



Adolescent nutrition mapping study

**A global stakeholder survey of policies,
research, interventions and data gaps**



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Students at Gurumu Koysha primary and secondary school gather to learn about the nutritional values that various types of foods can provide for their health.

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Abbreviations

| | |
|----------------|--|
| ARISING | Anaemia Reduction for In-school and non-School Girls |
| BMI | Body mass index |
| ENN | Emergency Nutrition Network |
| GAIN | Global Alliance for Improved Nutrition |
| GIFTS | Girls' Iron-Folate Tablet Supplementation |
| IFA | Iron folic acid |
| LMICs | Low- and middle-income countries |
| MIS | Management information system |
| NGOs | Non-governmental organisations |
| PCAAAN | Participation in Learning and Action for Nutrition |
| PD | Positive deviance |
| SDGs | Sustainable Development Goals |
| UN | United Nations |
| UNFPA | United Nations Population Fund |
| UNICEF | United Nations Children's Fund |
| USAID | United States Agency for International Development |
| WASH | Water, sanitation and hygiene |
| WFP | World Food Programme |
| WHA | World Health Assembly |
| WHO | World Health Organization |
| WIFS | Weekly iron folic acid supplementation |
| WRA | Women of reproductive age |



Executive summary

Nutrition in school-aged children and adolescents can significantly impact lifelong health and wellbeing as well as national economic growth and the health and development of future generations. There is currently a lack of information and/or consensus on the burden and long-term effects of malnutrition in adolescents, the metrics and indicators needed to define and prioritise nutritional deficits, adequacy and improvements and successful interventions to tackle adolescent malnutrition.

To map ongoing activities and experiences, we undertook a survey of stakeholders. The survey had three main sections, 1) research and data, 2) policies, strategies and guidelines on adolescent nutrition and 3) interventions and programmes targeting adolescents. Nutrition outcomes of interest were categorised as micronutrient status, undernutrition (including wasting, thinness and stunting), overweight and obesity and dietary behaviours or practices. The analysis included 133 responses with representation from across 42 countries covering seven United Nations International Children's Fund (UNICEF) global regions. Most respondents reported that their work focuses on low- and middle-income countries (LMICs) across Africa and Asia.

The results identified that research on adolescent nutrition has mainly focused on burden while indicators and consequences of malnutrition have received less attention. Micronutrient deficiencies, diets and undernutrition have been the focus of most studies with adolescent overweight and obesity receiving less attention. Policies targeting adolescents are available at international, regional and national levels and come from a range of sectors. Most adolescent nutrition programmes and interventions are provided through health, nutrition and education sectors with support from United Nations (UN) agencies and non-governmental organisations (NGOs). Many of the successful and large-scale adolescent nutrition programmes described by the respondents focus on micronutrient deficiencies, especially anaemia reduction through weekly iron and folate distributions. Other large-scale programmes include social media campaigns and school-based peer education programmes to influence diet choices.

The survey identified that a wide variety of definitions are being used for the adolescent period and, in some contexts, no definition is available at all. This lack of agreement creates difficulties in providing representative and comparable data on adolescents across the world. Data that does exist often cannot be compared because of differences between the age groups studied or how age groups are disaggregated. Differences between the reference populations used to define malnutrition further limit comparability. Thus, it would be helpful for organisations and national governments to adopt a universal definition of adolescence.

The lack of an agreed upon definition for adolescence may be acting as an important barrier to establishing national and international adolescent nutrition targets. In addition, there are a number of other important data and policy gaps for adolescent nutrition that need to be addressed including standardised anthropometric

definitions of malnutrition in adolescents and school-age children, particularly those feasible for use in emergency contexts, data on current and optimal diets, the inclusion and/or disaggregation of adolescent data within national surveys, data on sub-groups within adolescence (e.g., males, refugees, out-of-school adolescents), evidence on effective interventions to reach adolescents, adolescent voices within research, adolescent-specific targets, nationally and internationally, the inclusion of adolescents within national health and nutrition policies and designated research funding for this age group.

Lastly, our results suggest that, among this group of stakeholders (largely working in LMICs in Africa and Asia), overweight and obesity research, policies and programming efforts are the least represented areas of adolescent malnutrition. This is a worrying omission considering the rising tide of overnutrition and obesity across all age groups and the lifelong adverse consequences that can result.

Recommendations

- It would be helpful if a universal definition of adolescence could be adopted as this would facilitate the setting of global targets and allow comparison across research and programmes. To date, the most commonly used definition is 10-19 years.
- In order to focus efforts to tackle adolescent malnutrition, adolescent-specific nutrition targets are needed, nationally and internationally. These should go beyond anaemia in women of reproductive age.
- To guide programming, routine national surveys, such as demographic and health surveys and multiple indicator cluster surveys, should be age-disaggregated to represent the adolescent population.
- In order to improve adolescent nutrition, health and wellbeing, more research and agreement is required on:
 - Effective interventions, particularly for dietary patterns and overweight/obesity
 - The nutritional needs of subgroups including male adolescents, those out-of-school and adolescents in humanitarian contexts
 - The most useful indicators to identify and classify malnutrition
 - How best to reach adolescents, for example utilising new opportunities via social media platforms
- Greater attention to, and funding from, donor agencies is required to address the research and programmatic gaps identified in this review and to ultimately improve adolescent outcomes.



Introduction

Considerable evidence exists of the importance of nutrition in the first 1,000 days of a child's life. However, to date, less focus has been placed upon understanding or improving the nutritional status of children over five years of age or adolescents. Nutrition in adolescence can considerably impact lifelong health and wellbeing as well as national economic growth and the health and development of future generations. Adolescence is a period of rapid physical, emotional and behavioural growth that influences adult outcomes and, particularly in girls, the health of future offspring. Adolescents and school-age children, defined in this report as individuals between five and 19 years, encompasses a diverse group with varying nutritional needs according to age, gender, social standing and place of residence (urban/rural). Understanding the nutritional problems within this group and designing tailored interventions and approaches to measure progress are urgently needed if we are to meet Sustainable Development Goal 2 which encompasses ending all forms of malnutrition including addressing the nutritional needs of adolescent girls.

The Lancet Commission on adolescent health and wellbeing highlighted a number of gaps in our understanding of how to improve adolescent health and nutrition. These included a lack of disaggregated data by age groups and gender, a lack of outcome data from low- and middle- income countries (LMICs), the need for more adolescent-friendly, participatory, multi-sector, multi-component and multi-level interventions and identifying key research priorities (catch-up growth, critical age groups and platforms for intervention) (Patton

et al., 2016). It is also unclear what influences and motivates adolescents to change behaviour therefore a better understanding of adolescents' own needs and desires will help inform policies. Participatory approaches have shown promise with positive examples from the education sector. In health, peer education is the most evaluated strategy for increasing youth engagement while youth-led participatory action research is an increasingly popular approach to engaging adolescents in the design and implementation of interventions. However, cultural, generational, bureaucratic and financial barriers may limit the sustainability of meaningful youth engagement, particularly for adolescent girls. As adolescence is a period of openness to new ideas and adolescents are often the first to adopt new technologies, the use of digital technology and social media provides important potential opportunities for youth engagement (Patton et al., 2016). In general, there is a lack of information and/or consensus on the burden and long-term effects of malnutrition in adolescents, the metrics and indicators needed to define and prioritise nutritional deficits, adequacy and improvements and what successful interventions that can tackle the variety of malnutrition outcomes look like including micronutrient deficiencies, undernutrition and overweight and obesity.

