



Diet and Eating Practices among Adolescent Girls in Low- and Middle-Income Countries: A Systematic Review

Background and Methods

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Stakeholders Consultation on Adolescent Girls' Nutrition: Evidence, Guidance, and Gaps

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Background

- Adolescents comprise 1 in 6 of the global population today
- Girls in LMICs have poor nutritional profiles, including high risks for undernutrition, overweight/obesity, and micronutrient deficiencies
- In many LMIC contexts, the prevalence of overweight/obesity now surpasses that of underweight, aligning with the nutrition transition that has occurred in high income countries

Background, cont.

- When considering the shift from infectious diseases to NCDs in LMICs, the recognition of poor diet as a key risk factor for NCDs is becoming increasingly important
- Given the number of births in this age group, combatting malnutrition is exceedingly important in reference to reproductive and pregnancy outcomes, as well as the intergeneration effects

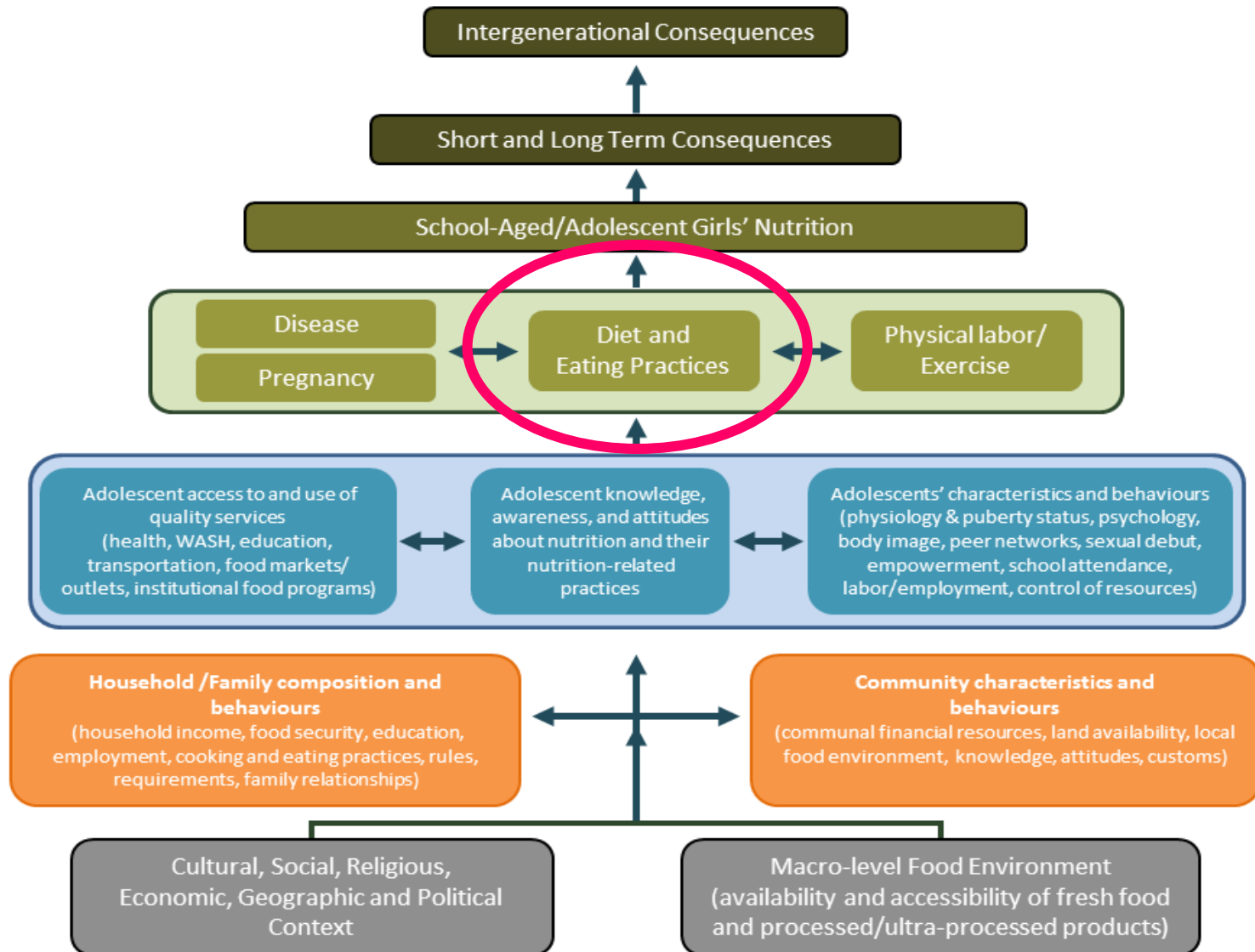
Objectives

1. To synthesize and critically appraise current literature on dietary intake (e.g. types of foods consumed), eating practices (e.g. time, place, frequency of consumption) and meal patterns (e.g. snacking, skipping meals) of adolescent* girls in LMICs.

