls (96 percent) than in normal weight girls (53 percent), while another study in rural China[43] demonstrated borderline significance for the association between snacking on four or more days per week and overweight/obesity. Interestingly, a third study in Turkey showed that more non-obese adolescents snack in the morning, while snacking in the afternoon is significantly associated with obesity.[54] Taken together, it is not clear that "snacking" should be considered an unhealthy behavior, especially where it is a culturally relevant practice and an important contributor to daily energy intake. Given that adolescents today commonly snack in between meals, it is important to ensure that healthy snack options are available at schools and in other community settings.

Vegetarianism

Of the 18 studies that reported on vegetarianism (table 23), 16 were from South Asia (15 from India and 1 from Sri Lanka). [80, 93, 94, 130, 132, 133, 135, 136, 139, 156, 158, 159, 180, 198, 219, 220, 243, 244] The two additional studies were from an urban population in Iran and a population in Brazil where urban/rural status was not reported. Within South Asia, we found that the majority of girls eat meat (59 percent non-vegetarian, n=3676 versus 29 percent vegetarian, n=1823). Additionally, 68 percent (n=717) of younger adolescents are non-vegetarian compared to 62 percent (n=2165) of older adolescents (Appendix I, table 23). Within Iran and

Brazil, the vast majority of adolescents were non-vegetarian (88 percent, n=321 and 94 percent, n=535).

Table 23. Prevalence of Vegetarianism among Adolescent Girls (10–19), by Region

Middle East and North Africa (N=1) Iran (1 urban)	
N studies	1
n participants	363
	1 urban
Vegetarian % (n)	2% (7)
Non-vegetarian	88% (321)
Latin America and the Caribbean (N=1) Brazil (1 NR)	
N studies	1
n participants	572
Urban/Rural/Mixed	NR
Vegetarian % (n)	6% (34)
Non-vegetarian	94% (535)
Africa (N=0)	
Europe and Central Asia (N=0)	
South Asia (N=16) India (11 urban, 2 rural, 1 mixed, 1 NR), Sri Lanka (1 rural)	
N studies	15
n participants	6246
Urban/Rural/Mixed	11 urban, 3 rural, 1 mixed
Vegetarian % (n)	29% (1823)
Non-vegetarian	59% (3676)
East Asia & Pacific (N=0)	
Total (N=18)	
N studies	18
n participants	7181
Urban/Rural/Mixed	12 urban, 3 rural, 2 NR, 1 mixed
Vegetarian % (n)	30% (2178)
Non-vegetarian	59% (4218)

Social, Demographic, and Economic Context

Macronutrient Status and Urban/Rural Residence, Socioeconomic Status, and Gender Inequality

When disaggregating data by factors more distal to the individual, including place of residence, country-level socioeconomic status, and gender inequality, we saw some striking differences in macronutrient intake. Protein, fat, and carbohydrate intake was lower among girls in rural areas (Appendix I, figures 3a and 3b). When considering macronutrient intake among low versus low-middle and upper-middle income countries, we saw a distinct linear trend whereby protein, fat, and carbohydrate intake increased alongside income level (Appendix I, figures 4a and 4b).

To incorporate a measure of female empowerment, we sorted countries by their ranking on the GII (GII ranges from 0–1; higher GII values indicate greater disparities and inequalities between genders in that country) and disaggregated macronutrient intake based on GII quintiles (e.g., 0.100–0.199 to 0.5–0.599), because no country within the macronutrient analysis ranked higher than 0.6. There was no consistent pattern noted for carbohydrates (Appendix I, table 24), though the highest intakes were seen among those living in the most equitable countries with GII from 0.100–0.199. Protein intake was highest for adolescents who live in the most equitable countries (0.100–0.199) and protein intake was lowest for those in the most inequitable countries (0.5–0.599) (Appendix I, table 25). Fat intake ranged from 59 to 64 grams per day among the first and fourth quintiles (0.100-0.499), and was less for the fifth quintile (0.5-0.599) (Appendix I, table 26).

DISCUSSION

Study Limitations

There were several limitations to our study. Firstly, there was a lack of available nationally representative data on diet and eating practices of adolescents in LMIC. Therefore, we acknowledge the difficulty in interpreting how representative the data are for different populations within a given region. For example, studies among affluent urban African populations would presumably yield slightly different results from assessments among poor rural ones, and our data did not always capture this. Additionally, certain countries are over or under-represented within these regional analyses. For example, studies from Brazil, India, and China made up 71 percent, 81 percent, and 53 percent of the Latin America and the Caribbean, South Asia, and East Asia and the Pacific region analyses, respectively. In contrast, studies from countries in Europe and Central Asia were lacking in most analyses. We have attempted to minimize this limitation by providing a table and a map to show the various geographies that are captured by our data. Additionally, we have linked sample size to each of our results statements. The majority of studies were low quality (64 percent) or medium

quality (35 percent), based on small sample size, cross-sectional study design, purposive sampling and completeness and validity of data collected.

Primary methods used to collect data on consumption also varied by study; as such, we have pooled data from 24-hour recalls, food frequency questionnaires, food records, and other methods (e.g., un-validated questionnaires created for the purpose of the primary study). A sensitivity analysis was conducted to determine whether the method of data collection had the potential to bias results, and we found no indication of this. We had to make several assumptions about traditional foods consumed because of lack of detailed information that was reported in the study. Generally, we classified these foods according to their main ingredient, though this varies by region and country. We found that we were unable to classify foods into staple foods or processed versus unprocessed foods, which we had initially set out to do. Doing so would rely heavily on context and would, in most cases, require seeking additional information that was not available within the studies themselves, such as information pertaining to purchasing and food/meal preparation. We also found inconsistent use of frequencies for food intake. To overcome this, we standardized intake categories into daily, two to three times per week, four to six times per week, monthly, or never, based on what was reported within the study. However, the majority of studies did not report on frequency of consumption, making it challenging to accurately compare how often a certain food was consumed across age groups and across regions. Many studies that investigated consumption habits of school children and adolescents did not disaggregate their data by sex. As such, a substantial amount of data had to be excluded from our analysis.

We used the IOM guidelines to determine adequate/inadequate intake of macronutrients, though these standards are based on healthy adolescents and do not take into account underlying nutritional deficiencies that are common in LMIC settings. Additionally, it was challenging to interpret the relevance of our results on protein, fat, and energy intake, as many of the studies did not report this in relation to body size and activity at an individual level. Future studies that triangulate data on macronutrient and energy intake, diet, and physical activity would be beneficial. Our decision to look at macronutrient intake, but not micronutrient intake, was also pragmatic given data availability and some of the aforementioned considerations. Because of our interest in the nutrition transition, we focused on macronutrients to determine whether imbalances in fat, protein, or carbohydrate intake were aligned with consumption of certain foods or eating patterns. With further time and resources, investigating micronutrient deficiencies as they relate to dietary intake is an important next step and might require access to individual-level data.

There were additional limitations when analyzing weight status of adolescents from the studies themselves. Several studies reported only mean BMI for the total study sample, which may have included a wide age range and did not allow us to disaggregate BMI by smaller age bands. The measure used in reporting BMI status also varied between studies (i.e., IOTF or CDC cutoff points). We came across many studies that did not mention which method, if any, was used

to classify their participants into weight status categories. For studies that did not disaggregate data by age and did not specify their reference cutoff points (e.g., BMI <16.5 or -2 SD), we were unable to re-categorize data according to WHO standards. Anthropometric measurements were not always taken for the total sample, limiting the units available for our analysis. In some cases, studies only reported on a single BMI outcome category (typically overweight), which may have led to overestimation.

Finally, the majority of the included studies (almost 70 percent) were conducted in a school setting, hence limiting their extrapolation to practices and patterns at household level and their generalizability overall. This might have had important implications for meal patterns and choice. The remaining studies were community or regionally based (e.g., household sampling), meaning the study population was likely to be a mixture of girls who were in and out of school. Given that many girls in LMIC lack the opportunity to attend school, and many will drop out of school, future studies should be population based or use sampling methods that ensure that non-school going children and adolescents are also included in dietary intake assessments.

Study Implications

This is the first large-scale systematic review to explore the current dietary intake and practices of adolescent girls from various low- and middle-income geographies. Our findings clearly depict some “Westernized” patterns that include consumption of processed, sugary, and high-fat items. Overall, we found that adolescent girls in LMIC have diets that are limited in diversity and typically do not meet global food-based dietary guidelines. On average, less than half of adolescent girls reported eating grains, dairy, fruits, and vegetables, and only about 60 percent consumed pulses. Even where fruits and vegetables are consumed daily, servings per day or portions are not sufficient to meet recommended intakes in most cases. We found that 90 percent of adolescent girls in South Asia did not consume an adequate diet of fruits or vegetables. Current consumption of flesh foods is high and may be replacing other important plant-based sources of protein. Intake of nuts and seeds, eggs, and fats and oils were underreported in the literature.

Along with insufficient nutrient intakes due to diets lacking in fruits and vegetables, legumes, and dairy, calorie-rich foods, including sweet and salty items, SSBs, and fast foods, are popular among adolescent girls. Across all regions, these foods/beverages are being consumed regularly. Overall, consumption of sweet items among girls 10–19 was higher than consumption of grains, dairy, fruits and vegetables. We found that 74 percent and 49 percent of younger adolescents are consuming sweet and salty items, respectively, on a daily basis. Additionally, we found important regional variations in consumption; 40 percent of adolescents in Latin America and the Caribbean and 25 percent in South Asia are eating fast foods daily. Adolescent diets that are low in nutritious foods and high in processed and other energy-dense foods will have many direct and indirect impacts on health. The Global Burden of Disease (GBD), Injuries,

and Risk Factor study 2016 found that poor dietary habits are a leading risk factor for mortality, accounting for close to one in five deaths globally.[245] From the period 2006 to 2016, the percentage of deaths attributable to diet increased by 11.2 percent. Within specific components of diet, low fruit consumption, low whole grain intake, and high sodium were among the most important contributors. Additionally, GBD has shown that diets high in red meat, SSB, and low in milk, respectively accounted for the greatest increase in attributable deaths and disability-adjusted life years between 1990 and 2016. Considering our dietary intake findings, this places adolescent girls at serious risk.

When looking at macronutrient and energy intake, we also found variations by region and by age. Based on IOM, protein intake was inadequate among older adolescents in Africa. Both fat and protein intake were higher among 10 to 14 year olds compared to older adolescents. Overall, fat intake was lowest for older adolescents living in South Asia and Africa. Similarly, energy intake overall (10–19 years) was lowest for girls living in South Asia (1494 kcal/day) and Africa (1585 kcal/day). When stratifying energy intake by place of residence, we found that girls residing in urban slums and rural regions had lower mean energy intake compared to those living in urban areas. Based on our analysis of underlying determinants, we noted some trends in macronutrient intake. For all macronutrients, average intake was highest among adolescents residing in upper middle-income countries. Additionally, there appear to be differences between urban and rural adolescents with urban girls achieving above the optimal macronutrient intake. Others have also shown increasing dual burden in urban areas where the food environment is more obesogenic. [7, 246, 247] Taken together, it would appear that nutrient requirements are not being met through dietary practices, and this has contributed to the dual burden of malnutrition that is driven by widespread micronutrient deficiencies and imbalanced macronutrient intakes.

We found that meal patterns among adolescent girls tended to be fairly consistent across regions. Almost half the adolescent girls in LMIC do not eat three full meals per day; similar proportions were noted for adolescents who skip breakfast, with the exception of girls in South Asia (28 percent) and Latin America and the Caribbean (17 percent). Lunch is typically consumed away from home. Whether lunch is provided at school or purchased from school canteens/cafeterias or nearby vendors or food stalls, schools (and their surrounding perimeters) represent potential arenas to intervene with nutrition-specific programming or policy. Similarly, we found that many adolescents snack during school hours (mid-morning or mid-afternoon). The data indicate that there could be a potential link between skipping breakfast and snacking in the morning. Further studies are required to both quantify this link and elucidate the types of mid-morning snacks that are being consumed, to ascertain whether this snack could be considered breakfast for some girls. Our analysis has revealed that younger adolescents disproportionately consume meals away from the home compared to older adolescents. This finding warrants further investigation, especially if meals away from the home consist mainly of fast and convenient foods that are relatively accessible and inexpensive.

Although this systematic review included few studies representative of the overall population, the results of our analysis of BMI status by age are consistent with recent epidemiological trends.[7] Overall, we found higher proportions of younger girls to be overweight or obese than older girls. For example, in Latin America and the Caribbean, 50 percent of girls ages 10 to 14 years were overweight and 11 percent were obese, while only 14 percent and 6 percent of girls 15 to 19 years were overweight and obese, respectively. Similarly, in Europe and Central Asia, 17 percent of younger adolescents were overweight and 5 percent were obese, compared to 5 percent and 1 percent of older adolescents who were overweight and obese, respectively. This surge in overweight and obesity in the younger age group may reflect shifts in the LMIC food environment, including penetration of globalized and accessible chain restaurants and superstores, extensive marketing, and widespread mass media,[248] which could adversely affect dietary habits even before adolescence is reached.

These findings should be interpreted with caution given that certain groups or regions might be under or overrepresented within our analyses. For instance, these trends contrast with recent findings from The Gambia,[249] where, as one might expect, younger adolescents were notably lighter and leaner than their older counterparts. The fact that this study was conducted only in rural areas could account for some of these differences. Harmonizing methods will require standardized definitions for investigating childhood overweight and obesity, along with a consensus on age ranges and related terminology.[250]

Ng and colleagues have demonstrated that nutritional status has shifted over time, with reductions in the prevalence of underweight, and shifts from normal weight to overweight and obese in both developed and developing countries.[251] Another recent, pooled analysis from the NCD Risk Factor Collaboration (NCD-RisC) looked at global trends in BMI for children ages 5–19 years, and has presented slightly different results from Ng.[7] Though authors similarly conclude that overweight and obesity is continuing to rise in LMIC, they also stress that the number of children who are moderately or severely underweight surpasses the number who are obese. We too found that underweight is still widely prevalent among adolescent girls. For example, in Europe and Central Asia we found that nearly 20 percent of adolescent girls (10–19) were underweight and in South Asia, this number reaches 40 percent. Though estimates of underweight are slightly smaller, NCD-RisC has found similar regional trends. Specifically, authors report that 63 percent of the 75 million moderately and severely underweight girls worldwide reside in South Asia. Taken together, these statistics highlights the double burden of malnutrition that is becoming increasingly evident in LMIC today, and the urgent need to focus on specific regions, like South Asia.

When comparing younger and older adolescents across all outcomes (table 24), some distinct patterns emerge. Younger adolescents had a slightly greater mean energy intake, and higher daily intakes of fat and protein compared to older adolescents. Although we do not have physical expenditure data, one could assume that these higher intakes are contributing to the inflated proportion of

young adolescents who are overweight and obese. These findings align with dietary patterns among younger adolescents, which demonstrate higher consumption of calorie-dense foods, including fast foods and sweet and salty/fried items, and low consumption of nutritious foods like fruits and vegetables compared to older adolescents. In terms of meal patterns, we found that older adolescents are more likely to eat meals away from the home on a daily basis and, for all adolescents, lunch is the meal most often consumed outside the home. However, it is challenging to accurately interpret results on place of consumption considering that most of the adolescents sampled were school-going and it is therefore reasonably likely that girls consume their lunch at school. For the majority of studies, we were not able to determine whether girls who consume their lunch at school bring food from home or purchase food at school or from nearby shops/vendors. While snacking appears to be more common among older adolescents, we found that breakfast skipping is typical at any age. Whether snacking is replacing regular meals for adolescents remains to be determined.

Table 24. Summary Comparing Younger (10–14) and Older (15–19) Adolescents across Various Outcomes

	BMI	BMI status	Energy Intake	Carbohydrate	Protein	Fat	POC	Breakfast skipping	Snacking
10–14y	18.6 ±2.9	Severely thin: 0.5% Thin: 11% Normal: 63% Overweight: 16% Obese: 9%	1844 kcal/d	249 g/d	61 g/d	64 g/d	11% eat outside the home daily	40%	33%
15–19y	20.1 ±3.4	Severely thin: 0.3% Thin: 11% Normal: 70% Overweight: 14% Obese: 5%	1834 kcal/d	253 g/d	58 g/d	53 g/d	20% eat outside the home daily	47%	59%

	Pulses	Dairy	Flesh foods	Vegetables	Fruit	SSB	Sweet and salty items	Fast foods	Alcohol
10–14y	Consumption was lower for most regions	10% consumed dairy daily	In MENA, Africa, and SA, intake was higher	33% consumed vegetables daily	32% consumed fruit; of these, 42% consumed them daily	21% consumed SSBs	74% and 49% consumed sweet and salty items daily	24% consumed FF daily, and 20% consumed FF on ≥ 4 days/week	13% consumed alcohol
15–19y	Higher consumption (except in LAC)	60% consumed dairy daily	Intake was higher in EAP and EUR/CA	53% consumed vegetables daily	56% consumed fruit; of these, 49% consumed them daily	35% consumed SSBs	31% and 1% consumed sweet and salty items daily	8% consumed FF daily, and 29% consumed FF on ≥ 4 days/week	20% consumed alcohol

LAC=Latin America and the Caribbean; MENA=Middle East and North Africa; SA=South Asia; EAP=East Asia & Pacific; EUR/CA=Europe and Central Asia; SSB=sugar sweetened beverages; FF=fast foods

Eating patterns, diet quality, and physical activity levels are important predictors of obesity, indicating that social and environmental factors may outweigh genetic predispositions.[212, 252, 253] We found that increased consumption of fast foods and the proportion of adolescents who are overweight and obese were positively associated in our study sample, though results were not statistically significant. There were several limitations to this analysis that likely contributed to this null finding, including small sample size and a lack of specificity in the characterization of fast foods. Nevertheless, the trend suggests a linear association. Other studies from high-income settings have convincingly demonstrated this association,[254-256] pointing to the reduction of fast food intake a as priority area for policy and programming.

These data have many important implications for adolescent girls who will become pregnant. Pregnancy in adolescence is associated with greater risks for anemia, prematurity, stillbirth, and mortality.[257] Adolescent girls are two to five times more likely to die from a pregnancy-related cause than women ages 20 to 29 years old.[257] These risks are compounded by increase in overweight and obesity—risk factors linked to chronic diseases, including hypertension, diabetes, and cardiovascular disease. In fact, results from GBD studies have reported increases in fasting plasma glucose, mean total cholesterol, mean blood pressure, and an increased prevalence of type 2 diabetes in LMIC.[258-260] As such, pregnancy in adolescence has become even more risky due to the exacerbation of pregnancy complications by underlying chronic diseases. For many, appropriate management throughout gestation, labor, and delivery will be critical. Though the impact of weight normalization on adolescent pregnancy has not been quantified, achieving normal weight and improving diet quality are two critical nutrition goals for the preconception period.

Other recent studies in the field of diet and nutrition have shown comparable findings. A cross-cohort comparison of adolescents' diets found changes consistent with the nutrition transition among the younger cohort, including increased consumption of sugar, processed foods, dairy and other animal-source foods at the expense of plant-based foods that are high in protein.[261] A 2014 review looking at dietary intake of school-aged children and adolescents in developing countries also found an increase in the consumption of energy-dense foods that contribute to overweight and obesity, with an overall lack in dietary diversity and inadequate nutrient intake.[247] This same study noted that breakfast skipping was common among children and adolescents,[247] a finding that has negative implications for learning and achievement, and potentially, for policymakers. The evidence for the impact of school breakfast programs in LMIC is limited but highlights some important findings. A randomized control trial conducted in Jamaica saw improvements in height, weight, school attendance, and arithmetic following the provision of breakfast, though these benefits were realized only for students who were undernourished at baseline.[262] Similarly, a crossover study conducted in Jamaica found that verbal fluency was improved with breakfast in the undernourished group only.[263] Among students from rural schools in Peru, vocabulary was significantly better among heavier children.[264]

The authors suggest that initially, heavier children were more malnourished (had higher weight-for-height scores) and performed worse on tests, indicating that their potential to respond to feeding programmes was greater than those who were not malnourished at baseline. Another study in South Africa compared children from two matched schools, where breakfast was provided in one school but not the other.[265] Results demonstrated improved cognitive and behavioral performance, including positive peer interaction and class participation among children who were given breakfast. Recent findings from high-income settings are mixed[266-268] and suggest improved enrolment and reduced absenteeism, though less robust links to health and nutrition outcomes with breakfast provision. Taken together, it appears that breakfast programs might be beneficial in LMIC, where malnutrition is high. More long-term RCTs are needed in developing countries to determine how age and nutrition status at baseline may affect the impacts of school breakfast programs.