In order to map global adolescent nutrition research, policies, interventions, data gaps and experiences, we undertook a survey of stakeholders with the aim of highlighting positive examples and to call for action in filling any identified gaps.

Methods

Survey design, questionnaire development and target participants

This study utilised an open online survey administered via SurveyMonkey to map recent and ongoing policies, research, interventions and data gaps on global adolescent nutrition. The survey was developed by the study team with input from members of the Adolescent Nutrition Interest Group coordinated by ENN. The interest group, started in late 2017, currently has 75 members comprising of experts from the United Nations (UN), donor and non-governmental organisations (NGOs) and researchers/academics (Bush & Mates, 2017). The survey design was further refined through feedback following piloting from four external reviewers not involved in the study. The survey targeted stakeholders within NGOs, academic institutions, UN organisations, donor agencies, government departments and ministries as well as independent experts/consultants working in adolescent nutrition or in fields relating to adolescent health or health in general globally. The survey was distributed via ENN's network mailing list, website and social media accounts and through contacts within the Adolescent Nutrition Interest Group, United Nations Children's Fund (UNICEF) and the World Food Programme (WFP) head offices and field offices.

The survey had three main sections on adolescent nutrition, 1) research and data on the burden of malnutrition (magnitude of the problem), consequences (the effects of, including long-term) and indicators

(including metrics and cut-off points), 2) policies, strategies and guidelines and 3) interventions and programmes targeting adolescents. Nutrition outcomes of interest were categorised as micronutrient status, undernutrition (including wasting, thinness, and stunting), overweight and obesity and dietary behaviours or practices. There was a mixture of quantitative and qualitative questions in each section to allow for in-depth responses. Participants were also asked to upload relevant documents and web addresses. While the survey is not a systematic literature review, our results summarise relevant published and grey literature provided by the respondents as well as unpublished reports or planned programmes which can often be missed by conventional literature review approaches. The respondents had the option of providing contact details for follow-up using key informant interviews to further build on the results of the survey.

Data analysis and presentation

Basic statistics (proportions and averages) were used to describe quantitative data. Qualitative data was thematically analysed to identify emerging concepts and a selection of direct quotations have been provided to illustrate findings. Data was extracted from all the documents indicated by the respondents and a narrative summary has also been outlined. Lastly, details provided by the respondents were used to summarise programmes that have successfully impacted adolescent nutrition at scale.¹

¹ We defined "successful" as interventions that had demonstrable impact on target nutrition indicators and "large-scale" as reaching over 300 participants or more than one district or similar administrative area in a country.



Adolescents of the “Alo Chaya Adolescent Club” engaged in various activities. The photo was taken at Chopdar Para, Bangladesh

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Results and Discussion

Survey respondents

The survey received a total of 150 responses with an over 50% completion rate. Data for 17 respondents, who only filled in demographic information but did not progress with the rest of the survey, was removed from the analysis. The analysis is therefore based on 133 responses.

The survey was answered by respondents working across 42 countries (**Annex 1**) covering each of the seven UNICEF global regions² (**Figure 1**) with a range of 1-13 respondents within each represented country. Most respondents (of the total 133) worked in NGOs (44%), academic institutions (17%), UN organisations (14%) and governmental departments (10.5%). Donor organisations made up 0.8% of respondents and 19% responded as “other”, self-identifying as independent experts or philanthropists (**Annex 2**). The respondents also reported working in a wide range of sectors (nutrition (90%), health (51%), social protection (17%), education (16%) and other sectors (19%) such as gender, agriculture, food systems, human rights and WASH)³ (**Figure 2**).

Research and data

There were three sections requesting data on adolescent nutrition, *burden* of malnutrition, *consequences* of malnutrition and *indicators* of malnutrition. The respondents reported that burden is the most researched area (29% of 133 responses) followed by indicators (15% of 123 responses) and then consequences (12% of 129 responses) (**Table 1**).

Research on malnutrition burden was reported across each of the nutritional areas (micronutrient status, undernutrition, overweight and obesity and dietary behaviours) with more research reported on undernutrition and micronutrient status than on diets and overweight and obesity. As most respondents report working in low- and middle-income countries (LMICs), this is perhaps not surprising. However, given the rising prevalence of overweight globally (Ng *et al.*, 2014), it is important to ensure that future adolescent research prioritises overweight in LMICs, especially in Asia (Sawyer *et al.*, 2012).

For the consequences of malnutrition, research was reported to focus predominantly on undernutrition and diet rather than micronutrient status and overweight. This may again reflect the lower priority of overweight interventions in some LMIC contexts and/or the greater complexity and cost of including measures of micronutrient status in large surveys. It may also be that the consequences of micronutrient deficiencies and overweight in other age groups, such as with children and adults, are already relatively well understood (Bhutta *et al.*, 2013; Black *et al.*, 2010; Black *et al.*, 2013). Nevertheless, the unique impact of malnutrition during this period of rapid growth warrants specific research for this age group (Salam *et al.*, 2016), particularly due to the potential effect on the next generation and in

² To align with the series of systematic literature reviews that ENN is currently conducting, UNICEF global regions were used to group countries for this mapping exercise.

³ Multiple responses apply.

Figure 1 Geographical regions where respondents work categorised by UNICEF region