1. Summarize available information to develop a call to action, and key recommendations for policies, programming, advocacy or further action

*adolescent = 10-19.9 years

Conceptual framework



Conceptual framework

- Limitations in addressing all components of the conceptual framework E.g. determinants of food choice were typically not captured in our included studies (reported 24-h recall or FFQ results most often)
- However, to understand some of the more distal determinants of diet and
- eating practices, we examined macronutrient intake as it relates to
- country context through **income level** (specified by the World Bank, 2017), **gender inequality** (UNDP's Gender Inequality Index), and **urban**
- **rural residence.**

*There is a second review underway that triangulates the food environment, dietary intakes, and health outcomes in LMICs.

Outcomes of interest

- **Primary Outcomes**
 - Types of foods consumed
 - Frequency of consumption
 - Macronutrient intake
 - Energy intake
 - Place of consumption
 - Meal Patterns
- **Secondary Outcomes**
 - BMI status

Adapted PICO

Population	Adolescent girls (10-19 years) in LMIC
Intervention	Current dietary intake and eating practices/patterns
Comparison	Author-defined
Outcomes	Primary outcomes: types of food consumed (food groups), food composition (macronutrients), place consumed, frequency of consumption, meal patterns Secondary outcomes: BMI

Search strategy

Databases used

- 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)

Date of last search: April 27, 2017



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Inclusion/exclusion criteria

Inclusion	Exclusion
Low or middle income country setting	High income setting
Must include, but is not restricted to, an adolescent population	Population includes boys only; or the study does not disaggregate outcome data by sex
Reports on one of the following: <ul style="list-style-type: none"> ·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 	Unhealthy study population (e.g. populations with chronic or genetic diseases such as HIV, TB, or metabolic disorders)
Relevant study types/designs: <ul style="list-style-type: none"> ·Observational studies (e.g. cross-sectional, cohort, case-control) ·Randomized controlled trials (RCTs) with a control arm or baseline nutritional data ·Surveys ·Program evaluations ·Qualitative research studies ·Descriptive program/government documents 	Experimental study designs (e.g. RCTs) that do not have a “standard of care” or “usual practices” arm
Data collection in 2007 or later	Data collection prior to 2007
English language	Non-English language

Data synthesis & analysis

- Quantitative analyses: means or proportions (%) most commonly reported; study data was pooled to produce summary estimates per outcome
- All quantitative analyses were weighted by sample size to account for variation in study size
- Subgroup analyses were conducted for:
 - Discrete age bands: 10-14 and 15-19
 - Region: according to World Bank 2017 classifications



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BMI

We determined **mean BMI** and **BMI status** (% underweight, overweight, obese) by age and region

BMI Status

- Where applicable, BMI data were converted and categorized according to WHO cut-off points (from IOTF, CDC, or other) into: **severe thinness, thinness, normal weight, overweight, and obese**

BMI cut-off values

WHO BMI-for-age z-scores (girls 5-19 years):

- Severely underweight: < -3 SD; underweight: < -2 SD; normal weight; overweight $> +1$ SD (equivalent to BMI 25 kg/m² at 19 years); obese: $> +2$ SD, equivalent to BMI 30 kg/m² at 19 years

IOTF BMI-for-age cut-offs (girls 2-18 years):

- Underweight: < 16 kg/m²; normal weight; overweight: > 25 kg/m²; obese: > 30 kg/m²

CDC BMI-for-age percentiles (girls 2-20 years):

- Underweight: $< 5^{\text{th}}$ percentile, normal weight: 5^{th} - 85^{th} percentile, overweight: 85^{th} - 95^{th} percentile, and obese: $> 95^{\text{th}}$ percentile

Energy and macronutrient intake

Energy

- All energy data was reported as kcal/day and presented as weighted means

Macronutrient intakes

- Macronutrient intake was reported for protein, carbohydrate, and fat in grams/day and presented as weighted means

Adequate macronutrient intake

- Macronutrient intake was classified as adequate/inadequate based on IOM guidelines (age and sex-specific):

- RDA for carbohydrates (girls aged 9-19 years): 130 g/d
- RDA for protein (girls 9-13 years): 34 g/day
- RDA for protein (girls 14-19): 46 g/day
- Currently, there is no RDA, AI, or EAR utilized for fat intake.