Although the nutrition transition has been long underway,[269] few countries have taken measures to stem the negative changes that are rapidly taking place. Support can be garnered from global initiatives, such as the Global Accelerated Action for the Health of Adolescents (AA-HA!), which provides a range of recommended actions and interventions for improving adolescent health.[270]

Additionally, there are tools that are specific to the promotion of healthy diets and reduction of obesity and NCD. For example, the WHO ECHO report provides nine recommendations to promote healthy diets and minimize the intake of unhealthy foods and SSBs.[271] These include recommendations such as taxing SSBs, reducing the exposure of children to marketing of unhealthy foods, developing a standardized global nutrient labeling system, ensuring that certain settings (e.g., child-care) are incentivized to create healthy food environments, and improving access to healthy foods for disadvantaged populations.[271]

The NOURISHING framework highlights areas for evidence-based action across the domains of the food environment, food system, and behavior change communication.[272] The NOURISHING framework is accompanied by a policy database, where one can find a regularly updated list of implemented policies to promote healthy diets, by country.[272] Such a list is important to highlight gaps in policy and programmatic areas for a specific country. Overweight and obesity in childhood or adolescence is an increasing concern, both because of its growing prevalence and its important link to NCDs. Moving forward, it is clear that mutli-sectoral efforts will be required, through the work of global bodies, policymakers, civil society, and researchers, to improve undernutrition, reduce obesity, and combat chronic disease.

RECOMMENDATIONS

Although we did not conduct a systematic research prioritization exercise, our review provides insights into gaps in the current evidence. The following are some key research areas that might help to better understand diets and food systems among school-age children and adolescents in various settings. One

priority is the need to conduct a global and regionally representative standardized survey of school-age and adolescent nutrition status and food environments. Following the list of research gaps, we have provided policy and implementation recommendations.

RESEARCH

- Multi-country or global survey on adolescent diet and nutrition
  - Incorporates consistent definitions, indicators, and measurement tools to allow better pooling of data
  - Clearly defines younger and older adolescents, and includes boys
  - Sufficiently powered to capture various populations:
    - Rural, urban, and urban poor populations
    - In-school and out-of-school adolescents
    - Pregnant adolescents
    - Displaced adolescents
    - Adolescents in conflict zones
- Understanding the underlying determinants of dietary intake and food choice at the individual, household, community, and national level
  - The role of media and information sources in impacting adolescent behaviors
  - Qualitative research
- Randomized controlled trials
  - Comparing impact of interventions (e.g., marketing, legislative or other) on dietary patterns and intake between areas with obesogenic food environments and those without
  - Including behavior change communication interventions to improve adolescents' diets, including those that take into account adolescents' values and motivations[273]
- Local and international research and collaboration in the area of dietary practices

POLICY

- Contextually-relevant, healthy school policies and/or regulations. For example:
  - School-feeding or school-meal programs for low income areas
  - Incentivizing cafeteria or tuck shop vendors to provide healthier retail environments
  - Limiting the number of vendors or food stalls that sell cheap, nutrient-poor and energy-dense products on school grounds
- Food advertisement regulation

IMPLEMENTATION

- Obesity-prevention initiatives (including physical activity components) targeted toward school-age children
- Program designs that take into account adolescents' behavior and common practices (e.g., breakfast skipping and snacking)

- Engaging adolescents themselves in the adolescent agenda
  - In research, programming, and policy initiatives

CONCLUSIONS

Our review provides further evidence from studies in LMIC that the nutrition transition is occurring at a global scale and that, while regional differences exist, the diet quality and diversity of adolescent girls in LMIC is generally poor. Not enough girls are consuming nutritious foods like plant-sourced proteins, milk, healthy fats, and fruits and vegetables, and processed, sugary, and other calorie-dense foods are being added to usual diets. These factors are contributing to the rise in overweight and obesity, especially among younger adolescents. On the other hand, the diets of some adolescent girls lack adequate protein and many girls are underweight, especially in South Asia and Africa, highlighting the prevailing double burden of malnutrition. Taken together, more action is needed. The specific interventions and timing of such strategies need to be defined. Considering that behaviors and habits have already formed by early adolescence, targeted nutrition interventions for school-age children are needed to reverse current dietary trends. A multi-sectoral effort should be encouraged, whereby regulated food systems, nutrition policies, and educational initiatives are put in place to promote healthy diets and protect young girls throughout their reproductive years. Additionally, context-specific programming will be fundamental to manage the double burden of malnutrition prevalent in many LMIC.

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APPENDIX I

TABLES

Table 1. PICO Table

Population	Adolescent girls (10–19 years) in low- and middle-income countries
Intervention	Current dietary intake and eating practices/patterns
Comparison	Author-defined
Outcomes	Primary outcomes: types of food consumed (food groups: grains, legumes and pulses, fruits, vegetables, meats and alternatives, dairy products, eggs, fats and oils; unprocessed versus processed; energy-dense versus nutrient-rich; staple foods), food composition, place consumed, frequency of consumption, meal patterns Secondary outcomes: height, weight, BMI, biomarkers of status, micronutrient deficiencies

Note: we did not restrict our search by outcome in order to broaden the scope of evidence retrieved.

Table 2. MeSH Terms and Key Words Used in Search Strategy

1. Adolescents	2. Diets/Foods	3. Patterns & Practices	4. LMIC
MeSH Terms			
Adolescent Minors Pregnancy in adolescence	Diet Diet, food, and nutrition Diet surveys Diet, western Energy intake Eating Food (bread, candy, chocolate, dairy products, butter, ghee, cheese, yogurt, ice cream, margarine, eggs, flour, fruit, meat, poultry, red meat, fish products, nuts, seeds, vegetables) Beverages (alcoholic, carbonated, coffee milk, tea, water) Dietary carbohydrates/ sucrose/ fats/ fibre/ proteins Fast foods	Eating Drinking Consumer behavior Choice behavior Feeding behavior Food preferences Healthy lifestyle Meals (breakfast, lunch, dinner, snacks)	Developing Countries (**low- and middle-income search bracket obtained from previous systematic review – lists all country names)

1. Adolescents	2. Diets/Foods	3. Patterns & Practices	4. LMIC
	Functional food Food quality Nutritive value Nutrition assessment Nutrition surveys Portion size Serving size		
Key Words			
Teen* Youth* Pre-Teen* Child-bearing age Pregnan* Preconception Prenatal Postnatal Young adult*	Food intake Dietary intake Nutrient intake Food consumption Diet diversity Diet quality Processed foods	Dietary pattern Meal pattern Eating habit Eating custom Eating practice Nutrition transition	Developing countr* Least developed countr* Less developed countr* Third-world countr* Third-world nation* Under-developed countr* Under-developed nation* Developing nation* Less developed nation* Low-income population* Low-income countr* Middle-income population* Middle-income countr*

Table 3. Mean BMI and BMI Status among Adolescent Girls, by Age Band and Region

	10–14	**15–19**	**10–19**
Middle East & North Africa Iran (13 urban, 2 mixed), Iraq (1 urban), Jordan (3 urban), Algeria (1 urban), Palestine (1 rural, 1 NR), Lebanon (1 NR), Morocco (1 urban, 1 mixed)			
Mean BMI Mean ±SD			
N studies	9	11	19
n participants	5052	4588	9640
Mean BMI	19.3 ±3.9	19.4 ±3.7	19.8 ±3.7
BMI Status N (%)			
N studies	8	12	19
n participants	7863	4129	11992
Severe thinness	0 (0)	34 (0.82)	34 (0.28)
Thinness	792 (10.07)	50 (1.21)	842 (7.02)
Normal weight	4855 (61.74)	2923 (70.79)	7778 (64.86)
Overweight	1242 (15.80)	878 (21.26)	2120 (17.68)
Obese	974 (12.39)	244 (5.91)	1218 (10.16)
Latin America & Caribbean Argentina (1 mixed), Brazil (5 urban, 3 mixed), Columbia (1 NR), Mexico (1 urban, 1 rural, 1 NR)			
Mean BMI Mean ±SD			
N studies	4	3	7
n participants	722	703	1533
Mean BMI	22.3 ±3.7	18.9 ±3.8	20.7 ±3.8
BMI Status N (%)			
N studies	4	6	10
n participants	417	3925	5481
Severe thinness	0 (0)	0 (0)	0 (0)
Thinness	43 (10.31)	60 (1.51)	189 (3.45)
Normal weight	119 (28.54)	3099 (78.96)	4096 (74.73)
Overweight	209 (50.12)	531 (13.53)	871 (15.89)
Obese	46 (11.03)	235 (5.99)	325 (5.93)
Africa Cameroon (1 urban), Ethiopia (1 urban, 1 rural, 2 mixed), Mozambique (2 mixed), Nigeria (1 urban, 2 rural, 1 mixed), South Africa (3 urban), Sudan (1 urban)			
Mean BMI Mean ±SD			
N studies	2	6	8
n participants	779	1635	2414
Mean BMI	21.1 ±2.6	20.9 ±3.8	21.0 ±3.4

	10–14	15–19	10–19
BMI Status N (%)			
N studies	3	11	12
n participants	2944	2679	5677
Severe thinness	0 (0)	0 (0)	0 (0)
Thinness	288 (9.78)	365 (13.36)	653 (11.50)
Normal weight	2167 (73.61)	1969 (72.05)	4136 (72.86)
Overweight	452 (15.35)	302 (11.05)	754 (13.28)
Obese	37 (1.26)	97 (3.55)	134 (2.36)
Europe & Central Asia Turkey (6 urban), Albania (1 urban), Serbia (1 urban)			
Mean BMI Mean ±SD			
N studies	4	2	5
n participants	1264	543	1807
Mean BMI	19.1 ±3.0	20.7 ±2.8	19.8 ±3.0
BMI Status N (%)			
N studies	4	4	6
n participants	872	1764	2636
Severe thinness	0 (0)	0 (0)	0 (0)
Thinness	1 (0.11)	481 (27.27)	482 (18.29)
Normal weight	683 (78.33)	1176 (66.67)	1859 (70.52)
Overweight	146 (16.74)	91 (5.16)	237 (8.99)
Obese	42 (4.82)	16 (0.91)	58 (2.20)
South Asia Bangladesh (2 urban), India (12 urban, 2 urban slum, 2 rural, 2 mixed, 1 NR), Pakistan (2 urban), Sri Lanka (1 rural, 1 mixed, 1 NR)			
Mean BMI Mean ±SD			
N studies	6	7	16
n participants	2505	1546	5418
Mean BMI	17.7 ±3.1	18.9 ±3.2	18.9 ±3.8
BMI Status N (%)			
N studies	7	11	21
n participants	895	1910	4392
Severe thinness	76 (8.49)	8 (0.42)	111 (2.53)
Thinness	387 (43.24)	745 (39.01)	1627 (37.04)
Normal weight	355 (39.66)	970 (50.79)	2072 (47.18)
Overweight	71 (7.93)	160 (8.38)	418 (9.52)
Obese	6 (0.67)	27 (1.41)	164 (3.73)

	10–14	15–19	10–19
East Asia & Pacific Cambodia (1 urban), China (11 urban, 2 rural, 2 mixed), Fiji (1 mixed), Malaysia (3 urban, 1 rural, 2 mixed, 1 NR), Myanmar (1 peri-urban), Philippines (2 urban), Thailand (1 urban), Tonga (1 mixed)			
Mean BMI Mean ±SD			
N studies	12	6	22
n participants	11202	3885	16832
Mean BMI	18.1 ±2.4	21.1 ±2.9	18.8 ±2.5
BMI Status N (%)			
N studies	14	6	19
n participants	4501	1894	7482
Severe thinness	6 (0.13)	7 (0.37)	13 (0.17)
Thinness	335 (7.44)	140 (7.39)	535 (7.15)
Normal weight	2875 (63.87)	1251 (66.05)	4458 (59.58)
Overweight	754 (16.75)	356 (18.80)	1636 (21.87)
Obese	531 (11.80)	140 (7.39)	840 (11.23)
Total			
[1]Mean BMI Mean ±SD			
N studies	37	35	77
n participants	21,524	12,900	37,644
Mean BMI	18.6 ±2.92	20.1 ±3.38	19.3 ±3.13
[2]BMI Status N (%)			
N studies	48	56	109
n participants	17,492	16,355	37,660
Severe thinness	82 (0.47)	49 (0.30)	158 (0.42)
Thinness	1846 (10.55)	1841 (11.26)	4328 (11.49)
Normal weight	11054 (63.19)	11388 (69.63)	24399 (64.79)
Overweight	2874 (16.43)	2318 (14.17)	6036 (16.03)
Obese	1636 (9.35)	759 (4.64)	2739 (7.27)

[1]3 studies stratified mean BMI data by younger (10–14) and older (15–19) age groups.
[2]5 studies stratified BMI status by younger and older age groups.

Table 4. Protein Intake (Grams/Day), by Age Group and Region

	10–14	**15–19**	**10–19**
Middle East & North Africa (n=14) Algeria (1 urban), Iran (10 urban), Libya (1 urban), Morocco (1 urban, 1 mixed)			
N studies	8	5	14
n participants	1946	1788	4108
Urban/Rural/Mixed	8 urban	4 urban, 1 mixed	13 urban, 1 mixed
Weighted Mean ±SD	74 ±18	48 ±14	61 ±15
Latin America & Caribbean (n=6)[1] Bolivia (1 urban), Brazil (1 urban), Mexico (1 urban, 1 rural, 1 mixed), Venezuela (1 peri-urban)			
N studies	3	2	6
n participants	1655	1919	4785
Urban/Rural/Mixed	1 rural, 1 mixed, 1 peri-urban	1 urban, 1 mixed	2 urban, 2 mixed, 1 rural, 1 peri-urban
Weighted Mean ±SD	74 ±27	73 ±28	72 ±27
Africa (n=10) Cameroon (1 urban, 1 rural), Ethiopia (1 rural) Mozambique (3 mixed), Nigeria (1 rural), Senegal (1 urban), South Africa (2 urban)			
N studies	1	6	10
n participants	119	853	1910
Urban/Rural/Mixed	1 urban	2 urban, 2 rural, 2 mixed	4 urban, 3 mixed, 3 rural
Weighted Mean ±SD	76 ±24	39 ±3	45 ±4
Europe & Central Asia (n=2) Turkey (2 urban)			
N studies	1	1	2
n participants	41	288	329
Urban/Rural/Mixed	1 urban	1 urban	2 urban
Weighted Mean ±SD	41 ±28	52 ±24	49 ±22
South Asia (n=19)[2] Bangladesh (1 urban, 1 mixed), India (8 urban, 2 rural, 2 urban slum, 1 mixed), Pakistan (3 urban), Sri Lanka (1 mixed)			
N studies	11	7	19
n participants	2826	944	4900
Urban/Rural/Mixed	7 urban, 2 rural, 1 urban slum, 1 mixed	5 urban, 1 mixed, 1 rural	12 urban, 3 mixed, 2 rural, 2 urban slum
Weighted Mean ±SD	37 ±12	51 ±12	40 ±11
East Asia & Pacific (n=12) China (4 urban, 1 mixed), Malaysia (1 urban, 3 mixed), Myanmar (1 peri-urban), Philippines (1 urban), Thailand (1 rural)			
N studies	8	3	12
n participants	2321	1446	3842
Urban/Rural/Mixed	4 urban, 3 mixed, 1 rural	2 urban, 1 peri-urban	6 urban, 4 mixed, 1 peri-urban, 1 rural
Weighted Mean ±SD	72 ±23	70 ±22	70 ±22

	10–14	15–19	10–19
Total (n=63)			
N studies	31	24	63
n participants	8851	7238	19911
Urban/Rural/Mixed	21 urban, 5 mixed, 3 rural, 1 urban slum, 1 peri-urban	15 urban, 5 mixed, 3 rural, 1 peri-urban	39 urban, 13 mixed, 7 rural, 2 urban slum, 2 peri-urban,
Weighted Mean ±SD	61 ±19	58 ±26	58 ±17

Table 5. Fat Intake (Grams/Day), by age Group and Region

	10–14	15–19	10–19
Middle East & North Africa (n=13) Iran (10 urban), Libya (1 urban), Morocco (1 urban, 1 mixed)			
N studies	8	5	13
n participants	1946	1788	3734
Urban/Rural/Mixed	8 urban	4 urban, 1 mixed	12 urban, 1 mixed
Weighted Mean ±SD	79 ±24	55 ±23	68 ±23
Latin America & Caribbean (n=6)[1] Bolivia (1 urban), Brazil (1 urban), Mexico (1 urban, 1 rural, 1 mixed), Venezuela (1 peri-urban)			
N studies	3	2	6
n participants	1655	1919	4785
Urban/Rural/Mixed	1 rural, 1 mixed, 1 peri-urban	1 urban, 1 mixed	2 urban, 2 mixed, 1 rural, 1 peri-urban
Weighted Mean ±SD	66 ±26	59 ±23	61 ±24
Africa (n=7) Cameroon (1 urban), Mozambique (3 mixed), Nigeria (1 rural), Senegal (1 urban), South Africa (1 urban)			
N studies	1	4	7
n participants	119	604	1563
Urban/Rural/Mixed	1 urban	2 mixed, 1 urban, 1 rural	3 mixed, 3 urban, 1 rural
Weighted Mean ±SD	76 ±24	28 ±3	36 ±6
Europe & Central Asia (n=2) Turkey (2 urban)			
N studies	1	1	2
n participants	41	288	329
Urban/Rural/Mixed	1 urban	1 urban	2 urban
Weighted Mean ±SD	106 ±11	62 ±37	67 ±34

	10–14	15–19	10–19
South Asia (n=11) Bangladesh (1 urban, 1 mixed), India (3 urban, 2 urban slum, 1 rural, 1 mixed), Pakistan (2 urban)			
N studies	5	3	11
n participants	1255	359	2027
Urban/Rural/Mixed	2 urban, 1 urban slum, 1 rural, 1 mixed	2 urban, 1 mixed	6 urban, 2 mixed, 2 urban slum, 1 rural
Weighted Mean ±SD	46 ±13	24 ±4	41 ±11
East Asia & Pacific (n=12) China (4 urban, 2 mixed), Malaysia (1 urban, 3 mixed), Philippines (1 urban), Thailand (1 rural)			
N studies	9	2	12
n participants	2611	1055	3741
Urban/Rural/Mixed	4 urban, 4 mixed, 1 rural	1 urban, 1 mixed	6 urban, 5 mixed, 1 rural
Weighted Mean ±SD	58 ±19	63 ±25	59 ±21
Total (n=51)			
N studies	27	17	51
n participants	7627	6013	16179
Urban/Rural/Mixed	16 urban, 6 mixed, 3 rural, 1 peri-urban, 1 urban slum	10 urban, 6 mixed, 1 rural	31 urban, 13 mixed, 4 rural, 2 urban slum, 1 peri-urban
Weighted Mean ±SD	64 ±21	53 ±21	57 ±20

Table 6. Carbohydrate Intake (Grams/Day), by Age Group and Region

	10–14	15–19	10–19
Middle East & North Africa (n=13) Algeria (1 urban), Iran (9 urban), Libya (1 urban), Morocco (1 urban, 1 mixed)			
N studies	7	5	13
n participants	1741	1788	3903
Urban/Rural/Mixed	7 urban	4 urban, 1 mixed	12 urban, 1 mixed
Weighted Mean ±SD	347 ±72	202 ±59	266 ±59

	10–14	15–19	10–19
Latin America & Caribbean (n=6)[1] Bolivia (1 urban), Brazil (1 urban), Mexico (1 urban, 1 rural, 1 mixed), Venezuela (1 peri-urban)			
N studies	3	2	6
n participants	1655	1919	4785
Urban/Rural/Mixed	1 rural, 1 mixed, 1 peri-urban	1 urban, 1 mixed	2 urban, 2 mixed, 1 rural, 1 peri-urban
Weighted Mean ±SD	263 ±84	268 ±95	264 ±84
Africa (n=8) Cameroon (1 urban), Mozambique (3 mixed), Nigeria (1 Rural), Senegal (1 urban), South Africa (2 urban)			
N studies	1	5	8
n participants	119	665	1624
Urban/Rural/Mixed	1 urban	2 urban, 2 mixed, 1 rural	4 urban, 3 mixed, 1 rural
Weighted Mean ±SD	317 ±104	213 ±17	223 ±16
Europe & Central Asia (n=2) Turkey (2 urban)			
N studies	1	1	2
n participants	41	288	329
Urban/Rural/Mixed	1 urban	1 urban	2 urban
Weighted Mean ±SD	391 ±88	209 ±86	231 ±86
South Asia (n=4) Bangladesh (1 urban, 1 mixed), India (1 urban), Pakistan (1 urban)			
N studies	2	2	4
n participants	785	279	1064
Urban/Rural/Mixed	2 urban	1 urban, 1 mixed	3 urban, 1 mixed
Weighted Mean ±SD	236 ±53	279 ±36	247 ±49
East Asia & Pacific (n=12) China (4 urban, 2 mixed), Malaysia (1 urban, 3 mixed), Philippines (1 urban), Thailand (1 rural)			
N studies	9	2	12
n participants	2771	1055	3901
Urban/Rural/Mixed	4 urban, 4 mixed, I rural	2 urban	6 urban, 5 mixed, 1 rural
Weighted Mean ±SD	175 ±93	342 ±122	220 ±101