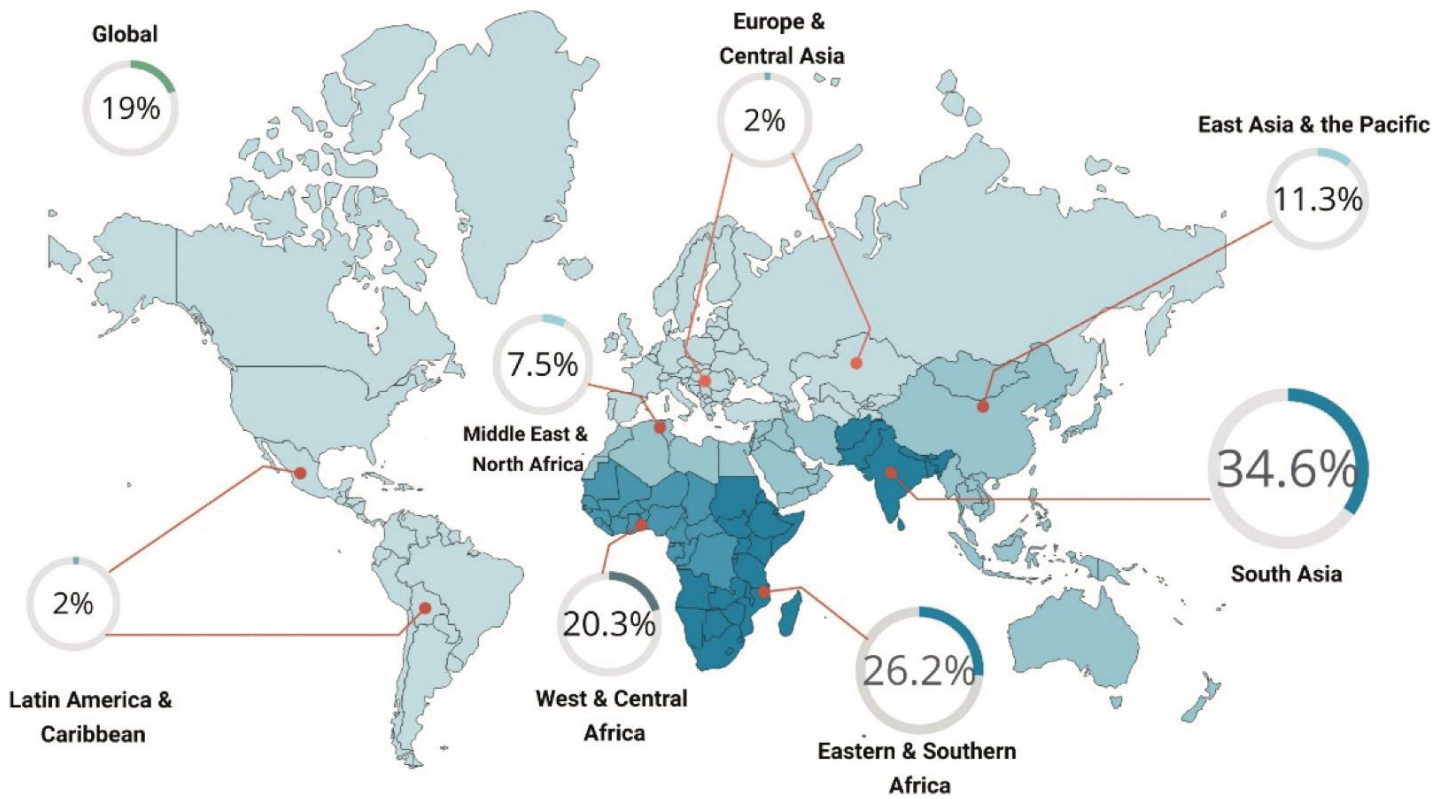
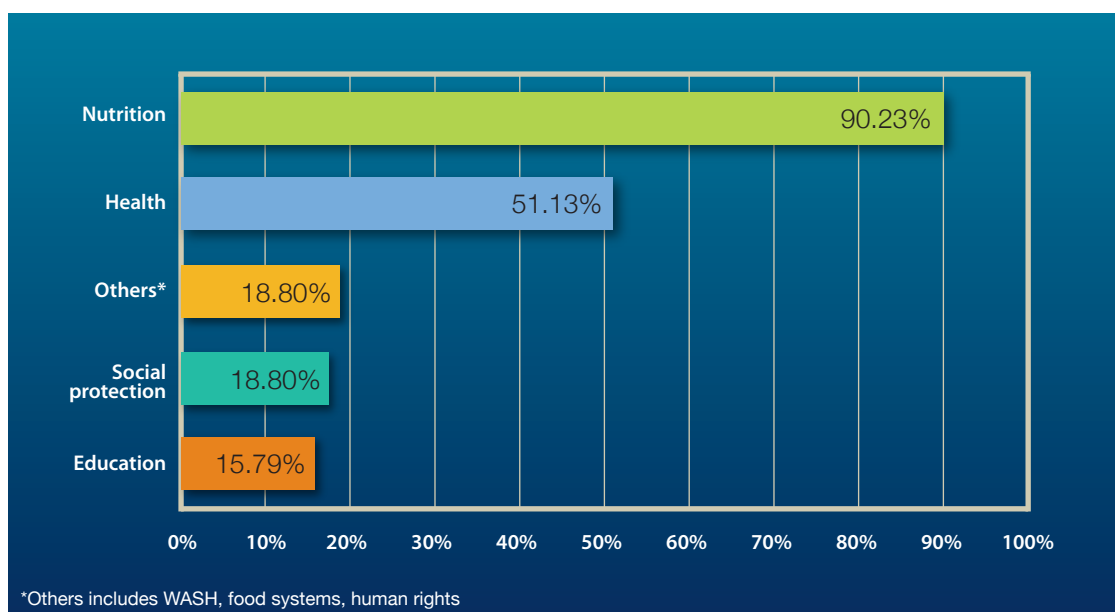


Figure 2 Areas of work of respondents (multiple responses possible)



settings where adolescent pregnancies are common (Darnton-Hill & Mkparu, 2015; Prentice *et al.*, 2013). There was also less focus on research into indicators of overweight in adolescents compared to the other nutrition indicators. A few respondents (n=3) reported conducting recent or ongoing research into indicators of adolescent diet. One study is seeking to map adolescent nutrition indicators within the conceptual framework of malnutrition, another is a review of data collection initiatives with the aim to develop robust metrics for the nutrition of school-age children and adolescents and the last is focused on generating evidence on adolescents' demand for better quality food during their snacking time and use of pocket money. This is interesting considering the current scarcity of standardised indicators for dietary intakes and patterns as highlighted by our survey (Cade, 2017; Moreno *et al.*, 2005). In general, overweight and obesity in adolescents had the lowest reported research focus for burden, consequences and indicators, making it a key area for further research considerations, especially in the African and Asian contexts (Güngör, 2014; Ng *et al.*, 2014).

As part of the survey, the respondents were asked to highlight relevant published research. After removing duplicates, we collated 15 studies following the survey (Beal *et al.*, 2018; Benedict *et al.*, 2018; Caulfield & Elliot, 2015; Government of Pakistan & UNICEF, 2019;

Keats *et al.*, 2018; Kerac *et al.*, 2017; Pramesthi *et al.*, 2019; Tarannum, 2019; Wrottesley, Pedro, *et al.*, 2019) which are summarised in **Annex 3**. This is neither a systematic nor comprehensive reflection of the current literature but does highlight the studies of importance to stakeholders. Eight of these studies described either the burden of malnutrition in adolescents, specifically stunting, thinness and micronutrient deficiencies (iron, vitamin A, zinc, folic acid), overweight and obesity or the dietary intakes and patterns and physical activity behaviours of adolescents using mainly cross-sectional data and reviews. Five studies described factors associated with indicators of adolescent nutrition including the challenges of classifying adolescent nutritional status using anthropometry especially in emergency contexts, the need for better methods for determining pubertal landmarks in order to accurately compare to reference data and the need to use references based on data from different settings rather than those built on data from the United States (Woodruff & Duffield, 2002; Woodruff & Duffield, 2000).

While recognising the challenges of anthropometry, one systematic review suggests the use of weight-for-height to classify pre-pubertal adolescents and body mass index (BMI) for post-pubertal adolescents and highlights the important of accurate age assessment for classifying malnutrition within adolescence (Woodruff & Duffield,

Table 1 Summary of evidence on burden, consequences and indicators of adolescent nutrition

| Response | Evidence of burden of malnutrition n (%) | Evidence of the current consequences of adolescent malnutrition n (%) | Evidenc of indicators of assessing adolescent nutrition n (%) |
|---------------------------|--|---|---|
| Response provided? | | | |
| Yes | 39 (29.3) | 16 (12.4) | 19 (15.4) |
| No | 94 (70.7) | 113 (87.6) | 104 (84.6) |
| Total | 133 | 129 | 123 |
| Response by sector | | | |
| Academic institution | 10 (25.6) | 5 (35.7) | 3 (17.6) |
| NGO | 18 (46.2) | 7 (50.0) | 9 (52.9) |
| Government | 5 (12.8) | 1 (7.1) | 2 (11.8) |
| UN | 4 (10.3) | 1 (7.1) | 2 (11.8) |
| Donor | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Other | 2 (5.1) | 0 (0.0) | 1 (5.9) |
| Total | 39 | 14 | 17 |
| Response by topic | | | |
| Micronutrient status | 26 (66.7) | 4 (28.6) | 9 (52.9) |
| Diet | 22 (56.4) | 10 (71.4) | 11 (64.7) |
| Undernutrition | 30 (76.9) | 10 (71.4) | 10 (58.8) |
| Overweight/obesity | 18 (46.2) | 6 (42.9) | 6 (35.3) |
| Total ^a | 39 | 14 | 17 |