However, the Acceptable Macronutrient Distribution Range (AMDR) for adolescents 10-18 years is 25-35% and aged 19 years is 20-35% of total energy coming from fat

Dietary intake

There are several classification systems currently used for measuring and defining adequate dietary diversity and nutrient intake for women.

For example:

- WHO's guide for dietary diversity that defines the basic food groups (grains, roots, tubers, and plantains, legumes and nuts, dairy products, flesh foods, eggs, fruits, vegetables, and fats and oils)
- FANTA's minimum dietary diversity for women
- The Food Monitoring Group's food categorization system
- NOVA food classification that categorizes foods based on the extent of their processing (unprocessed or minimally processed, processed culinary ingredients, processed foods, and ultra-processed foods and drink products)

We have adapted FANTA's classification system, which includes the basic food groups found in the WHO guide along with additional important categories that capture foods relating to the nutrition transition.

Dietary intake

Food items were categorized based on an adapted version of [FANTA's](#) minimum dietary diversity guide for WRA:

FANTA categories	Adaptations
1. Grains, white roots, tubers, and plantains	Snack foods was subdivided (Friel et al.) into: 11a. Sweet snacks (including confectionary) 11b. Savoury/salty and fried snack foods
2. Pulses (beans, peas, lentils)	14. Fast and convenience foods category added (Dunford et al.)
3. Nuts & seeds	
4. Dairy	
5. Meat, poultry, and fish	
6. Eggs	
7. Fruits	
8. Vegetables	
9. Condiments & seasonings	
10. Oils & fats (optional category)	
11. Snack foods (optional category)	
12. Sugar-sweetened beverages (optional category)	
13. Alcohol (part of 'other beverages' category)	

Dietary intake

Fast and convenient foods

- Considered a meal (makes them distinct from snack foods)
- Typically low in quality and nutritional value
- Prepared quickly & easily; typically frozen or pre-prepared
- Often available as take-out options in restaurants or bars
- E.g. pizza (frozen or fresh), fried chicken, hamburger, pre-prepared sandwiches

Dietary intake reporting

Consumption data was analyzed and presented in two categories: **mean general consumption** (for all studies) and **frequency of consumption** (for the subset of studies that reported frequency data)

- E.g. one study may have reported that 46% of adolescent girls consumed fast food. Another study may have reported that 70% of adolescent girls consumed fast food within the last 7 days and, of this 70%, 6% consumed it daily, 24% consumed it 2 to 3 times per week, and 65% 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
- 2-3 times per week
- 4-6 times per week
- weekly
- monthly

Adequate fruit/vegetable consumption

- We also determined whether consumption could be considered adequate for fruits and vegetables
- Based on WHO recommendations of >400 grams of fruits and vegetables daily (based on 5 servings per day of 80 grams each); which is equivalent to 2 servings of fruit and 3 servings of vegetables per day
- 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)

Meal patterns

- Place of consumption (% eating outside the home)
- Proportion (%) of girls consuming <3 meals per day
- Breakfast skipping (%)
- Snacking (%)
- Vegetarianism (%)

Underlying determinants of health/nutrition

We looked at macronutrient intake disaggregated by:

1. Country-level income status (World Bank, 2017)
2. Urban/rural residence
3. Country-level gender inequality, based on the UNDP Gender Inequality Index (GII); higher GII values = greater disparities

GII combines 3 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
- 3) Economic status: measured by the labour market participation rates between males and females aged 15 years or older

Quality assessment

- Individual studies were critically appraised according to a set of criteria based on study type, using the Cochrane guidelines
- For RCTs, 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 also assessed the risk of bias due to confounding, attrition, and reverse causality

Quality assessment

- For methodological rigor of studies, we considered whether the study population had been clearly defined (e.g. age range of population provided), the representativeness 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 self-reported)

Study quality was used to perform a sensitivity analysis, whereby all low quality studies were removed and dietary intake data (for grains, dairy products, flesh foods, fruits and vegetables) was re-

analyzed.



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THANK YOU!

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