	10–14	15–19	10–19
Total (n=45)			
N studies	23	17	45
n participants	7149	5994	15643
Urban/Rural/Mixed	15 urban, 5 mixed, 1 rural, 1 peri-urban	11 urban, 5 mixed, 1 rural	29 urban, 12 mixed, 3 rural, 1 peri-urban
Weighted Mean ±SD	249 ±85	253 ±77	248 ±73

Table 7. Energy Intake (Kcal/Day), by Age Group and Region

	10–14	15–19	10–19
Middle East & North Africa (n=15) Algeria (1 urban), Iran (11 urban), Libya (1 urban) Morocco (1 urban, 1 mixed)			
N studies	9	5	15
n participants	2190	1785	4349
Urban/Rural/Mixed	9 urban	4 urban, 1 mixed	14 urban, 1 mixed
Weighted Mean ±SD	2276.0 ±484.4	1498.4 ±433.9	1905.5 ±422.8
Latin America & Caribbean (n=10)[1] Bolivia (1 urban), Brazil (3 urban, 1 mixed), Mexico (1 urban, 1 rural, 1 mixed, 1 NR), Venezuela (1 peri-urban)			
N studies	3	6	10
n participants	1655	2687	5513
Urban/Rural/Mixed	1 mixed, 1 rural, 1 peri-urban	4 urban, 1 mixed, 1 NR	5 urban, 2 mixed, 1 rural, 1 peri-urban, 1 NR
Weighted Mean ±SD	1874.7 ±602.0	2064.2 ±628.2	1987.4 ±527.0
Africa (n=11) Cameroon (1 urban, 1 rural), Ethiopia (1 rural), Mozambique (3 mixed), Nigeria (2 rural), South Africa (3 urban)			
N studies	2	7	11
n participants	274	958	1881
Urban/Rural/Mixed	2 urban	3 mixed, 2 urban, 2 rural	4 urban, 4 rural, 3 mixed
Weighted Mean ±SD	2247.7 ±533.9	1597.8 ±315.4	1585.4 ±297.9

	10–14	15–19	10–19
Europe & Central Asia (n=2) Turkey (2 urban)			
N studies	1	1	2
n participants	35	288	323
Urban/Rural/Mixed	1 urban	1 urban	2 urban
Weighted Mean ±SD	2579.5 ±5 ±1863.0	1664.0 ±642.9	1763.2 ±775.1
South Asia (n=19)[1] Bangladesh (1 urban, 1 mixed), India (7 urban, 3 rural, 1 mixed, 2 urban slum), Pakistan (2 urban), Sri Lanka (1 mixed, 1 NR)			
N studies	10	8	19
n participants	2389	972	4748
Urban/Rural/Mixed	6 urban, 2 rural, 1 urban slum, 1 mixed	4 urban, 1 rural, 1 mixed, 1 urban slum, 1 NR	10 urban, 4 rural, 2 mixed, 2 urban slum, 1 NR
Weighted Mean ±SD	1441.9 ±465.1	1742.0 ±411.3	1526.4 ±380.9
East Asia & Pacific (n=20) Cambodia (1 urban), China (7 urban, 4 mixed), Malaysia (3 mixed, 1 urban, 1 rural), Myanmar (1 peri-urban), Philippines (1 urban), Thailand (1 rural)			
N studies	14	5	20
n participants	4719	3004	7798
Urban/Rural/Mixed	7 urban, 6 mixed, 1 rural	3 urban, 1 peri-urban, 1 rural	10 urban, 7 mixed, 2 rural, 1 peri-urban
Weighted Mean ±SD	1815.1 ±664.5	1991.1 ±492.9	1880.3 ±597.0
Total (n=77)			
N studies	39	32	77
n participants	11262	9694	24612
Urban/Rural/Mixed	25 urban, 8 mixed, 4 rural, 1 urban slum, 1 peri-urban	20 urban, 5 mixed, 5 rural, 1 peri-urban, 1 NR	45 urban, 2 peri-urban, 2 urban slum, 15 mixed, 11 rural, 2 NR
Weighted Mean ±SD	1846.8 ±580.3	1847.1 ±498.3	1816.3 ±488.3

Table 8. Consumption of Grains, Roots, Tuber, and Plantains, by Age Group and by Region

	10–14	**15–19**	**10–19**
Middle East & North Africa (n=3) Iran (2 urban), Jordan (1 urban)			
General Consumption pattern			
N studies	1	2	3
n participants	205	767	972
Consumption % (n)	100% (205)	100% (767)	100% (972)
Frequency			
N studies	1	1	2
n participants	205	261	466
n consumers	205	261	466
Urban/Rural/Mixed	1 urban	1 urban	2 urban
Daily	NR	100% (261)	56% (261)
Weekly	100% (205)	NR	44% (205)
Latin America & Caribbean (n=3)[1] Brazil (1 urban, 1 mixed, 1 NR)			
General consumption pattern			
N studies	2	1	4
n participants	11147	28941	40375
Consumption % (n)	46% (5149)	46% (13342)	46% (18727)
Frequency			
N studies	NR	NR	1
n participants	NR	NR	287
n consumers	NR	NR	236
Urban/Rural/Mixed	NR	NR	1 urban
Daily	NR	NR	82% (236)
Africa (n=8) Ethiopia (1 urban, 1 rural, 1 mixed), Nigeria (1 urban, 1 semi-urban, 1 rural), South Africa (2 urban)			
General consumption pattern			
N studies	3	5	8
n participants	2370	2508	4878
Consumption % (n)	96% (2285)	58% (1449)	76% (3734)
Frequency			
N studies	1	2	3
n participants	2097	888	2985
n consumers	2097	597	2694
Urban/Rural/Mixed	1 urban	1 urban, 1 rural	2 urban, 1 rural
Daily	90% (1879)	12% (70)	72% (1949)
2–3 times/week	10% (218)	19% (111)	12% (329)
4–6 times/week	NR	56% (333)	12% (333)
Weekly	NR	8% (47)	2% (47)
Monthly	NR	6% (36)	1% (36)

	10–14	15–19	10–19
Europe & Central Asia (n=3) Bosnia & Herzegovina (1 mixed), Serbia (1 urban), Turkey (1 urban)			
General consumption pattern			
N studies	1	1	3
n participants	306	377	1142
Consumption % (n)	14% (44)	72% (271)	28% (326)
Frequency			
N studies	NR	NR	NR
South Asia (n=9) Bangladesh (1 urban, 1 mixed), India (6 urban), Sri Lanka (1 rural)			
General consumption pattern			
N studies	2	7	9
n participants	717	1667	2384
Consumption % (n)	74% (533)	76% (1262)	75% (1795)
Frequency			
N studies	1	5	6
n participants	193	1527	1720
n consumers	16	1190	924
Urban/Rural/Mixed	1 urban	4 urban, 1 mixed	5 urban, 1 mixed
Daily	NR	64% (765)	63% (765)
2–3 times/week	NR	20% (235)	14% (235)
4–6 times/week	8% (16)	13% (157)	10% (173)
Weekly	NR	2% (33)	3% (33)
East Asia & Pacific (n=5) China (1 urban, 1 rural), Malaysia (1 urban, 2 mixed)			
General consumption pattern			
N studies	1	3	5
n participants	97	1690	3315
Consumption % (n)	80% (78)	79% (1335)	52% (1723)
Frequency			
N studies	NR	1	1
n participants	NR	1186	1186
n consumers	NR	1186	1186
Urban/Rural/Mixed	NR	1 urban	1 urban
Daily	NR	100% (1186)	100% (1186)
Total (n=31)			
General consumption pattern			
N studies	10	19	31
n participants	14842	35950	53066
Consumption % (n)	56% (8294)	51% (18,426)	51% (27277)

	10–14	15–19	10–19
Frequency			
N studies	3	9	13
n participants	2495	3862	6644
n consumers	2318	3234	5506
Urban/Rural/Mixed	3 urban	7 urban, 1 rural, 1 mixed	11 urban, 1 rural, 1 mixed
Daily	81% (1879)	71% (2282)	76% (4397)
2–3 times/week	9% (218)	11% (346)	10% (564)
4–6 times/week	1% (16)	15% (490)	10% (506)
Weekly	9% (205)	2% (80)	5% (285)
Monthly	NR	1% (36)	1% (36)

[1]One study stratifies data by younger and older adolescents

Table 9. Consumption of Pulses (Beans, Peas, and Lentils), by Age Group and by Region

	10–14	15–19	10–19
Middle East & North Africa (n=0)			
Latin America & Caribbean (n=2)[1] Brazil (2 mixed)			
General consumption pattern			
N studies	2	1	2
n participants	68060	28941	97001
Consumption % (n)	65% (44291)	63% (18320)	64% (62611)
Frequency			
N studies	NR	NR	NR
Africa (n=8) Ethiopia (1 urban, 1 rural, 1 mixed), Mozambique (1 mixed), Nigeria (1 semi-urban, 1 rural), South Africa (1 urban), 1 Sudan (1 urban)			
General consumption pattern			
N studies	2	5	8
n participants	273	2215	2933
Consumption % (n)	48% (131)	74% (1634)	68% (2004)
Frequency			
N studies	NR	3	3
n participants	NR	949	949
n consumers	NR	864	864
Urban/Rural/Mixed	NR	2 urban, 1 rural	2 urban, 1 rural
Daily	NR	36% (312)	36% (312)
Weekly	NR	32% (280)	32% (280)
Monthly	NR	31% (272)	31% (272)

	10–14	15–19	10–19
Europe & Central Asia (n=0)			
South Asia (n=7) Bangladesh (1 urban), India (5 urban), Sri Lanka (1 rural)			
General consumption pattern			
N studies	2	5	7
n participants	717	1373	2090
Consumption % (n)	32% (233)	49% (668)	43% (901)
Frequency			
N studies	2	4	6
n participants	717	1313	2030
n consumers	233	616	849
Urban/Rural/Mixed	1 urban, 1 rural	4 urban	5 urban, 1 rural
Daily	58% (135)	95% (583)	84% (718)
2–3 times/week	42% (98)	2% (12)	13% (110)
Weekly	NR	3% (21)	2% (21)
East Asia & Pacific (n=5) China (4 urban, 1 rural)			
General consumption pattern			
N studies	4	1	5
n participants	2777	1186	3963
Consumption % (n)	13% (373)	100% (1186)	39% (1559)
Frequency			
N studies	1	1	2
n participants	969	1186	2155
n consumers	142	1186	1328
Urban/Rural/Mixed	1 urban	1 urban	2 urban
Daily	100% (142)	96% (1138)	96% (1280)
Weekly	NR	3% (36)	3% (36)
Monthly	NR	1% (12)	0.9% (12)
Total (n=22)			
General consumption pattern			
N studies	10	12	22
n participants	71827	33715	105987
Consumption % (n)	63% (45028)	65% (21808)	63% (67075)

	10–14	15–19	10–19
Frequency			
N studies	3	8	10
n participants	1686	3448	5134
n consumers	375	2666	3041
Urban/Rural/Mixed	2 urban, 1 rural	7 urban, 1 rural	9 urban, 1 rural
Daily	74% (277)	76% (2033)	76% (2310)
2–3 times/week	26% (98)	0.4% (12)	4% (110)
Weekly	NR	13% (337)	11% (337)
Monthly	NR	11% (284)	9% (284)

[1]One study stratifies data by younger and older adolescents

Table 10. Consumption of Dairy Products, by Age Group and by Region

	10–14	15–19	10–19
Middle East & North Africa (n=13) Egypt (1 mixed), Iran (4 urban, 1 mixed), Iraq (1 urban), Jordan (2 urban), Lebanon (1 NR), Morocco (1 urban), Palestine (1 rural), Syria (1 urban)			
General consumption pattern			
N studies	5	7	13
n participants	13882	2377	17227
Consumption % (n)	43% (5991)	54% (1282)	47% (8131)
Frequency			
N studies	2	6	9
n participants	6791	1597	9356
n consumers	3005	882	4745
Urban/Rural/Mixed	2 mixed	5 urban, 1 rural	5 urban, 1 rural, 2 mixed, 1 NR
Daily	96% (2877)	79% (695)	75% (3580)
2–3 times/week	4% (123)	9% (78)	4% (201)
4–6 times/week	0.1% (5)	12% (109)	2% (114)
Weekly	NR	NR	8% (372)
Monthly	NR	NR	10% (478)
Latin America & Caribbean (n=3)[1] Brazil (2 mixed), Argentina (1 mixed)			
General consumption pattern			
N studies	3	1	3
n participants	68,250	28,941	97,191
Consumption % (n)	44% (30251)	21% (6020)	37% (36271)

	10–14	15–19	10–19
Frequency			
N studies	2	NR	2
n participants	57279	NR	57279
n consumers	27,892	NR	27,892
Urban/Rural/Mixed	2 mixed	NR	2 mixed
Daily	0.4% (101)	NR	0.4% (101)
4–6 times/week	99% (27,791)	NR	99% (27,791)
Africa (n=7) Ethiopia (1 urban, 1 rural, 1 mixed), Nigeria (1 urban, 1 rural), South Africa (1 urban), Sudan (1 urban)			
General consumption pattern			
N studies	2	5	7
n participants	2250	2215	4465
Consumption % (n)	94% (2125)	54% (1189)	74% (3314)
Frequency			
N studies	1	3	4
n participants	2097	1326	3423
n consumers	2097	958	3055
Urban/Rural/Mixed	1 urban	2 urban, 1 rural	3 urban, 1 rural
Daily	8% (170)	0.1% (1)	6% (171)
2–3 times/week	81% (1707)	56% (537)	73% (2244)
4–6 times/week	10% (220)	37% (354)	19% (574)
Weekly	NR	3% (30)	1% (30)
Monthly	NR	4% (36)	1% (36)
Europe & Central Asia (n=3) Bosnia & Herzegovina (1 mixed), Serbia (1 urban), Turkey (1 urban)			
General consumption pattern			
N studies	1	1	3
n participants	306	377	1142
Consumption % (n)	47% (145)	58% (219)	40% (457)
Frequency			
N studies	NR	NR	NR
South Asia (n=9) Bangladesh (2 urban, 1 mixed), India (3 urban, 1 mixed, 1 NR), Pakistan (1 urban)			
General consumption pattern			
N studies	1	6	9
n participants	146	1592	2618
Consumption % (n)	46% (67)	71% (1126)	72% (1895)

	10–14	15–19	10–19
Frequency			
N studies	NR	6	8
n participants	NR	1592	2472
n consumers	NR	1063	1483
Urban/Rural/Mixed	NR	5 urban, 1 mixed	6 urban, 2 mixed
Daily	NR	53% (561)	71% (1250)
2–3 times/week	NR	33% (348)	20% (355)
4–6 times/week	NR	10% (106)	6% (112)
Weekly	NR	5% (48)	3% (48)
East Asia & Pacific (n=7) China (3 urban, 2 rural), Malaysia (1 urban, 1 rural)			
General consumption pattern			
N studies	4	3	7
n participants	3526	1540	5066
Consumption % (n)	24% (851)	79% (1220)	41% (2071)
Frequency			
N studies	2	1	3
n participants	1547	1186	2733
n consumers	179	1186	1365
Urban/Rural/Mixed	2 rural	1 urban	1 urban, 2 rural
Daily	11% (19)	100% (1186)	88% (1205)
4–6 times/week	89% (160)	NR	12% (160)
Total (n=42)			
General consumption pattern			
N studies	16	23	42
n participants	88360	37042	127709
Consumption % (n)	45% (39430)	30% (11056)	41% (52139)
Frequency			
N studies	7	16	26
n participants	67,714	5701	38540
n consumers	33,173	4089	
Urban/Rural/Mixed	1 urban, 2 rural, 4 mixed	13 urban, 3 rural	15 urban, 5 rural, 5 mixed, 1 NR
Daily	10% (3167)	60% (2443)	16% (6307)
2–3 times/week	6%% (1830)	24% (963)	7% (2800)
4–6 times/week	85% (28176)	14% (569)	74% (28751)
Weekly	NR	2% (78)	1% (450)
Monthly	NR	1% (36)	1% (514)

[1]One study stratifies data by younger and older adolescents

Table 11. Consumption of Meat, Poultry, and Fish, by Age Group and by Region

	10–14	15–19	10–19
Middle East & North Africa (n=4) Iran (1 urban), Jordan (2 urban), Syria (1 urban)			
General consumption pattern			
N studies	1	3	4
n participants	151	954	1105
Consumption % (n)	72% (109)	54% (513)	56% (622)
Frequency			
N studies	1	2	3
n participants	151	448	599
n consumers	109	402	511
Urban/Rural/Mixed	1 urban	2 urban	3 urban
Daily	6% (7)	NR	1% (7)
2–3 times/week	39% (43)	56% (227)	53% (270)
4-6times/week	12% (13)	14% (55)	13% (68)
Weekly	42% (46)	30% (120)	32% (166)
Latin America & Caribbean (n=1)[1] Brazil (1 mixed)			
General consumption pattern			
N studies	1	1	1
n participants	10971	28941	39912
Consumption % (n)	84% (9194)	84% (24253)	84% (33447)
Frequency			
N studies	NR	NR	NR
Africa (n=10) Ethiopia (1 urban, 1 rural, 1 mixed), Mozambique (1 mixed), Nigeria (1 urban, 1 semi-urban, 1 rural), South Africa (2 urban), Sudan (1 urban)			
General consumption pattern			
N studies	3	6	10
n participants	2370	2946	5867
Consumption % (n)	91% (2169)	43% (1260)	61% (3594)
Frequency			
N studies	1	5	6
n participants	2097	2118	4215
n consumers	2097	971	3068
Urban/Rural/Mixed	1 urban	5 urban	6 urban
Daily	19% (400)	NR	13% (400)
2–3 times/week	49% (1032)	58% (559)	52% (1591)
4–6 times/week	32% (665)	36% (349)	33% (1014)
Weekly	NR	5% (48)	1% (48)
Monthly	NR	1% (15)	0.5% (15)

	10–14	15–19	10–19
Europe & Central Asia (n=4)[1] Serbia (1 urban), Turkey (2 urban), multi-country (Turkey and Albania, 1 mixed)			
General consumption pattern			
N studies	2	2	4
n participants	370	1287	2116
Consumption % (n)	58% (218)	89% (1140)	66% (1400)
Frequency			
N studies	1	NR	2
n participants	306	NR	1427
n consumers	197	NR	1206
Urban/Rural/Mixed	1 mixed	NR	1 urban, 1 mixed
Daily	NR	NR	63% (755)
2–3 times/week	100% (197)	NR	16% (197)
Weekly	NR	NR	21% (254)
South Asia (n=11) Bangladesh (2 urban, 1 mixed), India (4 urban, 1 NR, 1 urban slum), Pakistan (1 urban), Sri Lanka (1 rural)			
General consumption pattern			
N studies	1	10	11
n participants	524	2407	2931
Consumption % (n)	45% (238)	42% (1014)	43% (1252)
Frequency			
N studies	1	9	10
n participants	524	2154	2678
n consumers	238	998	1236
Urban/Rural/Mixed	1 rural	7 urban, 1 urban slum, 1 mixed	7 urban, 1 urban slum, 1 mixed, 1 rural
Daily	100% (238)	60% (604)	68% (842)
2–3 times/week	NR	22% (220)	18% (220)
4–6 times/week	NR	17% (167)	13% (167)
Monthly	NR	0.7% (7)	0.6% (7)
East Asia & Pacific (n=4) China (3 urban, 1 rural)			
General consumption pattern			
N studies	3	1	4
n participants	2665	1186	3851
Consumption % (n)	33% (877)	100% (1186)	54% (2063)