* Multiple responses apply

^a Total respondents answering

2002). There is also the challenge of discerning when to change between adolescent and adult indicators of malnutrition. Most of the commonly used references for BMI are up to 19 years, either 19.0 years (228 months World Health Organization (WHO) reference) or 18 years and 11 months (227 months International Obesity Task Force (IOTF) reference) and yet both recommend that adult BMI cut-offs are applicable to “adults over 20 years” leaving a gap for 19 year olds. Other studies focused on adolescent dietary choices and their driving factors (including gendered social norms, lack of autonomy from parents, poor economic status and environmental factors (violence, poor hygiene)) using focus group discussions and adolescent-led approaches to elicit adolescent perspectives (Jesson *et al.*, 2020; WFP, 2018; Wrottesley, Bosire, *et al.*, 2019). One study described the consequences of adolescent malnutrition, reporting a weak relationship between vitamin A deficiency and night blindness in refugee adolescents in Kenya and Nepal (Woodruff *et al.*, 2006).

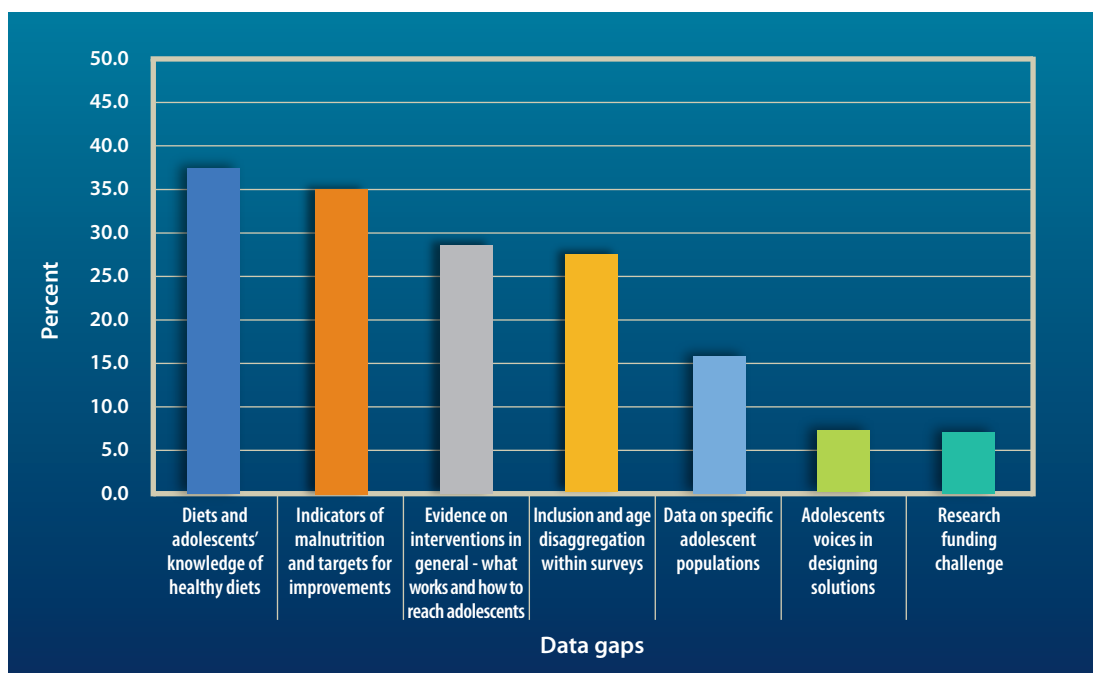
Current data gaps in adolescent nutrition data

Respondents identified several areas of adolescent nutrition with important data gaps using free text responses, see **Figure 3** below.

We used qualitative analysis methods to identify common themes across the respondents (**Box 1**). Many

highlighted the area of adolescent diets as lacking in research, noting that little is known about optimal diets during this key period of growth and development. In addition, we lack information of what adolescent diets currently consist of and adolescents’ perceptions of what is healthy. The lack of standardised, simple indicators of malnutrition in adolescents was also mentioned by some respondents along with targets for improving these indicators. Many noted insufficient data on the burden of malnutrition; not only is this age group not routinely included in national surveys but there is also no disaggregation of adolescent data from that of adults or pregnant and lactating women. Within the adolescent group there is also a paucity of data representing adolescent sub-groups including males, those out-of-school, refugees and adolescents in humanitarian contexts. Evidence of successful interventions to address malnutrition in adolescents was also highlighted as lacking. In particular, methods of reaching adolescents, for example via social media, was emphasised as an important area of exploration to increase access to adolescents. Of note, the lack of adolescent voices in designing interventions was mentioned along with the need for adolescent-led approaches to ensure that interventions are adequately tailored to their needs. Finally, funding challenges associated with adolescent nutrition research, especially for longer-term studies, were highlighted.

Figure 3 Areas of work of respondents (multiple responses possible)



Policies, strategies and guidelines

This section explores existing adolescent nutrition policies, strategies and guidelines as well as key gaps within this area. The definition of adolescents' age range within these policies was also examined.

Defining the adolescent period

The respondents reported using a range of ages to

define adolescence. Of 110 respondents in this section, the majority (77%) used a defined age range for adolescence as part of their work but almost 20% had no working definition. Most (61%) were guided by the WHO definition of 10-19 years (WHO, 2014b, 2015) but some used their own organisational definition (37%) or the national government definition (26%) (Figure 4). Adolescence was largely considered in two stages for

Box 1

Exemplar qualitative responses on current data gaps within the area of adolescent nutrition research

Exemplar quotations are presented to illustrate emerging themes (bold) from the analysis of evidence gaps in adolescent nutrition research:

Diets and adolescents' knowledge of healthy diets

"Clearer articulation of the role of specific macro and micronutrients in better physical and mental development during teenage years. There seems to be better information for under-2s."

"What adolescents perceive as a healthy diet"

"Dietary diversity – most nutritional data seems to be anthropometric indicators (height, weight, BMI, z scores, mid upper arm circumference) with less data on frequency of meals and contents of meals, as well as potential underlying health issues that either contribute to malnutrition or are the result of malnutrition."

"We need to better understand the underlying determinants and influencers of dietary intake and food choices of adolescents."

Indicators of malnutrition and targets for improvement

"The classification of malnutrition in this age group is a complex mess."

"A comprehensive set of indicators is missing, maybe due to no explicit mention of adolescent nutrition in the SDG indicators."

Evidence on interventions in general – what works and how to reach adolescents

"Evidence on what interventions work/don't work for addressing a whole host of adolescent nutrition-related outcomes/impacts. Evidence for programs of how best to reach adolescent cohorts and how this varies by sub-population groups"

"When focusing on adolescents in LMICs, some key gaps include adolescent nutrition behaviour, self-skills and social media."

Inclusion and age disaggregation within survey data

"Adolescents' data is not segregated by age and sex at community or health facility level hence adolescent health and nutrition issues are diluted with general population data..."

"In Indonesia, there are no nutrition indicators set as part of the national strategy."