	10–14	15–19	10–19
Frequency			
N studies	2	1	3
n participants	2568	1186	3754
n consumers	868	1186	2054
Urban/Rural/Mixed	2 urban	1 urban	3 urban
Daily	59% (510)	100% (1186)	83% (1696)
Weekly	41% (358)	NR	17% (358)
Total (n=34)			
General consumption pattern			
N studies	11	23	34
n participants	17051	37721	55782
Consumption % (n)	75% (12805)	78% (29366)	76% (42378)
Frequency			
N studies	6	18	24
n participants	5646	5906	12673
n consumers	3509	3557	8075
Urban/Rural/Mixed	4 urban, 1 rural, 1 mixed	16 urban, 1 urban slum, 1 mixed	20 urban, 2 mixed, 1 rural, 1 urban slum
Daily	33% (1155)	50% (1790)	46% (3700)
2–3 times/week	36% (1272)	28% (1006)	28% (2278)
4–6 times/week	19% (678)	16% (571)	15% (1249)
Weekly	11% (404)	5% (168)	10% (826)
Monthly	NR	0.6% (22)	0.3% (22)

[1]One study stratifies data by younger and older adolescents

Table 12. Consumption of Fruits, by Age Group and by Region

	10–14	15–19	10–19
Middle East & North Africa (n=11) Iran (2 mixed, 2 urban), Iraq (1 urban), Jordan (3 urban), Morocco (1 urban), Palestine (1 rural), Syria (1 urban)			
General consumption pattern			
N studies	4	6	11
n participants	13638	2028	16015
Consumption % (n)	80% (10631)	50% (1010)	73% (11716)

	10–14	15–19	10–19
Frequency			
N studies	3	5	9
n participants	6998	1522	8869
n consumers	5524	909	6508
Urban/Rural/Mixed	2 urban, 1 mixed	4 urban, 1 rural	7 urban, 1 rural, 1 mixed
Daily	97% (5391)	44% (403)	90% (5869)
2–3 times/week	2% (105)	15% (135)	4% (240)
4-7times/week	0.5% (28)	15% (137)	2% (165)
Monthly	NR	26% (234)	4% (234)
Latin America & Caribbean (n=7)[1] Brazil (4 urban, 2 mixed, 1 NR)			
General consumption pattern			
N studies	4	2	7
n participants	88429	29481	100404
Consumption % (n)	28%, (25011)	53% (15624)	41% (40922)
Frequency			
N studies	3	1	5
n participants	59488	540	60315
n consumers	19158	314	19759
Urban/Rural/Mixed	2 urban, 1 mixed	1 urban	4 urban, 1 mixed
Daily	7% (1444)	NR	9% (1731)
2–3 times/week	0.7% (136)	100% (314)	2% (450)
4–6 times/week	92% (17578)	NR	89% (17578)
Monthly	NR	NR	NR
Africa (n=7) Ethiopia (1 rural), Ghana (1 urban, 1 mixed), Nigeria (1 urban, 1 semi-urban), South Africa (1 urban), 1 Sudan (1 urban)			
General consumption pattern			
N studies	1	4	7
n participants	153	1346	2128
Consumption % (n)	17% (27)	71% (961)	60% (1269)
Frequency			
N studies	NR	3	4
n participants	NR	687	981
n consumers	NR	575	804
Urban/Rural/Mixed	NR	2 urban, 1 rural	3 urban, 1 rural
Daily	NR	1% (8)	1% (8)
2–3 times/week	NR	51% (296)	37% (296)
4–6 times/week	NR	25% (142)	18% (142)
Weekly	NR	14% (79)	10% (79)
Monthly	NR	9% (50)	35% (279)

	10–14	15–19	10–19
Europe & Central Asia (n=2) Serbia (1 urban), Turkey (1 urban)			
General consumption pattern			
N studies	1	1	2
n participants	713	377	1090
Consumption % (n)	72% (514)	97% (364)	81% (878)
Frequency			
N studies	NR	NR	NR
South Asia (n=11) Bangladesh (2 urban, 1 mixed), India (5 urban, 1 urban slum), Pakistan (1 urban), Sri Lanka (1 rural)			
General consumption pattern			
N studies	1	8	11
n participants	524	2234	3835
Consumption % (n)	63% (328)	63% (1414)	64% (2461)
Frequency			
N studies	1	7	10
n participants	524	2053	3654
n consumers	328	1571	2376
Urban/Rural/Mixed	1 rural	5 urban, 1 urban slum, 1 mixed	7 urban, 1 urban slum, 1 mixed, 1 rural
Daily	100% (328)	41% (652)	59% (1396)
2–3 times/week	NR	29% (458)	21% (500)
4–6 times/week	NR	25% (388)	17% (407)
Monthly	NR	5% (73)	3% (73)
East Asia & Pacific (n=10) China (4 urban, 2 rural), Malaysia (1 urban), Philippines (1 mixed), Tonga (1 mixed), multi-country (Cambodia, Indonesia, Malaysia, Myanmar, Philippines and Vietnam; 1 mixed)			
General consumption pattern			
N studies	7	2	10
n participants	27252	1558	29957
Consumption % (n)	22% (5950)	82% (1286)	28% (8381)
Frequency			
N studies	7	1	8
n participants	27252	1186	28438
n consumers	5950	1186	7136
Urban/Rural/Mixed	3 urban, 2 mixed, 2 rural	1 urban	4 urban, 2 mixed, 2 rural
Daily	99% (5905)	100% (1186)	99% (7091)
Weekly	0.7% (45)	NR	0.6% (45)

	10–14	15–19	10–19
Total (n=48)			
General consumption pattern			
N studies	18	23	48
n participants	130709	37024	153429
Consumption % (n)	32% (42461)	56% (20659)	43% (65627)
Frequency			
N studies	14	17	36
n participants	94262	21072	103776
n consumers	30960	4555	36583
Urban/Rural/Mixed	7 urban, 3 rural, 4 mixed	13 urban, 2 rural, 1 mixed, 1 urban slum	25 urban, 5 rural, 5 mixed, 1 urban slum
Daily	42% (13068)	49% (2249)	44% (16095)
2–3 times/week	0.7% (241)	26% (1203)	4% (1486)
4–6 times/week	57% (17606)	15% (667)	50% (18292)
Weekly	0.1% (45)	2% (79)	0.3% (124)
Monthly	NR	8% (357)	2% (586)

[1]One study stratifies data by younger and older adolescents

Table 13. Consumption of Vegetables, by Age Group and by Region

	10–14	15–19	10–19
Middle East & North Africa (n=11) Iran (2 mixed, 2 urban), Iraq (1 urban), Jordan (3 urban), Morocco (1 urban), Palestine (1 rural), Syria (1 urban)			
General consumption pattern			
N studies	4	6	11
n participants	13638	2028	16015
Consumption % (n)	43% (5924)	69% (1410)	46% (7436)
Frequency			
N studies	3	5	9
n participants	6998	1522	8869
n consumers	3083	1157	4343
Urban/Rural/Mixed	2 urban, 1 mixed	4 urban 1 rural	7 urban, 1 mixed, 1 rural
Daily	95% (2924)	47% (545)	82% (3571)
2–3 times/week	3% (108)	14% (165)	6% (273)
4–6 times/week	2% (51)	12% (144)	4% (195)
Monthly	NR	26% (303)	7% (303)

	10–14	15–19	10–19
Latin America & Caribbean (n=6)[1] Brazil (3 urban, 2 mixed, 1 NR)			
General consumption pattern			
N studies	1	2	6
n participants	68582	29481	98350
Consumption % (n)	40% (27431)	38% (11204)	40% (38922)
Frequency			
N studies	2	1	4
n participants	57434	540	58261
n consumers	23690	322	24299
Urban/Rural/Mixed	1 urban, 1 mixed	1 urban	3 urban, 1 mixed
Daily	NR	NR	1% (287)
2–3 times/week	0.7% (170)	100% (322)	2% (492)
4–6 times/week	99% (23520)	NR	97% (23520)
Africa (n=8) Ethiopia (2 mixed, 1 rural), Ghana (1 mixed), Mozambique (1 mixed), Nigeria (1 urban, 1 semi-urban), 1 Sudan (1 urban)			
General consumption pattern			
N studies	3	4	8
n participants	933	2113	3491
Consumption % (n)	30% (281)	59% (1249)	51% (1792)
Frequency			
N studies	1	2	3
n participants	660	626	1286
n consumers	220	568	788
Urban/Rural/Mixed	1 mixed	1 urban, 1 rural	1 urban, 1 rural, 1 mixed
Daily	100% (220)	7% (40)	5% (40)
2–3 times/week	NR	30% (173)	22% (173)
4–6 times/week	NR	47% (265)	34% (265)
Weekly	NR	5% (60)	35% (280)
Monthly	NR	10% (30)	4% (30)
Europe & Central Asia (n=3)[1] Serbia (1 urban), Turkey (1 urban), multi-country (Turkey and Albania, 1 mixed)			
General consumption pattern			
N studies	2	2	3
n participants	777	543	1320
Consumption % (n)	64% (500)	92% (499)	76% (999)
Frequency			
N studies	NR	NR	NR

	10–14	15–19	10–19
South Asia (n=11) Bangladesh (2 urban, 1 mixed), India (6 urban, 1 mixed), Pakistan (1 urban)			
General consumption pattern			
N studies	1	7	11
n participants	193	1773	3793
Consumption % (n)	31% (59)	85% (1515)	80% (3032)
Frequency			
N studies	1	6	10
n participants	193	1592	3612
n consumers	59	1361	2878
Urban/Rural/Mixed	1 urban	5 urban, 1 mixed	7 urban, 2 mixed, 1 NR
Daily	NR	48% (651)	72% (2064)
2–3 times/week	NR	17% (229)	9% (248)
4–6 times/week	100% (59)	30% (410)	17% (495)
Weekly	NR	2% (31)	1% (31)
Monthly	NR	3% (40)	1% (40)
East Asia & Pacific (n=8) China (3 urban, 2 rural), Philippines (1 mixed), Tonga (1 mixed), multi-country (Cambodia, Indonesia, Malaysia, Myanmar, Philippines and Vietnam; 1 mixed)			
General consumption pattern			
N studies	7	1	8
n participants	27349	1186	28438
Consumption % (n)	31% (8436)	100% (1186)	34% (9622)
Frequency			
N studies	7	1	8
n participants	27349	1186	28535
n consumers	8436	1186	9622
Urban/Rural/Mixed	3 urban, 2 mixed, 2 rural	1 urban	4 urban, 2 mixed, 2 rural
Daily	100% (8413)	100% (1186)	100% (9599)
Weekly	0.3% (23)	NR	0.2% (23)
Total (n=47)			
General consumption pattern			
N studies	18	22	47
n participants	111472	37124	151407
Consumption % (n)	55% (61544)	46% (17063)	53% (80716)
Frequency			
N studies	14	15	34
n participants	92634	5466	100563
n consumers	35488	4594	41930
Urban/Rural/Mixed	7 urban, 5 mixed, 2	12 urban, 2 rural, 1	22 urban, 7 mixed, 4

	10–14	15–19	10–19
	rural	mixed	rural
Daily	33% (11557)	53% (2422)	37% (15561)
2–3 times/week	0.7% (278)	19% (567)	3% (1186)
4–6 times/week	67% (23630)	18% (819)	58% (24475)
Weekly	0.06% (23)	2% (91)	0.7% (334)
Monthly	NR	8% (373)	0.8% (373)

[1]One study stratifies data by younger and older adolescents

Table 14. Consumption of Sweet Food Items, by Age Group and by Region

	10–14	15–19	10–19
Middle East & North Africa (n=9) Iran (2 mixed), Iraq (1 urban), Jordan (3 urban), Lebanon (1 NR), Morocco (1 urban), Syria (1 urban)			
General consumption pattern			
N studies	3	3	9
n participants	13431	904	15913
Consumption % (n)	35% (4786)	70% (636)	43% (6795)
Frequency			
N studies	2	2	6
n participants	6791	560	8580
n consumers	2443	387	4024
Urban/Rural/Mixed	1 urban, 1 mixed	2 urban	7 urban, 1 mixed
Daily	95% (2327)	NR	64% (2594)
2–3 times/week	4% (99)	32% (122)	15% (603)
4–6 times/week	1% (17)	68% (265)	21% (827)
Latin America & Caribbean (n=5)[1] Brazil (2 urban, 3 mixed)			
General consumption pattern			
N studies	2	2	5
n participants	11316	29481	159077
Consumption % (n)	31% (3463)	31% (9193)	61% (97591)
Frequency			
N studies	1	1	4
n participants	345	540	159077
n consumers	165	404	85,504
Urban/Rural/Mixed	1 urban	1 urban	2 urban, 2 mixed
2–3 times/week	NR	NR	33% (28623)
4–6 times/week	100% (165)	100% (404)	67% (56881)

	10–14	15–19	10–19
Africa (n=9) Ethiopia (1 rural, 1 mixed), Ghana (1 urban), Nigeria (2 urban), South Africa (3 urban), Sudan (1 urban)			
General consumption pattern			
N studies	1	7	9
n participants	2097	3795	6227
Consumption % (n)	13% (274)	51% (1930)	37% (2284)
Frequency			
N studies	NR	4	4
n participants	NR	1852	1852
n consumers	NR	1303	1303
Urban/Rural/Mixed	NR	3 urban, 1 rural	3 urban, 1 rural
Daily	NR	34% (437)	34% (437)
2–3 times/week	NR	35% (458)	35% (458)
4–6 times/week	NR	31% (408)	31% (408)
Europe & Central Asia (n=2) Serbia (1 urban), Turkey (1 urban)			
General consumption pattern			
N studies	1	1	2
n participants	713	377	1090
Consumption % (n)	18% (69)	5% (37)	10% (106)
Frequency			
N studies	NR	NR	NR
South Asia (n=6) India (5 urban), Pakistan (1 urban)			
General consumption pattern			
N studies	3	3	6
n participants	1033	677	1710
Consumption % (n)	73% (752)	56% (378)	66% (1130)
Frequency			
N studies	2	1	3
n participants	840	537	1377
n consumers	752	312	1064
Urban/Rural/Mixed	2 urban	1 urban	3 urban
Daily	12% (89)	100% (312)	38% (401)
2–3 times/week	62% (463)	NR	44% (463)
4–6 times/week	27% (200)	NR	19% (200)

	10–14	15–19	10–19
East Asia & Pacific (n=5) China (1 urban, 1 rural), Malaysia (1 urban), Thailand (1 urban), Tonga (1 Mixed)			
General consumption pattern			
N studies	2	2	5
n participants	1912	504	3563
Consumption % (n)	20% (388)	12% (60)	32% (1134)
Frequency			
N studies	1	NR	1
n participants	1450	NR	1450
n consumers	335	NR	335
Urban/Rural/Mixed	1 rural	NR	1 rural
Daily	100% (335)	NR	100% (335)
Total (n=36)			
General consumption pattern			
N studies	12	15	36
n participants	30502	35738	187580
Consumption % (n)	5% (9732)	34% (12,234)	58% (109040)
Frequency			
N studies	6	8	18
n participants	9426	3489	132424
n consumers	3695	2406	92230
Urban/Rural/Mixed	8 urban, 1 mixed	7 urban, 1 rural	16 urban, 3 mixed, 2 rural
Daily	74% (2751)	31% (749)	4% (3767)
2–3 times/week	15% (562)	24% (580)	33% (30147)
4–6 times/week	10% (382)	44% (1077)	63% (58316)

Table 15. Consumption of Salty/Fried Food Items, by Age Group and by Region

	10–14	15–19	10–19
Middle East & North Africa (n=7) Iran (1 urban, 2 mixed), Iraq (1 urban), Jordan (1 urban), Lebanon (1 NR), Morocco (1 urban)			
General consumption pattern			
N studies	3	2	7
n participants	13,485	717	15,519
Consumption % (n)	15% (2032)	54% (387)	23% (3526)

	10–14	15–19	10–19
Frequency			
N studies	2	1	5
n participants	6845	373	8535
n consumers	1118	241	2466
Urban/Rural/Mixed	1 urban, 1 mixed	1 urban	4 urban, 1 mixed
Daily	82%(913)	NR	37% (917)
2–3 times/week	10% (114)	NR	31% (777)
4–6 times/week	NR	100% (241)	27% (681)
Weekly	8% (91)	NR	4% (91)
Latin America & Caribbean (n=2)[1] Brazil (2 mixed)			
General consumption pattern			
N studies	1	1	2
n participants	10,971	28,941	97,001
Consumption % (n)	22% (2370)	23% (6723)	12% (11,592)
Frequency			
N studies	NR	NR	1
n participants	NR	NR	57,089
n consumers	NR	NR	9222
Urban/Rural/Mixed	NR	NR	1 mixed
4–6 times/week	NR	NR	100% (9222)
Africa (n=3) Ethiopia (1 mixed), South Africa (2 urban)			
General consumption pattern			
N studies	NR	3	3
n participants	NR	1620	1620
Consumption % (n)	NR	20% (329)	20% (329)
Frequency			
N studies	NR	1	1
n participants	NR	61	61
n consumers	NR	3	3
Urban/Rural/Mixed	NR	1 urban	1 urban
Daily	NR	100% (3)	100% (3)
Europe & Central Asia (n=2) Serbia (1 urban), Turkey (1 urban)			
General consumption pattern			
N studies	1	1	2
n participants	713	377	1090
Consumption % (n)	23% (161)	20% (76)	22% (237)
Frequency			
N studies	NR	NR	NR

	10–14	15–19	10–19
South Asia (n=3) India (2 urban), Pakistan (1 urban)			
General consumption pattern			
N studies	1	2	3
n participants	138	140	278
Consumption % (n)	61% (84)	53% (74)	57% (158)
Frequency			
N studies	1	NR	1
n participants	138	NR	138
n consumers	84	NR	84
Urban/Rural/Mixed	1 urban	NR	1 urban
Daily	100% (84)	NR	100% (84)
East Asia & Pacific (n=3) China (1 urban), Thailand (1 urban), Tonga (1 mixed)			
General consumption pattern			
N studies	1	1	3
n participants	969	372	2488
Consumption % (n)	87% (848)	5% (19)	56% (1440)
Frequency			
N studies	1	R	1
n participants	969	NR	969
n consumers	848	NR	848
Urban/Rural/Mixed	1 urban	NR	1 urban
Weekly	100% (848)	NR	100% (848)
Total (n=20)			
General consumption pattern			
N studies	7	10	20
n participants	26276	32167	117996
Consumption % (n)	21% (5495)	24% (7608)	20% (24005)
Frequency			
N studies	4	2	9
n participants	7952	434	66792
n consumers	2050	244	12623
Urban/Rural/Mixed	3 urban, 1 mixed	2 urban	7 urban, 2 mixed
Daily	49% (997)	1% (3)	8% (1004)
2–3 times/week	6% (114)	NR	6% (777)
4–6 times/week	NR	99% (241)	78% (9903)
Weekly	46% (939)	NR	7% (939)

Table 16. Consumption of Fast Foods, by Age Group and by Region

	10–14	15–19	10–19
Middle East & North Africa (n=13) Iran (3 urban, 2 mixed), Iraq (1 mixed), Jordan (2 urban), Lebanon (1 NR), Morocco (1 urban)			
General consumption pattern			
N studies	5	6	13
n participants	13778	3363	18458
Consumption % (n)	4% (581)	43% 91445)	16% (3014)
Frequency			
N studies	2	4	8
n participants	6791	1165	9273
n consumers	273	619	1880
Urban/Rural/Mixed	1 urban, 1 mixed	4 urban	6 urban, 1 mixed, 1 NR
Daily	55% (149)	NR	8% (153)
2–3 times/week	44% (120)	60% (370)	67% (1259)
4–6 times/week	1% (4)	20% (123)	18% (342)
Weekly	NR	20% (126)	7% (126)
Latin America & Caribbean (n=7)[1] Brazil (4 urban, 2 mixed), Costa Rica (1 mixed)			
General consumption pattern			
N studies	4	4	8
n participants	69874	31670	101544
Consumption % (n)	17% (11,691)	21% (6735)	18% (18,426)
Frequency			
N studies	2	2	4
n participants	1814	764	2578
n consumers	709	531	1240
Urban/Rural/Mixed	2 urban	1 urban, 1 mixed	3 urban, 1 mixed
Daily	66% (469)	3% (18)	39% (487)
2–3 times/week	NR	4% (20)	2% (20)
4–6 times/week	34% (240)	63% (336)	46% (576)
Weekly	NR	4% (21)	2% (21)
Monthly	NR	26% (136)	11% (136)