"Girls who are pregnant or lactating are often grouped with older women though their nutrition requirements, education needs, support, etc. are very different."

"...There is no data for adolescent boys and girls above the age of 15 years; they are included within the group of 15-49 years of female..."

"Disaggregate national data under each SDG target by age, sex and other categories, bearing in mind the intersecting nature of inequality so that progress for all girls is adequately captured."

Recognise girls and young women as a distinct demographic group with unique nutritional needs..."

"...Data on micronutrient deficiencies are hard to come by and we are not even certain about the prevalence of iron deficiency anaemia in many places."

Data on specific adolescent sub-groups: out-of-school, males, refugees and humanitarian contexts

"Less data on out-of-school adolescents and their dietary practices and patterns at home or in the workplace than on in-school adolescents"

"Less data on nutrition issues of male adolescents, lack of data on adolescent nutrition behaviours ..."

"Information on adolescent boys (micronutrient deficiencies). Need data on dietary practices for both boys and girls"

"Nutritional status of adolescents in school and out-of-school is lacking."

"We are hosting the largest refugee population on the planet. These adolescents are not included in our data either which makes it difficult to quantify the number of malnourished adolescents."

"High quality studies with the power to capture various differences between male and female adolescents, rural and urban adolescents, in- and out-of-school adolescents, pregnant and non-pregnant adolescents. And additional studies are needed to explore nutritional status and practices of displaced adolescents and those in conflict zones."

Adolescent voices in designing solutions

"The added value of empowering adolescents and involving them as nutrition activists. This was a finding of an ENN workshop in 2017."

"Adolescent centred approach/adolescent led..."

"Rigorous qualitative data exploring all factors that influence adolescent nutrition"

Research funding challenges especially for long-term prospective studies

"Research ideally needs to be over the longer-term which is challenging for funding / logistics but funders do need to be aware of the need for this longer-term perspective."

"Lack of funding for research on adolescents"

policy purposes, 'early' adolescence was defined as 10-14 years (others used 10-12 years and 9-14 years) and 'late' adolescence was defined as 15-19 years (others used 15-17 years and 15-18 years).

Some researchers have argued for a wider age range for adolescence (10-24 years) which is more representative of the rapid growth and nutrient requirements during this period and could facilitate investments into a broader range of settings (Sawyer *et al.*, 2018). A common definition of the age range of adolescence would be useful in tracking progress, advocacy and comparability of results across different settings and periods.

Existing policies and guidelines targeting adolescents

The respondents reported utilising policies targeting adolescents at international (51.4% of 105 responses), regional (23.3% of 90 respondents) and national levels (46.5% of 86 respondents). International policies were mainly from UN organisations such as WHO and UNICEF while some had been developed by international non-governmental organisations (INGOs). There were UN policies targeting adolescents at regional level as well as those developed by national governments and NGOs. National policies were, as expected, commonly defined by country governments (Table 2). Consistent with our findings on research data, policies targeting adolescents (international, regional and national) reportedly focus mainly on micronutrient status (>84% of reported policies), diet (>74%) and undernutrition (>75%) with fewer focusing on overweight and obesity in adolescents (>37%). There were very few policies reported at national level to be focussing on adolescent overweight and obesity (Table 3). The majority of policies mentioned were reported to be publicly available – 80% of international policies, 63% of regional policies and 65% of national level policies. The sharing of adolescent policies enables discussion and consensus building on action plans.

A number of policy gaps were highlighted by the respondents including the lack of adolescent-specific targets in the World Health Assembly (WHA) 2025 nutrition targets (WHO, 2014a)⁴, the Sustainable Development Goals (SDGs) and at national level. Also highlighted was the widespread exclusion of adolescents from many health and nutrition guidelines (both national and international).

Interventions and programmes

The final section of the survey focused on interventions and programmes targeting adolescent nutrition. The

An adolescent club member in her Grocery Store, Duaripara, Mirpur, Bangladesh

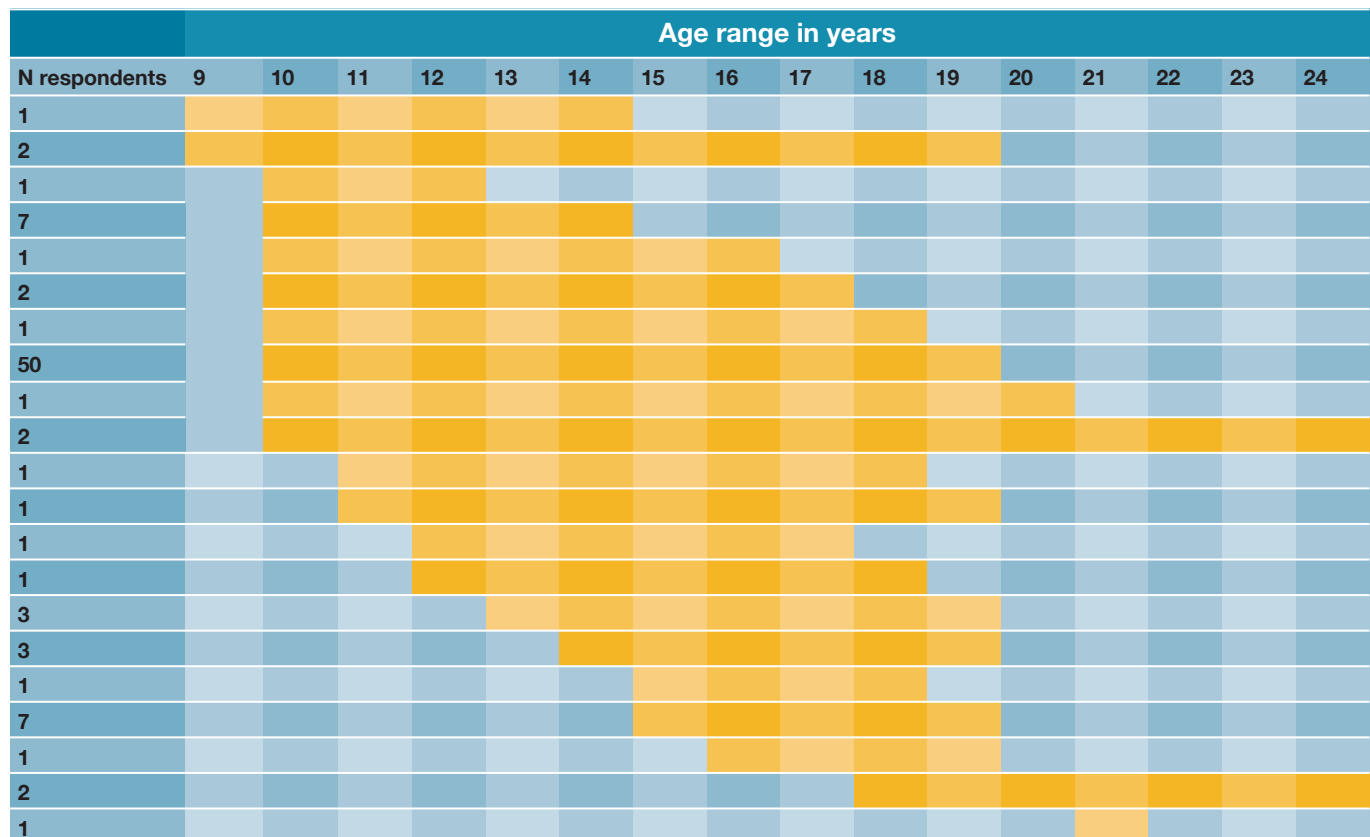


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results show that three major sectors are involved in the implementation of adolescent nutrition programmes in their settings, health (80% of 76 responses), nutrition (75% of 76 responses) and education (74% of 76 responses). Social protection (33% of 76 responses) was also highlighted as being involved in adolescent nutrition programming as well as "other sectors" (22% of 76 responses) including water, sanitation and hygiene (WASH) and government departments (gender and children, religious affairs and child protection).