	10–14	15–19	10–19
Africa (n=9) Ethiopia (1 urban, 1 mixed), Nigeria (1 semi-urban, 1 rural), South Africa (4 urban), Sudan (1 urban)			
General consumption pattern			
N studies	2	7	9
n participants	2250	3746	5996
Consumption % (n)	68% (1523)	42% (1585)	52% (3108)
Frequency			
N studies	1	4	5
n participants	2097	2126	4223
n consumers	1716	1425	3141
Urban/Rural/Mixed	1 urban	4 urban	5 urban
Daily	32% (548)	9% (127)	21% (675)
2–3 times/week	32% (553)	43% (613)	37% (1166)
4–6 times/week	36% (615)	48% (685)	41% (1300)
Europe & Central Asia (n=4)[1] Turkey and Albania (1 urban), Turkey (2 urban), Serbia (1 urban)			
General consumption pattern			
N studies	1	3	5
n participants	64	1664	2187
Consumption % (n)	33% (21)	29% (480)	28% (625)
Frequency			
N studies	NR	NR	1
n participants	NR	NR	459
n consumers	NR	NR	459
Urban/Rural/Mixed	NR	NR	1 urban
Daily	NR	NR	10% (44)
2–3 times/week	NR	NR	NR
4–6 times/week	NR	NR	33% (153)
Weekly	NR	NR	27% (125)
Monthly	NR	NR	30% (137)
South Asia (n=15) India (12 urban, 2 mixed, 1 NR)			
General consumption pattern			
N studies	3	8	15
n participants	799	3411	7210
Consumption % (n)	96% (769)	78% (2660)	84% (6060)

	10–14	15–19	10–19
Frequency			
N studies	2	6	11
n participants	782	2621	5653
n consumers	757	2164	4934
Urban/Rural/Mixed	2 urban	6 urban	11 urban
Daily	1% (8)	10% (224)	25% (1258)
2–3 times/week	74% (561)	31% (678)	37% (1805)
4–6 times/week	17% (130)	10% (213)	13% (656)
Weekly	7% (51)	22% (484)	13% (643)
Monthly	1% (7)	26% (565)	12% (572)
East Asia & Pacific (n=2) Cambodia, (1 mixed), China (1 urban)			
General consumption pattern			
N studies	2	NR	2
n participants	17029	NR	17029
Consumption % (n)	8% (1452)	NR	8% (1452)
Frequency			
N studies	2	NR	2
n participants	17029	NR	17029
n consumers	1452	NR	1452
Urban/Rural/Mixed	1 urban, 1 mixed	NR	1 urban, 1 mixed
Weekly	100% (1452)	NR	100% (1452)
Total (n=50)			
General consumption pattern			
N studies	17	28	50
n participants	103794	43854	152424
Consumption % (n)	15% (16037)	29% (12905)	21% (32685)
Frequency			
N studies	9	16	31
n participants	28513	6676	39215
n consumers	4907	4739	13106
Urban/Rural/Mixed	7 urban, 2 mixed	15 urban, 1 mixed	27 urban, 3 Mixed, 1 NR
Daily	24% (1174)	8% (369)	20% (2617)
2–3 times/week	25% (1234)	35% (1681)	32% (4250)
4–6 times/week	20% (989)	29% (1357)	23% (3027)
Weekly	31% (1503)	13% (631)	18% (2367)
Monthly	0.14% (7)	15% (701)	6% (845)

[1]One study stratifies data by younger and older adolescents

Table 17. Consumption of Sugar-Sweetened Beverages, by Age Group and by Region

	10–14	15–19	10–19
Middle East & North Africa (n=10) Iran (2 mixed), Iraq (1 urban), Jordan (3 urban), Lebanon (1 NR), Morocco (1 urban), Palestine (1 rural), Syria (1 urban)			
General consumption pattern			
N studies	3	4	10
n participants	13,431	1261	16,270
Consumption % (n)	13% (1717)	42% (528)	22% (3530)
Frequency			
N studies	2	4	9
n participants	6791	1261	9630
n consumers	548	528	2361
Urban/Rural/Mixed	1 urban, 1 mixed	3 urban, 1 rural	6 urban,1 rural, 1 mixed, 1 NR
Daily	92% (507)	NR	33% (774)
2–3 times/week	2% (10)	30% (159)	28% (658)
4–6 times/week	6% (31)	46% (242)	34% (802)
Monthly	NR	24% (127)	5% (127)
Latin America & Caribbean (n=9)[1] Brazil (4 urban, 4 mixed), Columbia (1 NR)			
General consumption pattern			
N studies	4	3	9
n participants	12477	29845	162968
Consumption % (n)	36% (4487)	33% (9742)	59% (95890)
Frequency			
N studies	3	2	8
n participants	1382	904	123056
n consumers	789	423	82873
Urban/Rural/Mixed	2 urban, 1 NR	1 urban, 1 NR	4 urban, 3 mixed, 1 NR
Daily	49% (388)	7% (31)	1% (1262)
2–3 times/week	NR	NR	49% (40183)
4–6 times/week	32% (251)	38% (159)	49% (41045)
Weekly	19% (150)	55% (233)	1% (383)
Africa (n=7) Ghana (1 urban), Nigeria (1 urban, 1 NR), South Africa (3 urban), Sudan (1 urban)			
General consumption pattern			
N studies	1	4	7
n participants	2097	1883	4814
Consumption % (n)	59% (1231)	52% (976)	63% (3038)

	10–14	15–19	10–19
Frequency			
N studies	1	1	3
n participants	2097	438	2870
n consumers	2097	276	2705
Urban/Rural/Mixed	1 urban	1 urban	3 urban
Daily	4% (91)	NR	7% (203)
2–3 times/week	11% (226)	63% (276)	17% (502)
4–6 times/week	85% (1780)	37% (162)	68% (1942)
Weekly	NR	NR	7% (210)
Europe & Central Asia (n=5)[1] Turkey and Albania (1 urban), Turkey (3 urban), Serbia (1 urban)			
General consumption pattern			
N studies	2	3	5
n participants	777	1664	2990
Consumption % (n)	27% (207)	28% (458)	27% (783)
Frequency			
N studies	NR	NR	NR
South Asia (n=7) India (5 urban), Pakistan (1 urban), Sri Lanka (1 NR)			
General consumption pattern			
N studies	1	4	7
n participants	138	983	2085
Consumption % (n)	70% (97)	80% (789)	48% (1009)
Frequency			
N studies	1	3	6
n participants	138	903	2005
n consumers	97	739	959
Urban/Rural/Mixed	1 urban	3 urban, 1 NR	5 urban, 1 NR
Daily	100% (97)	94% (696)	94% (899)
2–3 times/week	NR	1% (11)	1% (11)
4–6 times/week	NR	1% (10)	1% (10)
Weekly	NR	3% (22)	4% (39)
East Asia & Pacific (n=10) Cambodia, (1 mixed), China (3 urban, 1 rural, 1 mixed), Malaysia (1 rural, 1 mixed), Thailand (1 urban), Tonga (1 mixed)			
General consumption pattern			
N studies	7	2	10
n participants	15873	354	17374
Consumption % (n)	12% (1876)	24% (86)	14% (2440)

	10–14	15–19	10–19
Frequency			
N studies	4	NR	4
n participants	3089	NR	3089
n consumers	1112	NR	1112
Urban/Rural/Mixed	2 urban, 1 rural, 1 mixed	NR	2 urban, 1 rural, 1 mixed
Daily	17% (193)	NR	17% (193)
2–3 times/week	10% (117)	NR	10% (117)
4–6 times/week	6% (68)	NR	6% (68)
Weekly	61% (685)	NR	61% (685)
Monthly	6% (69)	NR	6% (69)
Total (n=48)			
General consumption pattern			
N studies	18	20	48
n participants	44763	35990	206411
Consumption % (n)	21% (9615)	35% (12579)	52% (106690)
Frequency			
N studies	11	10	30
n participants	13591	3506	140650
n consumers	4643	1966	90010
Urban/Rural/Mixed	7 urban, 1 rural, 2 mixed, 1 NR	8 urban, 1 rural, 2 NR	20 urban, 2 rural, 5 mixed, 2 NR
Daily	27% (1276)	34% (727)	4% (3331)
2–3 times/week	7% (353)	21% (466)	46% (41471)
4–6 times/week	46% (2130)	27% (573)	49% (43867)
Weekly	18% (835)	12% (255)	1% (1317)
Monthly	1% (69)	6% (127)	0.2% (196)

Table 18a. Grain Consumption by Diet Measurement Source (Adolescents 10–19 Years)

Grains				
	FFQ	24 hour recall	Food records	Non-validated tool
Middle East & North Africa (n=3) Iran (2 urban), Jordan (1 urban)				
N studies	1	1	NR	1
n participants	205	506	NR	261
Consumption % (n)	100% (205)	100% (506)	NR	100% (261)
Latin America & Caribbean (n=3) Brazil (1 urban, 1 mixed, 1 NR)				
N studies	2	NR	1	NR
n participants	463	NR	39912	NR
Consumption % (n)	55% (256)	NR	46% (18471)	NR

Grains				
	FFQ	24 hour recall	Food records	Non-validated tool
Africa (n=8) Ethiopia (1 urban, 1 rural, 1 mixed), Nigeria (1 urban, 1 semi-urban, 1 rural), South Africa (2 urban)				
N studies	3	3	NR	2
n participants	1041	1009	NR	2828
Consumption % (n)	67% (695)	92% (933)	NR	74% (2106)
Europe & Central Asia (n=3) Bosnia & Herzegovina (1 mixed), Serbia (1 urban), Turkey (1 urban)				
N studies	1	NR	NR	2
n participants	306	NR	NR	836
Consumption % (n)	14% (44)	NR	NR	34% (282)
South Asia (n=9) Bangladesh (1 urban, 1 mixed), India (6 urban), Sri Lanka (1 rural)				
N studies	2	5	NR	2
n participants	1043	938	NR	403
Consumption % (n)	77% (800)	82% (769)	NR	56% (226)
East Asia & Pacific (n=5) China (1 urban, 1 rural), Malaysia (1 urban, 2 mixed)				
N studies	2	1	NR	2
n participants	1318	1528	NR	469
Consumption % (n)	96% (1265)	20% (310)	NR	32% (148)
Total (n=31)				
N studies	11	10	1	9
n participants	4376	3981	39912	4797
Consumption % (n)	75% (3265)	63% (2518)	46% (18471)	63% (3023)

Table 18b. Dairy Product Consumption by Diet Measurement Source (Adolescents 10–19 Years)

Dairy				
	FFQ	24 hour recall	Food records	Non-validated tool
Middle East & North Africa (n=13) Egypt (1 mixed), Iran (4 urban, 1 mixed), Iraq (1 urban), Jordan (2 urban), Lebanon (1 NR), Morocco (1 urban), Palestine (1 rural), Syria (1 urban)				
N studies	5	1	NR	7
n participants	8210	506	NR	8511
Consumption % (n)	48% (3976)	79% (400)	NR	44% (3755)

Dairy				
	FFQ	24 hour recall	Food records	Non-validated tool
Latin America & Caribbean (n=3) Brazil (2 mixed), Argentina (1 mixed)				
N studies	NR	NR	1	2
n participants	NR	NR	39912	57279
Consumption % (n)	NR	NR	21% (8379)	49% (27892)
Africa (n=7) Ethiopia (1 urban, 1 rural, 1 mixed), Nigeria (1 urban, 1 semi-urban, 1 rural), South Africa (1 urban)				
N studies	3	2	NR	2
n participants	1041	889	NR	2535
Consumption % (n)	53% (548)	26% (231)	NR	100% (2535)
Europe & Central Asia (n=3) Bosnia & Herzegovina (1 mixed), Serbia (1 urban), Turkey (1 urban)				
N studies	1	NR	NR	2
n participants	306	NR	NR	836
Consumption % (n)	47% (145)	NR	NR	37% (312)
South Asia (n=9) Bangladesh (2 urban, 1 mixed), India (3 urban, 1 mixed, 1 NR), Pakistan (1 urban)				
N studies	4	3	NR	2
n participants	1319	339	NR	960
Consumption % (n)	70% (919)	63% (213)	NR	79% (763)
East Asia & Pacific (n=7) China (3 urban, 2 rural), Malaysia (1 urban, 1 rural)				
N studies	3	1	NR	3
n participants	2917	380	NR	1769
Consumption % (n)	58% (1704)	53% (200)	NR	9% (167)
Total (n=42)				
N studies	16	7	1	18
n participants	13793	2114	39912	71890
Consumption % (n)	53% (7292)	49% (1044)	21% (8379)	49% (35244)

Table 18c. Flesh Food Consumption by Diet Measurement Source (Adolescents 10–19 Years)

Flesh foods				
	FFQ	24 hour recall	Food records	Non-validated tool
Middle East & North Africa (n=4) Iran (1 urban), Jordan (2 urban), Syria (1 urban)				
N studies	1	1	NR	2
n participants	151	506	NR	448
Consumption % (n)	72% (109)	11% (58)	NR	90% (402)
Latin America & Caribbean (n=1) Brazil (1 mixed)				
N studies	NR	NR	1	NR
n participants	NR	NR	39912	NR
Consumption % (n)	NR	NR	84% (33447)	NR
Africa (n=10) Ethiopia (1 urban, 1 rural, 1 mixed), Mozambique (1 mixed), Nigeria (1 urban, 1 semi-urban, 1 rural), South Africa (2 urban), Sudan (1 urban)				
N studies	3	4	NR	3
n participants	1041	1560	NR	3266
Consumption % (n)	49% (509)	33% (510)	NR	79% (2575)
Europe & Central Asia (n=4) Serbia (1 urban), Turkey (2 urban), multi country (Turkey & Albania, 1 mixed)				
N studies	1	1	NR	2
n participants	306	230	NR	1580
Consumption % (n)	64% (197)	66% (152)	NR	66% (1051)
South Asia (n=11) Bangladesh (2 urban, 1 mixed), India (4 urban, 1 NR, 1 urban slum), Pakistan (1 urban), Sri Lanka (1 rural)				
N studies	2	6	NR	3
n participants	1043	1166	NR	722
Consumption % (n)	34% (353)	47% (552)	NR	48% (347)
East Asia & Pacific (n=4) China (3 urban, 1 rural)				
N studies	3	NR	NR	1
n participants	3754	NR	NR	97
Consumption % (n)	55% (2054)	NR	NR	9% (9)
Total (n=34)				
N studies	10	12	1	11
n participants	6295	3462	39912	6113
Consumption % (n)	51% (3222)	37% (1272)	84% (33447)	72% (4383)

Table 18d. Fruit Consumption by Diet Measurement Source (Adolescents 10–19 Years)

Fruits				
	FFQ	24 hour recall	Food records	Non-validated tool
Middle East & North Africa (n=11) Iran (2 mixed, 2 urban), Iraq (1 urban), Jordan (3 urban), Morocco (1 urban), Palestine (1 rural), Syria (1 urban)				
N studies	3	1	NR	7
n participants	6998	506	NR	8511
Consumption % (n)	79% (5524)	20% (101)	NR	72% (6091)
Latin America & Caribbean (n=7) Brazil (4 urban, 2 mixed, 1 NR)				
N studies	4	NR	1	2
n participants	1349	NR	39912	59143
Consumption % (n)	57% (775)	NR	53% (21125)	32% (19022)
Africa (n=7) Ethiopia (1 rural), Ghana (1 urban, 1 mixed), Nigeria (1 urban, 1 semi-urban), South Africa (1 urban), 1 Sudan (1 urban)				
N studies	2	2	NR	3
n participants	341	355	NR	1432
Consumption % (n)	47% (162)	65% (231)	NR	61% (876)
Europe & Central Asia (n=2) Serbia (1 urban), Turkey (1 urban)				
N studies	NR	NR	NR	2
n participants	NR	NR	NR	1090
Consumption % (n)	NR	NR	NR	85% (878)
South Asia (n=11) Bangladesh (2 urban, 1 mixed), India (5 urban, 1 urban slum), Pakistan (1 urban), Sri Lanka (1 rural)				
N studies	3	4	NR	4
n participants	1173	976	NR	1686
Consumption % (n)	84% (982)	63% (614)	NR	51% (865)
East Asia & Pacific (n=10) China (4 urban, 2 rural), Malaysia (1 urban), Philippines (1 mixed), Tonga (1 mixed), multi-country (Cambodia, Indonesia, Malaysia, Myanmar, Philippines and Vietnam; 1 mixed)				
N studies	3	NR	NR	7
n participants	2897	NR	NR	27060
Consumption % (n)	60% (1735)	NR	NR	25% (6646)

Fruits				
	FFQ	24 hour recall	Food records	Non-validated tool
Total (n=48)				
N studies	15	7	1	25
n participants	12758	1837	39912	98922
Consumption % (n)	72% (9178)	51% (946)	53% (21125)	35% (34378)

Table 18e. Vegetable Consumption by Diet Measurement Source (Adolescents 10–19 Years)

Vegetables				
	FFQ	24 hour recall	Food records	Non-validated tool
Middle Eat & North Africa (n=11) Iran (2 mixed, 2 urban), Iraq (1 urban), Jordan (3 urban), Morocco (1 urban), Palestine (1 rural), Syria (1 urban)				
N studies	3	1	NR	7
n participants	6998	506	NR	8511
Consumption % (n)	44% (3083)	50% (253)	NR	48% (4100)
Latin America & Caribbean (n=6) Brazil (3 urban, 2 mixed, 1 NR)				
N studies	4	NR	1	1
n participants	1349	NR	39912	57089
Consumption % (n)	65% (878)	NR	36% (14524)	41% (23520)
Africa (n=8) Ethiopia (2 mixed, 1 rural), Ghana (1 mixed), Mozambique (1 mixed), Nigeria (1 urban, 1 semi-urban), Sudan (1 urban)				
N studies	2	3	NR	3
n participants	341	1393	NR	1757
Consumption % (n)	51% (173)	45% (626)	NR	56% (993)
Europe & Central Asia (n=3) Serbia (1 urban), Turkey (1 urban), multi-country (Turkey and Albania, 1 mixed)				
N studies	NR	1	NR	2
n participants	NR	230	NR	1090
Consumption % (n)	NR	67% (154)	NR	77% (845)
South Asia (n=11) Bangladesh (2 urban, 1 mixed), India (6 urban, 1 mixed), Pakistan (1 urban)				
N studies	3	3	NR	5
n participants	1173	339	NR	2281
Consumption % (n)	91% (1068)	92% (311)	NR	72% (1653)

Vegetables				
	FFQ	24 hour recall	Food records	Non-validated tool
East Asia & Pacific (n=8) China (3 urban, 2 rural), Philippines (1 mixed), Tonga (1 mixed), multi-country (Cambodia, Indonesia, Malaysia, Myanmar, Philippines and Vietnam; 1 mixed)				
N studies	3	NR	NR	5
n participants	2897	NR	NR	25541
Consumption % (n)	79% (2297)	NR	NR	29% (7325)
Total (n=47)				
N studies	15	8	1	23
n participants	12758	2468	39912	96269
Consumption % (n)	59% (7499)	54% (1344)	36% (14524)	40% (38436)

Table 19a. Consumption of Grains among Adolescents Ages 10–19 Years (Low Quality Studies Removed)

Middle East & North Africa	N studies=0	NR
Latin America & Caribbean	N studies=1 n participants=287	Consumption % (n): 82.2% (236)
Africa	N studies=4 n participants=3716	Consumption % (n): 34% (1276)
East Asia & Pacific	N studies=1 n participants=97	Consumption % (n): 80.4% (78)
Europe & Central Asia	N studies=1 n participants=377	Consumption % (n): 72% (271)
South Asia	N studies=2 n participants=586	Consumption % (n): 42.3% (248)

Table 19b: Consumption of dairy products among adolescents aged 10 to 19 years (low quality studies removed)

Middle East & North Africa	N studies=3 n participants=13487	Consumption % (n): 20% (2829)
Latin America & Caribbean	N studies=1 n participants=190	Consumption % (n): 53% (101)
Africa	N studies=3 n participants=985	Consumption % (n): 53% (1584)
East Asia & Pacific	N studies=3 n participants=3146	Consumption % (n): 9% (303)
Europe & Central Asia	N studies=1 n participants=377	Consumption % (n): 58% (219)
South Asia	N studies: 1 n participants=506	Consumption % (n): 56% (282)

Table 19c: Consumption of meats, poultry, and fish among adolescents aged 10 to 19 years (low quality studies removed)

Middle East & North Africa	N studies=0	NR
Latin America & Caribbean	N studies=0	NR
Africa	N studies=4 n participants= 3716	Consumption % (n): 34.5% (1280)
East Asia & Pacific	N studies=4 n participants=3851	Consumption % (n): 17.3% (667)
Europe & Central Asia	N studies=1 n participants=230	Consumption % (n): 43.6% (100)
South Asia	N studies=4 n participants=1191	Consumption % (n): 15% (180)

Table 19d: Consumption of fruits among adolescents aged 10 to 19 years (low quality studies removed).

Middle East & North Africa	N studies=3 n participants=13487	Consumption % (n): 38% (5130)
Latin America & Caribbean	N studies=2 n participants=632	Consumption % (n): 32.3% (204)
Africa	N studies=3 n participants=1182	Consumption % (n): 22% (261)
East Asia & Pacific	N studies=7 n participants=26147	Consumption % (n): 4% (1214)
Europe & Central Asia	N studies=1 n participants=377	Consumption % (n): 96.5% (364)
South Asia	N studies=4 n participants=1807	Consumption % (n): 19% (342)

Table 19e. Consumption of Vegetables among Adolescents Ages 10–19 Years (Low Quality Studies Removed)

Middle East & North Africa	N studies=3 n participants=13487	Consumption % (n): 20.7% (2798)
Latin America & Caribbean	N studies=2 n participants=632	Consumption % (n): 35% (223)
Africa	N studies=2 n participants=847	Consumption % (n): 34.2% (290)
East Asia & Pacific	N studies=7 n participants=26147	Consumption % (n): 6% (1732)
Europe & Central Asia	N studies=2 n participants= 607	Consumption % (n): 43% (266)
South Asia	N studies=3 n participants=1634	Consumption % (n): 34% (563)

Table 20. Frequency of Eating Meals Outside Of The Home, Disaggregated By Region And By Age.

	10–14	15–19	10–19
Daily (n=7) India (1 urban, 1 mixed), Malaysia (1 urban, 1 rural, 1 NR), Morocco (1 urban), South Africa (1 urban)			
N studies	1	5	7
n participants	803	1795	3174
Urban/Rural/Mixed	1 NR	3 urban, 1 rural, 1 mixed	4 urban, 1 mixed, 1 NR, 1 rural
Weighted prevalence % (n)	11.1% (89)	19.9% (357)	23.8% (757)
1–3 times/week (n=7) India (2 urban), Malaysia (1 urban, 1 rural, 1 NR), Pakistan (1 mixed), South Africa (1 urban)			
N studies	2	5	7
n participants	883	2680	3563
Urban/Rural/Mixed	1 urban, 1 NR	3 urban, 1 rural, 1 mixed	4 urban, 1 rural, 1 mixed, 1 NR
Weighted prevalence % (n)	32.5% (287)	17.7% (476)	21.4% (763)
4–6 times/week (n=9) China (1 urban), India (2 urban), Malaysia (1 urban, 1 rural, 1 NR), Palestine (1 rural), Pakistan (1 mixed), South Africa (1 urban)			
N studies	3	6	9
n participants	2421	3037	5458
Urban/Rural/Mixed	2 urban, 1 NR	3 urban, 2 rural, 1 mixed	5 urban, 2 rural, 1 mixed, 1 NR
Weighted prevalence % (n)	10.3% (250)	10.5% (320)	10.4% (568)
Monthly (n=5) India (2 urban, 1 mixed), Malaysia (1 urban, 1 NR)			
N studies	2	3	5
n participants	883	2430	3313
Urban/Rural/Mixed	1 urban, 1 NR	2 urban, 1 mixed	3 urban, 1 mixed, 1 NR
Weighted prevalence % (n)	33.3% (291)	25.4% (616)	27.4% (907)
Never (n=6) India (2 urban), Malaysia (1 urban, 1 NR), Pakistan (1 mixed), South Africa (1 urban)			
N studies	1	4	6
n participants	803	2548	3927
Urban/Rural/Mixed	1 NR	3 urban, 1 mixed	4 urban, 1 mixed, 1 NR
Weighted prevalence % (n)	12% (97)	26.7% (680)	24.5% (962)

	10–14	15–19	10–19
Total[1]			
N studies	8	19	28
n participants	4990	9942	15508
Urban/Rural/Mixed	4 NR, 3 urban	11 urban, 4 mixed, 4 rural	16 urban, 4 NR, 4 mixed, 4 rural
Weighted prevalence % (n)	21.8% (1089)	17.8% (1768)	19.3% (2993)

[1]Note that total eating out of the home doesn't include 'never' category

Table 21. Prevalence of Breakfast Skipping, Disaggregated by Region and by Age

	10–14	15–19	10–19
Middle East & North Africa (n=10) Egypt (1 mixed), Iran (2 mixed, 1 urban), Iraq (1 urban, 1 mixed), Gaza (1 NR), Jordan (2 urban), Palestine (1 rural)			
N studies	2	6	10
n participants	6791	3260	15407
Urban/Rural/Mixed	1 urban, 1 mixed	3 mixed, 2 urban, 1 NR	4 urban, 4 mixed, 1 rural, 1 NR
Skipping % (n)	36.5% (2478)	53.3% (1739)	43.3% (6667)
Latin America & Caribbean (n=4) Brazil (4 urban)			
N studies	2	2	4
n participants	1814	294	2108
Urban/Rural/Mixed	2 urban	2 urban	4 urban
Skipping % (n)	10.6% (193)	54.8% (161)	16.8% (354)
Africa (n=5) Ghana (1 mixed, 1 NR), Nigeria (2 urban, 1 semi-urban)			
N studies	2	1	5
n participants	2250	384	3147
Urban/Rural/Mixed	1 urban, 1 semi-urban	1 urban	2 urban, 1 semi-urban, 1 mixed, 1 NR
Skipping % (n)	65.8% (1481)	20.6% (79)	47.2% (1486)
Europe & Central Asia (n=2) Bosnia & Herzegovina (1 mixed), Serbia (1 urban)			
N studies	1	1	2
n participants	306	377	683
Urban/Rural/Mixed	1 mixed	1 urban	1 urban, 1 mixed
Skipping % (n)	58.5% (179)	35.0% (132)	45.5% (311)

	10–14	15–19	10–19
South Asia (n=8) India (6 urban, 1 rural, 1 mixed)			
N studies	2	4	8
n participants	913	858	2291
Urban/Rural/Mixed	1 urban, 1 rural	4 urban	6 urban, 1 rural, 1 mixed
Skipping % (n)	41.9% (383)	22.5% (193)	27.6% (632)
East Asia & Pacific (n=13) China (4 rural, 2 urban, 1 mixed), Fiji (1 mixed), Malaysia (2 urban, 1 rural, 1 NR), Tonga (1 mixed)			
N studies	9	3	13
n participants	10479	1056	21354
Urban/Rural/Mixed	4 rural, 3 urban, 1 mixed, 1 NR	1 urban, 1 rural, 1 mixed	5 rural, 4 urban, 3 mixed, 1 NR
Skipping % (n)	41.1% (4310)	56.2% (594)	40.6% (8679)
Total (n=42)			
N studies	18	17	42
n participants	22553	6229	44990
Urban/Rural/Mixed	8 urban, 5 rural, 3 mixed, 1 semi-urban, 1 NR	11 urban, 4 mixed, 1 rural, 1 NR	21 urban, 10 mixed, 7 rural, 3 NR, 1 semi-urban
Skipping % (n)	40.0% (9024)	46.5% (2898)	40.3% (18129)

[1]One study stratifies data by younger and older adolescents

Table 22. Prevalence of Snacking, Disaggregated by Age

	10–14	15–19	10–19
Snacking (n=24)[1] Brazil (3 urban), China (2 urban, 1 rural), Egypt (1 mixed), India (5 urban, 1 NR), Iran (1 urban), Lebanon (1 NR), Malaysia (1 urban), Myanmar (1 rural), Sudan (1 urban), Nigeria (1 urban, 1 semi-urban), Syria (1 urban), Tanzania (1 mixed), Tonga (1 mixed), Turkey (1 urban)			
N studies	8	14	24
n participants	5995	5234	12647
Urban/Rural/Mixed	4 urban, 2 rural, 1 mixed, 1 semi-urban	11 urban, 2 mixed, 1 NR	16 urban, 3 mixed, 2 rural, 1 semi-urban, 2 NR
Consumption % (n)	33.2% (1993)	58.9% (3135)	48.5% (6134)

Table 23. Prevalence of Vegetarianism, Disaggregated by Region and by Age

	10–14	**15–19**	**10–19**
Middle East & North Africa (n=1) Iran (1 urban)			
N studies	1	NR	1
n participants	363	NR	363
	1 urban	NR	1 urban
Vegetarian % (n)	2% (7)	NR	2% (7)
Non-vegetarian	88% (321)	NR	88% (321)
Latin America & Caribbean (n=1) Brazil (1 NR)			
N studies	NR	1	1
n participants	NR	572	572
Urban/Rural/Mixed	NR	NR	NR
Vegetarian % (n)	NR	6% (34)	6% (34)
Non-vegetarian	NR	94% (535)	94% (535)
Africa (n=0)			
Europe & Central Asia (n=0)			
South Asia (n=15) India (11 urban, 2 rural, 1 mixed), Sri Lanka (1 rural)			
N studies	4	8	15
n participants	1060	3489	6246
Urban/Rural/Mixed	2 urban, 2 rural	7 urban, 1 NR	11 urban, 3 rural, 1 mixed
Vegetarian % (n)	21% (225)	34% (1174)	29% (1823)
Non-vegetarian	68% (717)	62% (2165)	59% (3676)
East Asia & Pacific (n=0)			
Total (n=17)			
N studies	5	9	17
n participants	1423	3981	7181
Urban/Rural/Mixed	3 urban, 2 rural	8 urban, 1 NR	12 urban, 3 rural, 2 NR, 1 mixed
Vegetarian % (n)	38% (546)	30% (1208)	30% (2178)
Non-vegetarian	51% (724)	68% (2700)	59% (4218)

Table 24. Carbohydrate Intake (Grams/Day), Disaggregated by Country-Level GII Ranking

	10–19
Gender Inequality Index 0.100-0.199 (N=7) China (4 urban, 2 mixed), Libya (1 urban)	
N studies	7
n participants	2599
Weighted Mean ±SD	308.3 ±116.1

	10–19
Gender Inequality Index 0.200-0.299 (N=4) Malaysia (3 mixed, 1 urban)	
N studies	4
n participants	1138
Weighted Mean ±SD	220.6 ±65.4
Gender Inequality Index 0.300-0.399 (N=8) Mexico (1 urban, 1 rural, 1 mixed), Thailand (1 rural), Turkey (2 urban) South Africa (2 urban)	
N studies	8
n participants	1774
Weighted Mean ±SD	250.6 ±58.4
Gender Inequality Index 0.400-0.499 (N=7) Algeria (1 urban), Bolivia (1 urban), Brazil (1 mixed) Morocco (1 urban, 1 mixed), Philippines (1 urban), Venezuela (1 peri-urban)	
N studies	7
n participants	4573
Weighted Mean ±SD	263.5 ±81.2
Gender Inequality Index 0.500-0.599 (N=18) Bangladesh (1 urban, 1 mixed), Cameroon (1 urban), India (1 urban), Iran (9 urban), Mozambique (3 mixed), Pakistan (1 urban), Senegal (1 urban)	
N studies	18
n participants	5487
Weighted Mean ±SD	259.0 ±51.1

Table 25. Protein Intake (Grams/Day), Disaggregated by Country-Level GII Ranking

	10–19
Gender Inequality Index 0.100-0.199 (N=6) China (4 urban, 1 mixed), Libya (1 urban)	
N studies	6
n participants	2146
Weighted Mean ±SD	79.2 ±27.4
Gender Inequality Index 0.200-0.299 (N=4) Malaysia (3 mixed, 1 urban)	
N studies	4
n participants	1138
Weighted Mean ±SD	64.2 ±19.9
Gender Inequality Index 0.300-0.399 (N=11) Mexico (2 urban, 1 mixed, 1 rural), Myanmar (1 peri-urban), Thailand (1 rural), Turkey (2 urban), South Africa (2 urban), Sri Lanka (1 mixed)	
N studies	11
n participants	2495
Weighted Mean ±SD	55.8 ±16.3
Gender Inequality Index 0.400-0.499 (N=8)	

	10–19
Algeria (1 urban), Bolivia (1 urban), Brazil (1 mixed), Ethiopia (1 rural), Morocco (2 mixed), Philippines (1 urban), Venezuela (1 peri-urban)	
N studies	8
n participants	4761
Weighted Mean ±SD	70.2 ±23.3
Gender Inequality Index 0.500-0.599 (N=34) Bangladesh (1 urban, 1 mixed), Cameroon (1 urban, 1 rural), India (8 urban, 2 rural, 2 urban slums, 1 mixed), Iran (10 urban), Mozambique (3 mixed), Pakistan (3 urban), Senegal (1 urban),	
N studies	34
n participants	9367
Weighted Mean ±SD	48.2 ±12.3

Table 26. Fat Intake (Grams/Day), Disaggregated by Country-Level GII Ranking

	10 – 19
Gender Inequality Index 0.100-0.199 (N=7) China (4 urban, 2 mixed), Libya (1 urban)	
N studies	7
n participants	2439
Weighted Mean ±SD	60.8 ±23.2
Gender Inequality Index 0.200-0.299 (N=4) Malaysia (1 urban, 3 mixed)	
N studies	4
n participants	1138
Weighted Mean ±SD	58.7 ±19.4
Gender Inequality Index 0.300-0.399 (N=7) Mexico (1 urban, 1 rural, 1 mixed), Thailand (1 rural), Turkey (2 urban), South Africa (1 urban)	
N studies	7
n participants	1676
Weighted Mean ±SD	64.1 ±26.8
Gender Inequality Index 0.400-0.499 (N=6) Bolivia (1 mixed), Brazil (1 mixed), Morocco (1 urban), Philippines (1 urban, 1 mixed), Venezuela (1 peri-urban)	
N studies	6
n participants	4199
Weighted Mean ±SD	59.4 ±21.3

	10 – 19
Gender Inequality Index 0.500-0.599 (N=26) Bangladesh (1 urban, 1 mixed), Cameroon (1 urban), India (3 urban, 2 urban slum, 1 mixed, 1 rural), Iran (10 urban), Mozambique (3 mixed) Pakistan (2 urban), Senegal (1 urban)	
N studies	26
n participants	6655
Weighted Mean ±SD	53.4 ±16.3

FIGURES

Figure 1. Association between Fast/Convenient Food Intake and Mean BMI (P-Value=0.2)

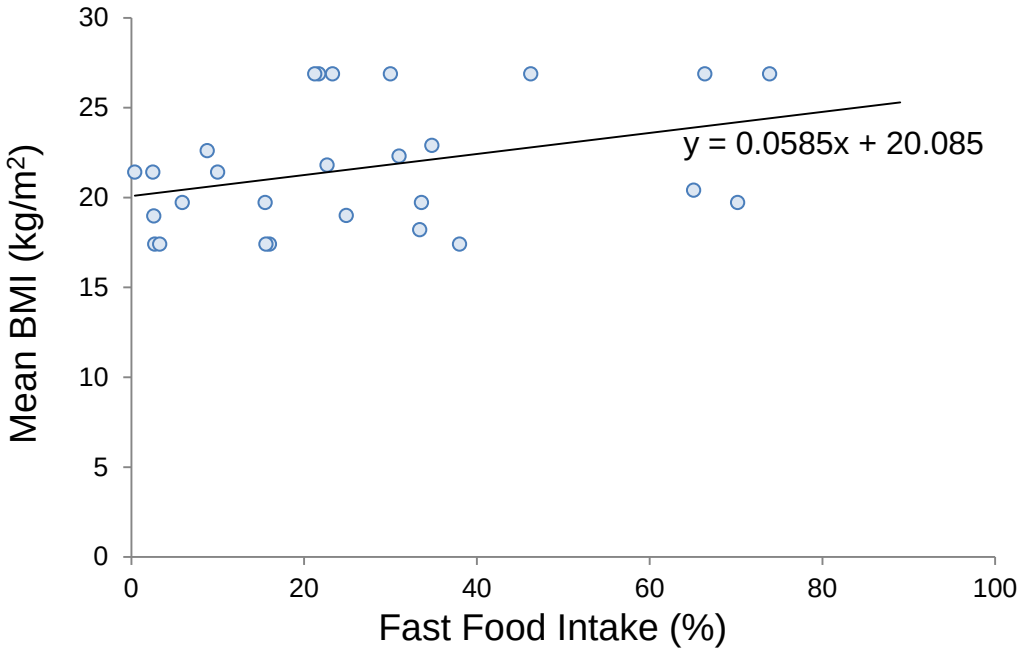


Figure 2. Association between Fast/Convenient Food Intake and Proportion of Adolescents Who Are Overweight and Obese (P-Value=0.2)

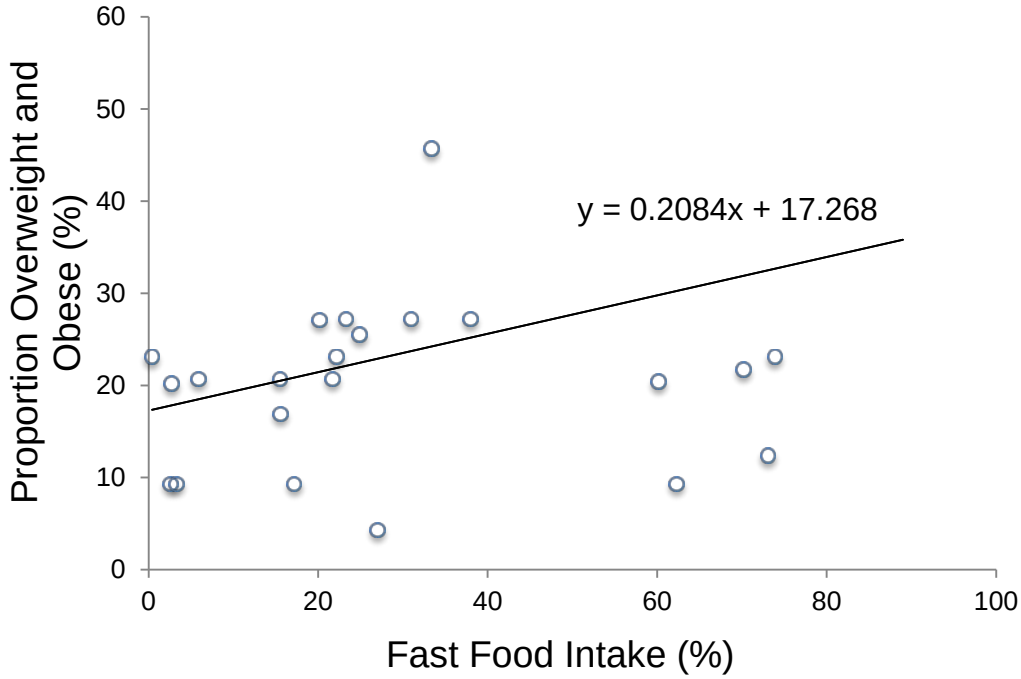


Figure 3a. Protein and Fat Intake of Adolescent Girls (10–19), Disaggregated by Rural and Urban Residence

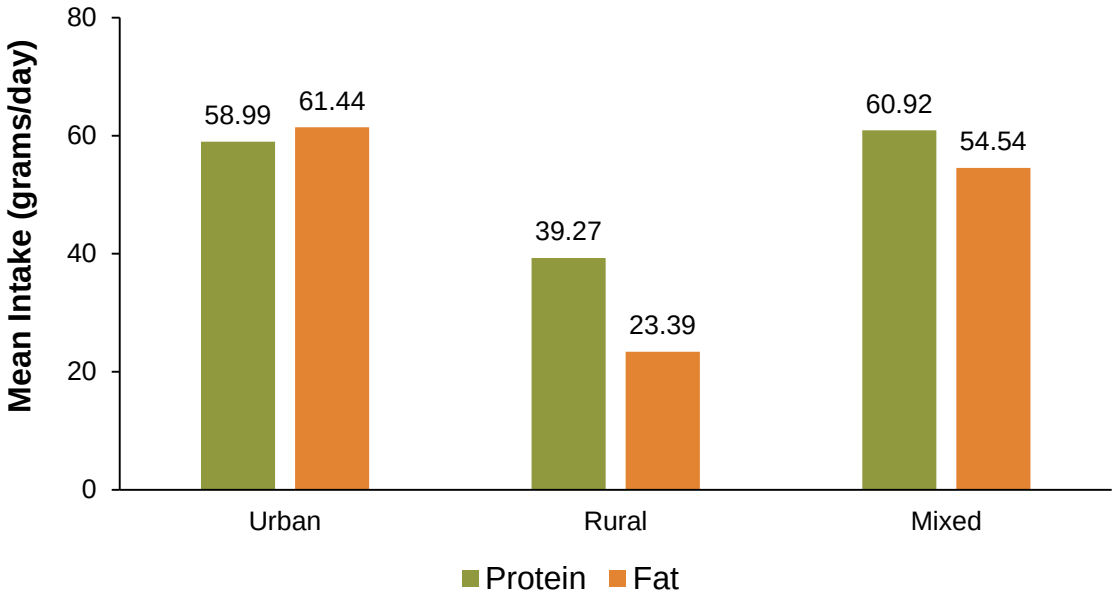


Figure 3b. Carbohydrate Intake of Adolescent Girls (10–19), Disaggregated by Rural and Urban Residence