Respondents from various backgrounds – NGOs, national governments and UN agencies – reported implementing successful or medium/large-scale adolescent nutrition programmes. We defined "successful" as interventions that had demonstrable impact on target nutrition indicators and "large-scale" as reaching over 300 participants or more than one district or similar administrative area in a country. Reported "successful" programmes had multiple impacts and mainly focused on adolescent diets (58% of 26 responses), micronutrient status (54% of 26 responses) and undernutrition (35% of 26 responses) but only a small

⁴ The WHA target for anaemia is "a 50% reduction of anaemia in women of reproductive age"

Figure 4 | Reported age ranges used to define adolescence

Table 2 | Policies, strategies and guidelines targeting adolescent nutrition at international, regional and national level

| Response | Existing policies targeting adolescent nutrition at international level n (%) | Existing policies targeting adolescent nutrition at regional level n (%) | Existing policies targeting adolescent nutrition at national level n (%) |
|--------------------------------|---|--|--|
| Response provided? | | | |
| Yes | 54 (51.4) | 21 (23.3) | 40 (46.5) |
| No | 51 (48.6) | 69 (76.7) | 46 (53.5) |
| Total | 105 | 90 | 86 |
| Conducting organisation | | | |
| Academic institution | 0 (0.0) | 0 (0.0) | 1 (3.7) |
| NGO | 5 (13.5) | 4 (28.6) | 2 (7.4) |
| Government | 4 (10.8) | 3 (21.4) | 18 (66.7) |
| UN | 25 (67.6) | 6 (42.9) | 5 (18.5) |
| Donor | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Other | 3 (8.1) | 1 (7.1) | 1 (3.7) |
| Total | 37 | 14 | 27 |
| Focus of the study* | | | |
| Micronutrient status | 36 (83.7) | 17 (89.5) | 31 (86.1) |
| Diet | 35 (81.4) | 14 (73.7) | 29 (80.6) |
| Undernutrition | 37 (86.1) | 14 (73.7) | 30 (83.3) |
| Overweight/obesity | 28 (65.1) | 7 (36.8) | 18 (50.0) |
| Total ^a | 43 | 19 | 36 |

* Multiple responses apply

^a Total respondents answering

proportion of these included components that impacted overweight and obesity in adolescents (15% of 26 responses). Medium/large-scale reported programmes mainly focused on improving micronutrient status (64% of 25 responses) and adolescent diets (56% of 25 responses) (**Table 3**). A large number of these programmes or intervention studies have not been publicly described (>65%).

Eight intervention studies were described in detail by the survey respondents. A key feature of these interventions is the use of a “mix” of nutrition-specific (e.g., iron and folic acid supplements) and nutrition-sensitive approaches (e.g., WASH, nutrition education, deworming, malaria control). Most of the programmes were UN/NGO government supported interventions targeting micronutrient status, particularly those aiming to reduce the prevalence of anaemia using iron and folic acid supplementation. The interventions were delivered through existing channels including schools and community health services (Gyawali *et al.*, 2019; Maroof *et al.*, 2019; Roche *et al.*, 2018; UNICEF, 2018, 2019). Box 2 provides details of a UNICEF supported national programme in India which has been striving to eliminate anaemia for over 15 years in one of the world’s largest adolescent populations (UNICEF, 2018). Interventions targeting anaemia control have achieved significant reductions in anaemia prevalence in adolescents from

different settings through the weekly iron and folic acid tablet supplementation (WIFS) programme – achieving reductions of 31% in India (UNICEF, 2018), 27% in Indonesia (Roche *et al.*, 2018) and 26% in Ghana (Ghana Health Service *et al.*, 2019) where similar programmes are being implemented (See **Table 4**).

Many of the successful interventions reported by the respondents have used participatory approaches to harness the potential of adolescents as nutrition changemakers in schools, families and communities. One example is the NGO-led Participation in Learning and Action for Nutrition (PCAAN) programme in Mozambique. This programme uses school-based training for adolescents in nutrition and hygiene to influence family knowledge and practices of exclusive breastfeeding, equitable food sharing and diet diversity (Hanbury *et al.*, 2016). Following the success of this programme, the national government announced plans to implement it nationwide from 2020. Another example of a large-scale programme was reported from Bangladesh where a combination of role modelling and social media campaigns is being used to improve food choices by adolescents, reaching over 70,000 adolescents within four months of its inception (GAIN, 2020; Parkinson *et al.*, 2019). Further details of the adolescent nutrition programmes provided by the respondents are described in **Table 4**.

Table 3 Interventions and programmes on adolescent nutrition

| Response | Successful interventions (nutrition-sensitive/specific) that impacted adolescent nutrition n (%) | Medium to large-scale intervention (nutrition-sensitive/specific of at least 300 participants) that support adolescent nutrition n (%) |
|--------------------------------|--|--|
| Response provided? | | |
| Yes | 39 (29.3) | 16 (12.4) |
| No | 94 (70.7) | 113 (87.6) |
| Total | 133 | 129 |
| Conducting organisation | | |
| Academic institution | 10 (25.6) | 5 (35.7) |
| NGO | 18 (46.2) | 7 (50.0) |
| Government | 5 (12.8) | 1 (7.1) |
| UN | 4 (10.3) | 1 (7.1) |
| Donor | 0 (0.0) | 0 (0.0) |
| Other | 2 (5.1) | 0 (0.0) |
| Total | 39 | 14 |
| Focus of the study* | | |
| Micronutrient status | 26 (66.7) | 4 (28.6) |
| Diet | 22 (56.4) | 10 (71.4) |
| Undernutrition | 30 (76.9) | 10 (71.4) |
| Overweight/obesity | 18 (46.2) | 6 (42.9) |
| Total ^a | 39 | 14 |

* multiple responses apply

^a Total respondents answering

WFP nutrition programming for adolescents

In light of the growing prioritisation of nutrition during adolescence, the World Food Programme (WFP) commissioned an in-depth quantitative and qualitative review of their operations reaching adolescents between May and October 2019. This review aimed to both estimate the reach of WFP programmes with regard to adolescents as well as to review ongoing adolescent interventions, barriers, opportunities, entry points and strategies using a qualitative survey and in-depth interviews with regional and/or country offices. The review methodology used proportional population piling to assess the reach of activities and the results are therefore estimates. Findings from the review are summarised in **Box 3**.

Study limitations

This mapping exercise is not a systematic review of all studies and interventions and it has focused on medium/large scale and 'successful' interventions only, hence not all studies are represented. However, our methods do provide different opportunities, such as capturing interventions, programmes and opinions that would not be reflected in a review of peer-reviewed publications. The limited representation from some regions of the world (e.g., East and Central Europe, South and Central Americas and the Caribbean) as well as lower representation from academia and donor organisations were other potential limitations. However, we do note that many senior programme officers have a global focus so may cover wider scope. Finally, the survey was only available in the English language which will have limited the participation of non-English speakers.