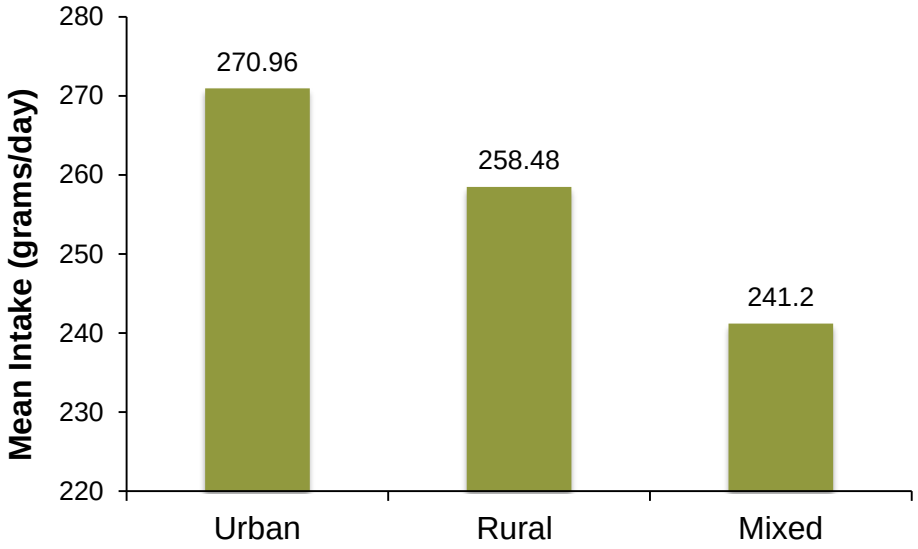


Figure 4a. Protein and Fat Intake of Adolescent Girls (10–19), Disaggregated by Country-Level Socioeconomic Status

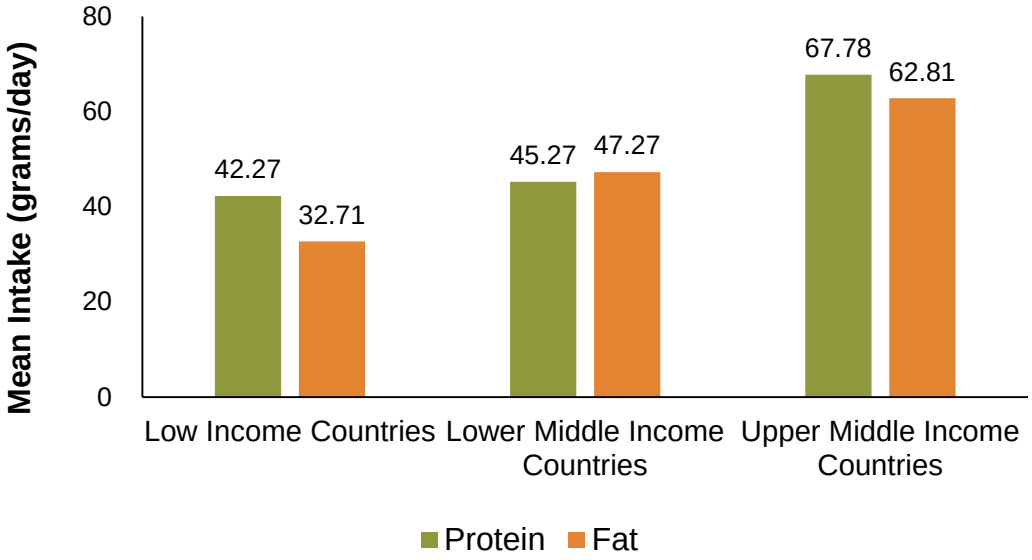
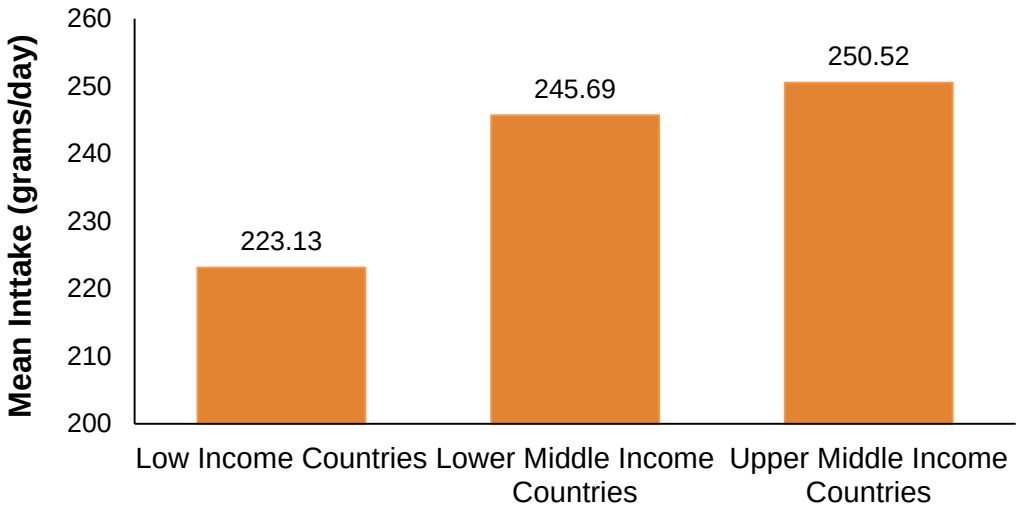


Figure 4b. Carbohydrate Intake of Adolescent Girls (10–19), Disaggregated by Country-Level Socioeconomic Status



APPENDIX II

External Document: Dietary Intake – Summary Table

Author	Publication Year	Study Setting			Study Design	Demographics		Outcomes							Quality Assessment
		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Ansa, V. O. et al.	2008	Nigeria	Africa	Undetermined	Cross-sectional	10-19	499	✓							Low
Astrom, A. N. and Mbawalla, H.	2011	Tanzania	Africa	Urban: 48.2% Rural: 51.8%	Cross-sectional	15-19	1256			✓					Low
Ayele, E. and Berhan, Y.	2013	Ethiopia	Africa	Urban: 54.3% Rural: 45.7%	Cross-sectional	10-14	660	✓		✓			✓		Low
Belete, Y. et al.	2016	Ethopia	Africa	Urban: 15% Rural: 85%	Cross-sectional	15-19	424			✓					Medium
Buxton, C.N.A.	2014	Ghana	Africa	Urban	Cross-sectional	10-19	335	✓		✓					Medium
Dapi, L.N. et al.	2010	Cameroon	Africa	Urban	Cross-sectional	10-14	119				✓	✓	✓		Medium
Doku, D. et al.	2013	Ghana	Africa	MIxed	Cross-sectional	15-19	659	✓							Medium
Feeley, A. B. and Norris, S.A.	2014	South Africa	Africa	Urban: 100%	Cohort	15-19	731	✓							Medium
Feeley, A.B., Musenge, E. et al.	2012	South Africa	Africa	Urban: 100%	Cohort	15-19	653	✓	✓				✓		Medium
Feeley, A.B., Musenge, E. et al.	2012	South Africa	Africa	Urban: 100%	Cohort	15-19	739	✓						✓	Low
Feeley, A.B., Pettifor, J.M. et al.	2009	South Africa	Africa	Urban: 100%	Cross-sectional	15-19	335	✓	✓				✓		Low

Author	Publication Year	Study Setting			Study Design	Demographics		Outcomes							Quality Assessment
		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Fiorentino, M. el	2016	Senegal	Africa	Urban: 100%	Cross-sectional	10-19	289					✓			Low
Freese, R. et al.	2015	Mozambique	Africa	Mixed	Cross-sectional	15-19	262				✓	✓	✓		Low
Henry-Unaeze, H. N. and Okonkwo, C.N.	2011	Nigeria	Africa	Urban: 68% Rural: 32%	Cross-sectional	15-19	100						✓		Low
Ibe, S.N.O.	2010	Nigeria	Africa	Rural	Cross-sectional	15-19	218				✓				Low
Ilesanmi, O.S. et al.	2014	Nigeria	Africa	Urban	Cross-sectional	15-19	294	✓							Low
Intiful, F.D. and Lartey, A.	2014	Ghana	Africa	Undetermined	Cross-sectional	10-19	178			✓					Low
Korkalo, L., Erkkola, M. et al.	2017	Mozambique	Africa	Mixed	Cross-sectional	10-19	551	✓					✓		Low
Korkalo, L., Freese, R. et al.	2015	Mozambique	Africa	Mixed	Cross-sectional	10-19	551				✓	✓			Low
Mulugeta, A. et al.	2015	Ethiopia	Africa	Urban: 53.8% Rural: 46.2%	Cross-sectional	15-19	828	✓		✓					Low
Musaiger, A.O., Nabag, F.O. et al.	2016	Sudan	Africa	Urban	Cross-sectional	15-19	438	✓		✓			✓		Low
Mutanen, M. et al.	2016	Mozambique	Africa	Mixed	Cross-sectional	15-19	145				✓	✓	✓		Low
Napier, C.E. and Hlambelo, N.	2014	South Africa	Africa	Urban: 100%	Cross-sectional	15-19	61	✓			✓	✓	✓		Low
Naude, C.E. et al.	2012	South Africa	Africa	Urban: 100%	Cross-sectional	10-14	47				✓				Low

Author	Publication Year	Study Setting			Study Design	Demographics		Outcomes							Quality Assessment
		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Odunaiya, N.A. et al.	2015	Nigeria	Africa	Rural	Cross-sectional	15-19	577	✓					✓		Low
Ogunkunle, M.O. and Oludele, A.S.	2013	Nigeria	Africa	Semi-Urban	Cross-sectional	10-14	153	✓		✓					Low
Olumakaiye, M.F.	2013	Nigeria	Africa	Rural	Cross-sectional	10-14	120	✓							Low
Omuemu, V and Oko-Oboh, A.G.	2015	Nigeria	Africa	Urban	Cross-sectional	15-19	384	✓		✓					Low
Onabanjo, O.O. et al.	2014	Nigeria	Africa	Rural	Cross-sectional	15-19	72				✓	✓	✓		Low
Onyiriuka, A.N. et al.	2013	Nigeria	Africa	Urban	Cross-sectional	10-14	2097	✓	✓	✓			✓		Medium
Ponka, R. and Fokou, E.	2011	Cameroon	Africa	Rural	Cross-sectional	10-19	98				✓	✓			Low
Roba, A.C. et al.	2015	Ethiopia	Africa	Rural	Cross-sectional	15-19	188	✓			✓	✓	✓		Medium
Roba, K.T. et al.	2016	Ethiopia	Africa	Urban	Cross-sectional	15-19	700	✓					✓		Medium
Teji, K. et al.	2016	Ethiopia	Africa	Urban: 50.6% Rural: 49.4%	Cross-sectional	10-14	547			✓			✓		Low
Van den Berg, V.L. et al.	2014	Lesotho-South Africa	Africa	Urban	Cross-sectional	15-19	125				✓	✓	✓		Low
Abdul Majid, H. et al.	2016	Malaysia	East Asia & Pacific	Urban: 50.3% Rural: 49.7%	Cohort	10-14	511	✓	□		✓	✓	✓		Medium
Abdullah, N. F. et al.	2013	Malaysia	East Asia & Pacific	Rural	Cross-sectional	15-19	132	✓	✓	✓	✓		✓		Low

Author	Publication Year	Study Setting			Study Design	Demographics		Outcomes							Quality Assessment
		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Cacavas, K. et al.	2011	Tonga	East Asia & Pacific	Mixed	Mixed Design	10-14	1125 Qualitative: 24	✓	✓	✓			✓	✓	Low
Cao, M. et al.	2015	China	East Asia & Pacific	Urban	Cross-sectional	10-14	4468	✓					✓		Medium
Chen, X. et al.	2016	China	East Asia & Pacific	Urban	Cross-sectional	10-14	2388	✓							Low
Chin, Y.S. and Mohn Nasir, M.T.	2009	Malaysia	East Asia & Pacific	Urban	Cross-sectional	15-19	407	✓	✓	✓			✓		Low
Chongwatpol, P. and Gates, G.E.	2016	Thailand	East Asia & Pacific	Urban	Cross-sectional	15-19	1051			✓			✓		Low
Chu, C.H. et al.	2012	Myanmar	East Asia & Pacific	Rural	Cross-sectional	10-14	43			✓					Low
Cui, Z. and Dibley, M.J.	2012	China	East Asia & Pacific	Urban: 26.9% Rural: 73.1%	Cross-sectional	10-19	450				✓	✓			Low
Cynthia, J. et al.	2013	Malaysia	East Asia & Pacific	Urban	Cross-sectional	10-14	219				✓	✓	✓		Medium
Dong, H. et al.	2017	China	East Asia & Pacific	Urban	Cross-sectional	10-14	969	✓					✓		Medium
Gao Y. et al.	2010	China	East Asia & Pacific	Rural	Cross-sectional	10-14	1450	✓		✓			✓		Medium
Gonzalez- Suarez, C. et al.	2015	Philippines	East Asia & Pacific	Urban	Cross-sectional	10-14	208			✓			✓		Medium
Gonzalez- Suarez, C. et al.	2012	Philippines	East Asia & Pacific	Urban	Cross-sectional	10-14	196				✓	✓	✓		Medium
Guo, X., Zhang X. et al.	2011	China	East Asia & Pacific	Rural	Cross-sectional	10-14	2147			✓					Medium

Author	Publication Year	Study Setting			Study Design	Demographics		Outcomes							Quality Assessment
		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Guo, X., Zheng, L. et al.	2013	China	East Asia & Pacific	Rural	Cross-sectional	10-14	1963			✓			✓		Medium
Htet, M.K. et al.	2015	Myanmar	East Asia & Pacific	Peri-Urban: 100%	RCT	15-19	391				✓	✓	✓		Medium
Jan Mohamed, H.J. et al.	2016	Malaysia	East Asia & Pacific	Mixed (National)	Cross-sectional	10-14	1209	✓							Low
Jia, M. et al.	2012	China	East Asia & Pacific	Urban	Cross-sectional	10-14	380	✓					✓		Low
Kwanbunjan, K. et al.	2008	Thailand	East Asia & Pacific	Rural	Cross-sectional	10-14	57				✓	✓			Low
Li, J., Huang, Z. et al.	2013	China	East Asia & Pacific	Urban: 100%	Cross-sectional	10-14	112	✓			✓				Low
Li, J., Liu, H. et al.	2016	China	East Asia & Pacific	Urban	Twin-Study	10-14	296	✓		✓	✓	✓			Medium
Mao, C. et al.	2012	China	East Asia & Pacific	Urban	Cross-sectional	10-14	430	✓							Low
Norimah, A.K. et al.	2015	Malaysia	East Asia & Pacific	Urban: 67.1% Rural: 32.9%	Cross-sectional	10-14	1528	✓							Low
Peltzer K. and Pengpid, S.	2015	Philippines	East Asia & Pacific	Mixed (National)	Cross-sectional Cohort	10-14	2007: 3190 2011: 2986	✓					✓		Medium
Pengpid, S. and Peltzer, K.	2016	Cambodia, Indonesia, Malaysia, Myanmar, Philippines & Vietnam	East Asia & Pacific	Mixed (National)	Cross-sectional Cohort	10-14	15430	✓					✓		Medium
Rezali, F.W. et al.	2015	Malaysia	East Asia & Pacific	Urban	Cross-sectional	10-14	242			✓					Low

Author	Publication Year	Study Setting			Study Design	Demographics		Outcomes							Quality Assessment
		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Seo, D.C. and Niu, J.	2013	China	East Asia & Pacific	Mixed (National)	Cross-sectional	10-14	290	✓			✓	✓	✓		Medium
Shikanai, S. et al.	2014	Cambodia	East Asia & Pacific	Urban	Cross-sectional	10-14	29	✓			✓		✓		Low
Sun, C. et al.	2014	China	East Asia & Pacific	Urban	Cohort	15-19	900	✓			✓	✓	✓		Medium
Tajik, E. et al.	2016	Malaysia	East Asia & Pacific	Undetermined	Cross-sectional	10-14	803		✓	✓			✓		Low
Thompson-McCormick, J.J. et al.	2010	Fiji	East Asia & Pacific	Urban: 50% Rural: 50%	Cross-sectional	15-19	517			✓			✓		Low
Wang, D. et al.	2014	China	East Asia & Pacific	Rural	Cross-sectional	10-14	97	✓		✓					Medium
Wang, L. et al.	2011	China	East Asia & Pacific	Urban	Cross-sectional	10-14	1599	✓	✓	✓					Medium
Wang, M. et al.	2016	China	East Asia & Pacific	Urban: 40% Rural: 60%	Cross-sectional	10-19	9819			✓					Medium
Woon F.C., Chin, Y.S., and Nasir, M.T.	2015	Malaysia	East Asia & Pacific	Mixed	Cross-sectional	10-14	10				✓	✓	✓		Low
Woon, F.C., Chin Y.S. et al.	2014	Malaysia	East Asia & Pacific	Mixed	Cross-sectional	10-14	197	✓			✓	✓			Medium
Xia, W. et al.	2011	China	East Asia & Pacific	Urban	Cross-sectional	15-19	168	✓			✓	✓	✓		Medium
Xue, H. et al.	2016	China	East Asia & Pacific	Urban	Cross-sectional	10-14	798				✓		✓		Medium
Ye, Y.L. et al.	2016	China	East Asia & Pacific	Urban	Cross-sectional	15-19	989	✓					✓		Medium

Author	Publication Year	Study Setting			Study Design	Demographics		Outcomes							Quality Assessment
		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Zarei, M. et al.	2014	Malaysia	East Asia & Pacific	Urban	Cross-sectional	10-14	146			✓			✓		Low
Zhang, C.X. et al.	2012	China	East Asia & Pacific	Urban	Cross-sectional	15-19	1186	✓			✓		✓		Low
Zhang, J. et al.	2016	China	East Asia & Pacific	Mixed (National)	Cohort	10-14	173				✓		✓		Medium
Zhang, R. et al.	2015	China	East Asia & Pacific	Mixed (Regional)	Cross-sectional	10-19	75				✓	✓			Medium
Zhang, Y. et al.	2016	China	East Asia & Pacific	Urban	Cross-sectional	10-14	462	✓							Low
Zhou, X. et al.	2015	China	East Asia & Pacific	Urban	Cross-sectional	10-14	635				✓	✓	✓		Medium
Zhu, Y. et al.	2016	China	East Asia & Pacific	Urban	Cross-sectional	10-14	1125	✓		✓			✓		Medium
Akbulut, G. et al.	2014	Turkey	Europe & Central Asia	Urban	Cross-sectional	10-14	446	✓					✓		Low
Ayranci, U. et al.	2010	Turkey	Europe & Central Asia	Urban	Cross-sectional	15-19	1121	✓		✓			✓		Low
Borici, S. et al.	2009	Turkey & Albania	Europe & Central Asia	Urban	Cross-sectional	10-14, 15-19	230	✓					✓		Medium
Djordjevic-Nikic, M. and Dopsaj, M.	2013	Serbia	Europe & Central Asia	Urban	Cross-sectional	15-19	377	✓		✓			✓		Medium
Erenoglu, N. et al.	2013	Turkey	Europe & Central Asia	Urban	Cross-sectional	10-14	713	✓		✓			✓		Low
Giannopoulou, D. et al.	2017	Turkey	Europe & Central Asia	Urban	Cross-sectional	10-14	41				✓	✓	✓		Medium

Author	Publication Year	Study Setting			Study Design	Demographics		Outcomes							Quality Assessment
		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Kayisoglu, S. and Icoz, A.	2014	Turkey	Europe & Central Asia	Urban	Cross-sectional	10-19	459	✓							Low
Koksal, E. et al.	2011	Turkey	Europe & Central Asia	Urban	Cross-sectional	15-19	469				✓	✓	✓		Low
Taljic, I. and Toroman, A.	2016	Bosnia and Herzegovina	Europe & Central Asia	Urban: 78.9% Rural: 21.1%	Cross-sectional	10-14	306	✓		✓					Low
Araki, E.L. et al.	2011	Brazil	Latin America & Caribbean	Urban	Cross-sectional	15-19	41		✓	✓					Low
Azeredo, C, M. et al.	2014	Brazil	Latin America & Caribbean	Mixed	Cross-sectional	10-14	57089	✓							Low
Barbosa Filho, V.C. et al.	2012	Brazil	Latin America & Caribbean	Urban	Cross-sectional	10-14	855	✓							Medium
Barbosa-Cortes, L. et al.	2015	Mexico	Latin America & Caribbean	Rural	Longitudinal	10-14	26				✓	✓	✓		Low
Bernal, J., Frongillo E.A. et al.	2016	Venezuela	Latin America & Caribbean	Peri-urban	Cross-sectional	10-14	63				✓	✓			Medium
Bernal, J., Frongillo, E.A., Herrera, H. et al.	2012	Venezuela	Latin America & Caribbean	Peri-urban	Qualitative	10-19	6							✓	Low
Bernardo, C.O. et al.	2012	Brazil	Latin America & Caribbean	Urban	Cross-sectional	10-14	1469	✓		✓					Low
Bigio, R.S. et al.	2013	Brazil	Latin America & Caribbean	Urban	Cross-sectional	10-19	90	✓							Low
da Silva, J.G. et al.	2014	Brazil	Latin America & Caribbean	Urban	Qualitative	10-19	15							✓	Low
De Moraes, A., Adami, F. et al.	2012	Brazil	Latin America & Caribbean	Urban	Cross-sectional	15-19	540			✓					Low

Author	Publication Year	Study Setting			Study Design	Demographics		Outcomes							Quality Assessment
		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
De Moraes, A. and Falcao M.C.	2013	Brazil	Latin America & Caribbean	Urban	Cross-sectional	15-19	540	✓							Low
Dumith, S.C. et al.	2012	Brazil	Latin America & Caribbean	Urban	Birth Cohort Followup	10-14	2054	✓							Medium
Enes, C.C. and Slater, B.	2015	Brazil	Latin America & Caribbean	Mixed	Cross-sectional	10-14	260	✓					✓		Low
Estima, C.C.P. et al.	2012	Brazil	Latin America & Caribbean	Urban	Cross-sectional	15-19	572			✓					Low
Forero-Bogota, M.A. et al.	2017	Colombia	Latin America & Caribbean	Not reported	Cross-sectional	10-14	610	✓					✓		Low
Freire, M. et al.	2015	Brazil	Latin America & Caribbean	Mixed	Cross-sectional	10-19	2009: 30 129 2012: 31 062	✓							Medium
Geremia, R.	2015	Brazil	Latin America & Caribbean	Urban: 100%	Cross-sectional	10-14	345	✓		✓			✓		Medium
Hirschler, V. et al.	2009	Argentina	Latin America & Caribbean	Mixed	Cross-sectional	10-14	190	✓					✓		Medium
Leme, A. et al.	2016	Brazil	Latin America & Caribbean	Urban	RCT	15-19	253	✓			✓		✓		Medium
Lopez-Olmedo, N. et al.	2016	Mexico	Latin America & Caribbean	Mixed	Cross-sectional	10-19	1031				✓	✓			Medium
Masuet-Aumatell, C. et al.	2015	Bolivia	Latin America & Caribbean	Urban	Cross-sectional	10-19	180				✓	✓			Low
Mendez, R.O. et al.	2013	Mexico	Latin America & Caribbean	Urban	RCT	15-19	131				✓	✓	✓		Medium
Miranda, A.C. et al.	2015	Brazil	Latin America & Caribbean	Undetermined (Town)	Cross-sectional	10-14	177	✓							Low

Author	Publication Year	Study Setting			Study Design	Demographics		Outcomes							Quality Assessment
		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Monge-Rojas, R. et al.	2013	Costa Rica	Latin America & Caribbean	Urban: 61.2% Rural: 38.8%	Cross-sectional	15-19	224	✓							Low
Philippi, S. and Leme, A.C.B.	2015	Brazil	Latin America & Caribbean	Urban (low-income areas)	RCT	15-19	253			✓	✓		✓		High
Rieth, M.A. et al.	2012	Brazil	Latin America & Caribbean	Urban	Cross-sectional	10-19	287	✓					✓		Medium
Sales, C.H. et al.	2017	Brazil	Latin America & Caribbean	Urban	Cross-sectional	15-19	176				✓				Medium
Santana, M. et al.	2013	Brazil	Latin America & Caribbean	Urban	Cross-sectional	10-19	852	✓					✓		Medium
Schneider, B.C. et al.	2016	Brazil	Latin America & Caribbean	Urban	Birth Cohort	15-19	1965	✓					✓		Low
Silva, F. et al.	2016	Brazil	Latin America & Caribbean	Urban: 63.6% Rural: 36.4%	Cross-sectional	15-19	1544	✓					✓		Low
Silva, K. et al.	2014	Brazil	Latin America & Caribbean	Mixed (Regional)	Cross-sectional	15-19	3525	✓							Low
Souza, A.D.M. et al.	2016	Brazil	Latin America & Caribbean	Mixed (National)	Cross-sectional	10-14, 15-19	39912	✓							Low
Souza, R.A. et al.	2015	Brazil	Latin America & Caribbean	Mixed (National)	Cross-sectional	10-14, 15-19	3377				✓	✓			Medium
Tassitano, R.M. et al.	2014	Brazil	Latin America & Caribbean	Urban: 88.0% Rural: 12.0%	Cross-sectional	15-19	374	✓							Low
Tijerina-Saenz, A. et al.	2015	Mexico	Latin America & Caribbean	NR	Case Study Prospective	15-19	86				✓		✓		Low
Abu-Mweis, S.S. et al.	2014	Jordan	Middle East & North Africa	Urban	Cross-sectional	10-19	349	✓		✓			✓		Low

Author	Publication Year	Study Setting			Study Design	Demographics		Outcomes							Quality Assessment
		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Alizadeh, M. et al.	2015	Iran	Middle East & North Africa	Urban	Cross-sectional	10-14	244				✓	✓	✓		Medium
Allioua, M. et al.	2015	Algeria	Middle East & North Africa	Urban	Cross-sectional	10-19	374				✓	✓	✓		Low
Azadbakht, L., Haghightdoost, F. et al.	2016	Iran	Middle East & North Africa	Urban	Cross-sectional	10-14	415	✓			✓	✓	✓		Low
Azadbakht, L. et al.	2014	Iran	Middle East & North Africa	Urban	Cross-sectional	10-14	265				✓	✓	✓		Low
Azadbakht, L., Hajishafiee, M. et al.	2016	Iran	Middle East & North Africa	Urban	Cross-sectional	10-14	265	✓		✓	✓	✓	✓		Low
Bagherniya, M. et al.	2015	Iran	Middle East & North Africa	Urban	Cross-sectional	10-14	172	✓					✓		Low
Bahreynian M., Qorbani, M. et al.	2015	Iran	Middle East & North Africa	Urban: 75.6% Rural: 24.4%	Cross-sectional	10-14	6640	✓			✓	✓	✓		Medium
Bahreynian, M., Paknahad, Z. et al.	2013	Iran	Middle East & North Africa	Urban	Cross-sectional	10-14	324				✓	✓	✓		Medium
Baygi, F. et al.	2015	Iran	Middle East & North Africa	Mixed (National)	Cross-sectional	10-19	1308			✓					Medium
Dehardi, T. el (b)	2014	Iran	Middle East & North Africa	Urban (low income area)	Quasi-Experimental	10-14	100			✓			✓		Medium

Author	Publication Year	Study Setting			Study Design	Demographics		Outcomes							Quality Assessment
		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Dehdari, T. et al. (a)	2013	Iran	Middle East & North Africa	Urban	Quasi-Experimental	10-14	100					✓			Medium
El-Gilany, A.H. and Elkhawaga, G.	2012	Egypt	Middle East & North Africa	Urban: 56.9% Rural: 43.1%	Cross-sectional	15-19	448		✓	✓					Low
El-Qudah, J.M.	2014	Jordan	Middle East & North Africa	Urban	Cross-sectional	10-14	151	✓		✓			✓		Low
Ghrayeb, F. et al.	2014	Palestine	Middle East & North Africa	Rural: 100%	Cross-sectional	15-19	357	✓		✓			✓		Low
Haddad, L.G. et al.	2009	Jordan	Middle East & North Africa	Urban	Cross-sectional	15-19	261	✓		✓					Low
Hamrani, A. et al.	2014	Moroccan	Middle East & North Africa	Urban	Cross-sectional	15- 19	344	✓					✓		Low
Heidari-Beni, M. et al.	2015	Iran	Middle East & North Africa	Urban	Cross-sectional	10-14	205	✓			✓	✓	✓		Low
Heydari, S.T. et al.	2013	Iran	Middle East & North Africa	Urban: 100%	Cross-sectional	15-19	887				✓	✓	✓		Low
Huew, R. et al.	2011	Libya	Middle East & North Africa	Urban	Cross-sectional	10-14	88				✓	✓			Low
Jalambo, M.O. et al.	2013	Gaza	Middle East & North Africa	Undetermined	Cross-sectional	15-19	316			✓					Low

Author	Publication Year	Study Setting			Study Design	Demographics		Outcomes							Quality Assessment
		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Kadhum, M.J. et al.	2014	Iraq	Middle East & North Africa	Urban: 44% Rural: 56%	Quasi Experimental	15-19	1692	✓		✓					Low
Kelishadi, R., Mozafarian, N. et al.	2017	Iran	Middle East & North Africa	Urban: 75.5% Rural: 24.5%	Cross-sectional	10-19	6640			✓					Medium
Kelishadi, R., Qorbani, M. et al.	2016	Iran	Middle East & North Africa	Urban: 75.5% Rural: 24.5%	Cross-sectional	10-14	6640			✓					Medium
Kelishadi, R., Qorbani, M. et al.	2016	Iran	Middle East & North Africa	Urban: 75.5% Rural: 24.5%	Cross-sectional	10-14	6640	✓					✓		Low
Lopez, P.M. et al.	2012	Morocco	Middle East & North Africa	Mixed	Cross-sectional	15-19	192				✓	✓	✓		Low
Maddah, M. and Nikooyeh, B.	2010	Iran	Middle East & North Africa	Urban: 100%	Cross-sectional	10-19	2577			✓			✓		Low
Majabadi, H, A. et al.	2016	Iran	Middle East & North Africa	Urban	Qualitative	15-19	26							✓	Low
Mirhosseini, N.Z. et al.	2009	Iran	Middle East & North Africa	Urban	Cross-sectional	15-19	622				✓	✓	✓		Low
Mirkarimi, K. et al.	2016	Iran	Middle East & North Africa	Urban	Cross-sectional	15-19	250		✓	✓			✓		Low
Montero, M.D.P. et al.	2017	Morocco	Middle East & North Africa	Urban	Cross-sectional	10-19	192				✓	✓			Low

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		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Musaiger, A.O., Al-Mufty, B.A. et al.	2014	Iraq	Middle East & North Africa	Urban	Cross-sectional	15-19	373	✓		✓			✓		Low
Musaiger, A.O. and Kalam, F.	2014	Syria	Middle East & North Africa	Urban	Cross-sectional	15-19	187	✓		✓					Low
Naja, F. et al.	2015	Lebanon	Middle East & North Africa	Mixed	Cross-sectional	15-19	220			✓					Low
Omidvar, N., Neyesetani, T.R. et al.	2015	Iran	Middle East & North Africa	Urban	Cross-sectional	10-14	244				✓				Low
Rafraf, M. et al.	2013	Iran	Middle East & North Africa	Urban	Cross-sectional	15-19	216				✓	✓	✓		Medium
Ramezankhani, A. et al.	2016	Iran	Middle East & North Africa	Urban	Cross-sectional	10-14	308	✓							Low
Ramzi, M. et al.	2011	Iran	Middle East & North Africa	Urban	Cross-sectional	10-14	363			✓					Low
Rouhani, M.H. et al.	2012	Iran	Middle East & North Africa	Urban	Cross-sectional	10-14	140	✓			✓	✓	✓		Low
Salameh, P. et al.	2011	Lebanon	Middle East & North Africa	NR	Cross-sectional	10-19	968	✓		✓			✓		Low
Shafie, G. et al.	2013	Iran	Middle East & North Africa	Mixed (National)	Cross-sectional	10-14	2786						✓		Medium

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		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Shokrvash, B., Majlessi, F. et al.	2013	Iran	Middle East & North Africa	Urban	Cross-sectional	10-14	207	✓							Medium
Shokrvash, B., Salehi, L. et al.	2015	Iran	Middle East & North Africa	Urban	Cross-sectional	10-14	207	✓							Medium
Tayyem, R.F., Al-Hazzaa, H.M. et al.	2014	Jordan	Middle East & North Africa	Urban	Cross-sectional	15-19	349			✓			✓		Medium
Tayyem, R.F., Al-Hazzaa, H.M. et al.	2014	Jordan	Middle East & North Africa	Urban	Cross-sectional	15-19	312	✓					☐		Medium
Vakili, M. et al.	2013	Iran	Middle East & North Africa	Urban	Cross-sectional	15-19	506	✓					✓		Low
Adeel, F. F. A. et al.	2012	Pakistan	South Asia	Urban: 56.3% Rural: 43.8%	Cross-sectional	15-19	360	✓	✓						Low
Akhter, N. and Sondhya, F.Y.	2013	Bangladesh	South Asia	Urban: 50% Rural: 50%	Cross-sectional	15-19	214	✓			✓	✓			Low
Banerjee S. et al.	2011	India	South Asia	Rural	Cross-sectional	10-19	450				✓				Low
Chiplonkar, S. et al.	2013	India	South Asia	Urban	Cross-sectional	10-14, 15-19	841				✓	✓	✓		Low
Choudhary, K. et al.	2014	India	South Asia	Rural	Cross-sectional	10-14	240			✓	☐				Low
Choudhary, S. et al.	2009	India	South Asia	Rural	Cross-sectional	10-14	270			✓			✓		Low

Author	Publication Year	Study Setting			Study Design	Demographics		Outcomes							Quality Assessment
		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Dixit, S. et al.	2013	India	South Asia	Urban	Cross-sectional	10-19	450	✓	✓	✓					Low
Garg, M. et al.	2014	India	South Asia	Mixed	Cross-sectional	10-19	70			✓					Low
Gavaravarapu, S.M. et al.	2015	India	South Asia	Urban	Cross-sectional, Qualitative	10-14	39						✓	✓	Medium
Goel, S. et al.	2013	India	South Asia	Urban	Cross-sectional	15-19	80	✓		✓	✓	✓	✓		Medium
Gupta, A. et al.	2016	India	South Asia	Urban	Cross-sectional	10-14	80		✓	✓	✓	✓			Medium
Gupta, N. et al.	2008	India	South Asia	Urban (low income area)	Cross-sectional	10-19	110				✓	✓	✓		Low
Gupta, P. et al.	2014	India	South Asia	Urban	Cross-sectional	10-14	50			✓			✓		Low
Iftikhar, A. et al.	2012	Pakistan	South Asia	Urban	Cross-sectional	10-14	138	✓							Low
Islam, R and Hoque, M.	2015	Bangladesh	South Asia	Urban	Cross-sectional	15-19	210	✓					✓		Low
Jaisheeba, A.A. et al.	2012	India	South Asia	Urban	Cross-sectional	15-19	430			✓			✓		Low
Kabir, Y. et al.	2010	Bangladesh	South Asia	Urban	Cross-sectional	15-19	65	✓			✓	✓	✓		Low
Kadam, N.S. et al.	2011	India	South Asia	Urban (low income area)	Cross-sectional	10-14	202				✓	✓			Medium
Karkada, S. et al.	2011	India	South Asia	Rural	Qualitative & Cross-sectional	10-14	10				☐			✓	Low

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		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Kaur, T. and Kaur, M.	2015	India	South Asia	Rural: 100%	Cross-sectional	10-14	250		✓	✓	✓	✓			Low
Kotecha, P.V. et al.	2013	India	South Asia	Urban	Cross-sectional	10-14	748			✓				✓	Low
Mahmood, S. et al.	2016	Pakistan	South Asia	Urban	Cross-sectional	15-19	130	✓				✓	✓		Low
Maliye, C.H. et al.	2010	India	South Asia	Rural	Cross-sectional	10-19	430				✓	✓	✓		Low
Mishra, M. et al.	2014	India	South Asia	NR	Cross-sectional	10-14	73	✓							Low
Mishra, S.K. et al.	2011	India	South Asia	Urban: 50% Rural: 50%	Cross-sectional	15-19	577		✓	✓			✓		Low
Niranjala, A.M.S. and Gunawardena, N.S.	2011	Sri Lanka	South Asia	Rural & Estate (very poor)	Cross-sectional	10-14	524 Qual: 359	✓		✓			✓	✓	Low
Omidvar, S. and Begum, K.	2014	India	South Asia	Urban	Cross-sectional	15-19	1000	✓		✓			✓		Low
Parmar, J. et al.	2015	India	South Asia	Urban	Cross-sectional	15-19	45			✓			✓		Low
Paul, B., Nayaki, V. et al.	2015	India	South Asia	Not reported	Cross-sectional	15-19	253	✓		✓			✓		Medium
Peltzer, K., Pengpid, S. and Mohan, K.	2014	India	South Asia	Urban	Cross-sectional	15-19	259	✓		✓					Medium
Potdar, N. and Raje, L.	2012	India	South Asia	Urban	Cross-sectional	10-14	186			✓		✓			Low
Singla, P. and Dhillon, P.K.	2013	India	South Asia	Urban	RCT	15-19	60	✓		✓					Low

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		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Singla, P., Sachdeva, R. et al.	2012	India	South Asia	Urban	RCT	15-19	60	✓		✓					Low
Ranathunga, R.M.T.K. et al.	2008	Sri Lanka	South Asia	Urban: 55.2% Rural: 44.8%	Cross-sectional	10-14	259				✓	✓	✓		Low
Rani, M.A., and Sathiyasekaran, B.W.C.	2013	India	South Asia	Urban	Cross-sectional	10-19	947	✓		✓					Medium
Rathnayake, K.M. et al.	2014	Sri Lanka	South Asia	NR	Case Control	15-19	200				✓		✓		Low
Ratnayake, N and Ekanayake, L.	2012	Sri Lanka	South Asia	Urban	Cross-sectional	15-19	592	✓							Medium
Rifat-uz-Zaman et al.	2013	Pakistan	South Asia	Urban	Cross-sectional	10-14	153				✓	✓	✓		Medium
Rupa Vani, K. et al.	2013	India	South Asia	Urban: 83.4% Rural: 16.6%	Cross-sectional	10-19	853	✓					✓		Low
Ruqayya, S. and Khan, A.	2012	Pakistan	South Asia	Urban	Cross-sectional	15-19	12				✓	✓			Low
Sabale, R.V. et al.	2013	India	South Asia	Urban	Cross-sectional	10-14	193	✓							Low
Sachan, B. et al.	2013	India	South Asia	Urban: 70% Rural: 30%	Cross-sectional	10-19	847				✓	✓	✓		Medium
Sanwalka, N.J. et al.	2010	India	South Asia	Urban	Cross-sectional	10-14	200				✓	✓	✓		Medium
Shah, T.A. et al.	2013	India	South Asia	Urban	Cross-sectional	10-14	46	✓	✓				✓		Low
Sharma, R. et al.	2011	India	South Asia	Urban	Cross-sectional	15-19	181	✓							Medium

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		Country	World Region	Urban/ Rural		Age Bands	Sample Size	FANTA	Place of Consumption	Meal Pattern	Energy Intake	Macro-nutrients	BMI	Qualitative	
Shrivastav, M. and Thomas, S.	2010	India	South Asia	Urban	Cross-sectional	10-14	702	✓							Low
Singh, A.P. and Misra, G.	2016	India	South Asia	Mixed	Cross-sectional	10-19	750	✓							Low
Som, N. et al.	2016	India	South Asia	Urban	Cross-sectional	15-19	506	✓							Medium
Taranikanti, M. et al.	2016	India	South Asia	Urban	Cross-sectional	15-19	348	✓		✓			✓		Low
Tupe, R. et al.	2010	India	South Asia	Urban	Cross-sectional	10-14	630	✓			✓	✓	✓		Medium
Tupe, R., Chiplonkar, S.A. et al.	2009	India	South Asia	Urban slums	Case Control	10-14	170				✓	✓	✓		Low
Tupe, R., Chiplonkar,S.A. and Kapadia-Kundu, N.	2009	India	South Asia	Urban slums	Cross-sectional	15-19	173	✓			✓	✓	✓		Medium
Uma, C. et al.	2015	India	South Asia	Urban	Cross-sectional	15-19	1446	✓	✓	✓					Low
Vemula, S.R. et al.	2013	India	South Asia	Urban	Qualitative	10-19	253							✓	Low
Vijayeta, P. et al.	2016	India	South asia	NR	Cross-sectional	15-19	80			✓			✓		Low