Box 2

India's journey towards anaemia-free adolescents and lessons for other countries

Weekly iron and folic acid supplementation (WIFS) in India: from development to national scale-up

Development, replication and expansion

Following reports of widespread anaemia (56%) among adolescent girls aged 15-19 years in the 1998 round of the National Family Health Survey, the Government of India, with technical support from UNICEF, set out to address anaemia in adolescents. The programme utilised existing government service delivery systems to explore the effectiveness of an anaemia control programme for adolescent girls. Starting in the year 2000, with an initial pilot targeting adolescent girls in 2,000 public schools in 20 districts, it ultimately reached 8.8 million adolescent girls. One year after the programme's inception, anaemia prevalence had dropped by 31% and adherence to supplementation was 90%. The programme was identified as being cost-effective with an average annual unit cost of about US\$0.50 per adolescent girl. Applying the learning and success of the initial pilot, a replication study was conducted in 2005-2008. This time, both adolescent girls and boys both in- and out- of-school were targeted and 14.5 million beneficiaries were reached. The next step was an expansion programme in 2011, targeting adolescent girls and boys in- and out-of-school in additional Indian states. This reached 27 million adolescents in 13 states. The expansion programme involved the use of existing community-based delivery platforms called Anganwadi centres (village nutrition outposts for women, adolescent girls and children) which facilitated access to out-of-school adolescents.¹

National scale-up and increasing reach

In 2012, after a decade of evidence generation and gradual scale-up, the Government of India announced a nationwide roll-out of the national WIFS programme. The annual budget totalled US\$19.5 million in 2016-17 with a target of reaching 116 million adolescents aged 10-19 years across 32 of the country's 36

states. The inclusion of adolescent boys in the nationwide programme was a further opportunity to advance equity, as evidence showed that anaemia prevalence in boys was also high.¹ The WIFS programme continues to be implemented nationwide and the number of adolescents who receive iron and folic acid tablets in school and out-of-school increases each year. For instance, by the close of 2019, 41% of adolescents in school received the tablets, an increase of 13 percentage points from the previous year. More effort has also been made to reach out-of-school adolescent girls at Anganwadi centres with the proportion of adolescent girls receiving iron and folic acid tablets doubling from 12.1% in 2018 to 22.7% in 2019.²

Application of UNICEF's learning to similar programmes in different settings

Building on the 15+ years of learning and experience of developing the programme and scaling it nationally, UNICEF is currently supporting governments in other settings to implement context specific adolescent anaemia control programmes. Examples include the Girls' Iron-Folate Tablet Supplementation (GIFTS) programme in Ghana³ and the Anaemia Reduction for In-school and non-School Girls (ARISING) programme in Nigeria.⁴

¹ United Nations Children's Fund (UNICEF) (2018) Forging an anaemia-free future. The path to India's nationwide adolescent anaemia control programme. (Access: https://anemiamuktbharat.info/wp-content/uploads/2019/09/Field_report_nutrition-web3.pdf)

² Author calculations based on national programme MIS data (Access: <https://anemiamuktbharat.info/quarterly-progress-report/>)

³ UNICEF Ghana (Access: <https://www.unicef.org/ghana/reports/girls-iron-folate-tablet-supplementation>)

⁴ Programme description (Access: <https://www.von.gov.ng/unicef-moves-to-check-iron-deficiency-among-nigerian-girls-women/>).

Table 4 Large scale or successful adolescent nutrition programmes described by respondents

| No. | Author (Implementing organisation) | Title of uploaded file (document) | Year | Sample size | Country (context) | Objective | Target population | Intervention approaches and results |
|-----|--|---|------|--|-------------------|---|--|--|
| 1 | Clare Hanbury, Joshua George, Joanna Molgaard (Children for Health) | Children's Participation in Learning and Action for Nutrition (PCCAN) A Case Study, July 2016 | 2016 | NA | Mozambique | To contribute to the reduction of chronic malnutrition by building and consolidating a platform that enables children to work together to create behaviour change for themselves and families | Adolescents aged 10-14 years | Children in grades 5-7 are educated about hygiene and nutrition in a way that develops skills and attitudes and requires sharing and discussing the messages and activities with peers at school and with family members at home. This study was associated with an increase in breastfeeding of families, more equitable food sharing practices, improvement in hygiene practices and a shift in the way that children are and can continue to be perceived as positive influencers of health behaviours in their family. There was probable impact on the variety of food eaten through involvement of children in PCCAN programmes. |
| 2 | Gosdin, Lucas, Andrea J. Sharma, Katie Tripp, et al., (Government of Ghana, UNICEF, United States Agency for International Development (USAID) and Centers for Disease Control and Prevention (CDC)) | Barriers to and Facilitators of Iron and Folic Acid Supplementation within a School-Based Integrated Nutrition and Health Promotion Program among Ghanaian Adolescent Girls | 2020 | National sample of 1,387 | Ghana | To assess barriers and facilitators of consuming iron and folic acid (IFA) supplements of a national weekly iron folic acid supplementation (WIFAS) programme | Adolescent girls (10-19 years) | The Government of Ghana, through the Ministry of Health and the Ministry of Education with support from UNICEF, USAID and CDC, jointly designed an anaemia control programme consisting of weekly IFA supplementation, nutrition education on anaemia, malaria prevention and WASH. The programme started with four regions in 2017 and was scaled up nationwide in 2019. An initial evaluation found that the programme was associated with a 26% reduction in anaemia prevalence and increase in knowledge on IFA and anaemia. It targets both in-school and out-of-school adolescent girls using school and health facility delivery platforms. The barrier analysis show that average adherence was about half of the available tablets and 88% of consumers liked the tablets. Twenty seven percent reported undesirable changes primarily related to heavy menstrual flow. Ability to make up missed IFA distributions, junior and secondary school and educators' participation in programme training were positively associated with total IFA consumed. |
| 3 | Marion Leslie Roche, Bury Louise, Yusadiredja Isma Novitasari, et al., (Nutrition International, Government of Indonesia) | Adolescent girls' nutrition and prevention of anaemia: a school based multisectoral collaboration in Indonesia | 2018 | 52,000 adolescents in two districts | Indonesia | Reduce adolescent anaemia through WIFS | n-school adolescent girls | This was a pilot of WIFS policy in two districts (Cimahi and Purwakarta in West Java) where anaemia was over 50%. The programme gave 60 mg elemental iron +400 µg folic acid, once weekly for every week of the year. The programme also delivered nutrition education. It reached 52,000 adolescent girls in the two districts and is estimated to have reduced anaemia by 27% during the project life between 2015 and 2018. This was a multi-sector implemented programme with key implementing partners including the Ministry of Health, the Ministry of Education and Culture, the Ministry of Religious Affairs, the Ministry of Home Affairs, Nutrition International and, finally, adolescent girls. |
| 4 | Min Raj Gyawali, Aryal Kabita, Neupane Gyanu, et al., (Suaahara II programme in Nepal: USAID funded) | Breaking the cycle of malnutrition: Designing an adolescent programme in Nepal | 2019 | Adolescents in 42 districts in 84 secondary schools in disadvantaged areas | Nepal | To improve adolescent knowledge and practices related to health, nutrition and water, sanitation and hygiene (WASH) and decrease malnutrition and poor health | The intervention focuses on younger adolescents (aged 10-15 years) | In 2018, Suaahara II initiated an integrated school-based adolescent intervention package in coordination with the government. The programme uses an integrated nutrition curriculum for teachers and students with focus on dietary practices and provision of deworming and IFA tablets. A key strategy is peer to peer learning where a ratio of 1:5 (one trained (or 'resource') student to five peers) learn/share information informally and formally at specially designed areas called 'sathi' (friend) corners created for this purpose in all selected schools. Suaahara II has also created episodes for radio based on this peer curriculum to be integrated into a pre-existing radio programme for teens called 'Chatting with my best friend'. Students are able to listen to the programme and discuss its contents with each other in the sathi corners. The programme plans to follow 1,000 adolescent girls for four years aiming to have data on long-term impacts of nutrition and WASH interventions. Scale-up to 102 districts is planned for 2020. |

Table 4 Cont'd

| No. | Author (Implementing organisation) | Title of uploaded file (document) | Year | Sample size | Country (context) | Objective | Target population | Intervention approaches and results |
|-----|---|---|-----------|---|-------------------|---|---|--|
| 5 | Sarah Parkinson, Wendy Gonzalez, Ashish Kumar Deo, et al., (Global Alliance for Improved Nutrition (GAIN) and Shormokishoree Network Foundation (SKNF)) | Nourishing Dreams: Implementing a social movement with adolescents in Bangladesh | 2019-2020 | Adolescents in 200 schools across Bangladesh | Bangladesh | To improve adolescent food choice through role modelling and social media approaches | Adolescents in schools, age group not specified | A social movement to encourage adolescents to make better food choices and to inspire their peers, families and community as well. Bhalo Khabo, Bhalo Thakbo ("Eat Well, Live Well") launched in July 2019. The first stage of the campaign, My Dream My Decision, had three phases, 1) "Express your dreams" encouraged adolescents to realise and express their dreams for the future, 2) "Feel validated" engaged SKNF alumni, celebrities and influential community members to validate the adolescents' dreams and 3) "Feel challenged", reminded the adolescents that dreams are achievable when they are "nourished" by quality food. Stage 2 was the launch of a pledge, taken by adolescents, to buy better quality snack foods with their pocket money. The pledge was promoted on social media and through in-school activations at over 200 schools. As of November 2019, the online campaign resulted in hundreds of dream videos being posted on Facebook by adolescents, one of which achieved more than 8.8 million views and over 70,000 adolescents had taken the pledge. Co-implementing a social movement with adolescents is an innovative approach to motivating them to choose nutritious foods. The process has unearthed learnings that are applicable to other social movements and nutrition projects interested in this innovative approach. |
| 6 | UNICEF & Government of India | Forging An Anaemia-Free Future The path to India's nationwide adolescent anaemia control programme | 2018 | 35 million reached in 2016-2017 | India | To reduce anaemia through WIFS | Adolescent girls and boys | The Government of India, with technical support from UNICEF, studied the effectiveness of an adolescent girls' anaemia control programme delivered through existing government service delivery systems. The programme was implemented in stages starting with an initial pilot targeting only adolescent girls in school in 2000, through replication, expansion and a nationwide scale-up in 2011. Box 2 gives further details and the resulting impact of India's anaemia control programme. |
| 7 | Vani Sethi, Monique Sternin, Deepika Sharma, et al., (UNICEF) | Applying Positive Deviance (PD) for Improving Compliance to Adolescent Anaemia Control Program in Tribal Communities of India | 2017 | 434 adolescent girls, 18 frontline workers, 15 teachers and 751 community leaders/parents/relatives | India | To use positive deviance (PD) to improve compliance to adolescent anaemia control programme | Adolescent girls | Stakeholders were interviewed to identify positive deviants and PD determinants across 17 villages. Perceived benefits of IFA tablets and nutritional care during adolescence were low. Positive deviants exist among adolescent girls (26 of 434), villages (2 of 17) and schools (2 of 17). Positive deviant adolescent girls consumed both a variety of iron-rich foods and in higher frequency and IFA tablets and practiced recommended personal hygiene behaviours. PD practices in schools included supervision of students during tablet distribution among others. |
| 8 | Zakia Maroof, M Homayoun Ludin, Suzanne Fuhrman (UNICEF and Government of Afghanistan) | Addressing adolescent anaemia in Afghanistan through a school-based programme | 2019 | National | Afghanistan | To reduce anaemia through WIFS | Adolescent girls in school (10-19 years) | Weekly supplementation of IFA and deworming in 34 provinces. The programme reached 1.6 million school-going adolescent girls (10-19) with IFA supplementation in all 34 provinces by December 2018. An evaluation study has found increased haemoglobin levels and high knowledge about anaemia which are likely associated with the WIFS programme. |



Conclusions and Recommendations

Abadit Wondim and Senait Tsegay, 15 are both part of drama club in thier school and love acting, May'ayni primary school, Shire, Ethiopia

This survey was an attempt to map global adolescent nutrition research, policies and interventions and to identify who is doing what and where, the impacts achieved and relevant data gaps. The respondents represented a wide range of sectors and backgrounds (nutrition, health, education, social protection) across all UNICEF world regions. The results identified that research on adolescent nutrition has mainly focused on burden while indicators and consequences of malnutrition have received less attention. Micronutrient deficiencies, diets and undernutrition have been the focus of most studies with burden, consequences and indicators of adolescent overweight and obesity receiving less attention in research.

Policies targeting adolescents are available at international, regional and national levels and come from a range of sectors. Most adolescent nutrition programmes and interventions are provided through the health, nutrition and education sectors with support from UN agencies and NGOs. Many of the successful and large-scale adolescent nutrition programmes described by the respondents focus on micronutrient deficiencies, especially anaemia reduction through weekly iron and folate distributions. Other large-scale programmes include social media campaigns and school-based peer-education programmes to influence diet choices.

The survey identified that a wide variety of definitions is being used for the adolescent period and, in some contexts, no definition is available at all. This lack of agreement creates difficulties in providing representative and comparable data on adolescents across the world. Data that does exist often cannot be compared because of differences between the age groups studied or how age groups are disaggregated. Differences between the reference populations used to define malnutrition further limit comparability. Thus, to aid researchers and programmers, both when assessing the needs and in designing and implementing effective interventions, it would be helpful for organisations and national governments to adopt a universal definition of adolescence.

The lack of an agreed-upon definition for adolescence may be acting as an important barrier to establishing national and international adolescent nutrition targets. In addition, there are a number of other important data and policy gaps for adolescent nutrition that need to be addressed including standardised anthropometric definitions of malnutrition in adolescent and school-age children, particularly those feasible for use in emergency contexts, data on current and optimal diets, the

inclusion and/or disaggregation of adolescent data within national surveys, data on sub-groups within adolescence (e.g., males, refugees, out-of-school adolescents), evidence of effective interventions to reach adolescents, adolescent voices within research, adolescent-specific targets, nationally and internationally, the inclusion of adolescents within national health and nutrition policies and designated research funding for this age group.

Lastly, our results suggest that, among this group of stakeholders (largely working in LMICs in Africa and Asia), overweight and obesity research, policies and programming efforts are the least represented areas of adolescent malnutrition. This is a serious omission considering the rising tide of overnutrition and obesity across all age groups and the lifelong adverse consequences that can result.

Recommendations

- It would be helpful if a universal definition of adolescence could be adopted as this would facilitate the setting of global targets and allow comparison across research and programmes. To date, the most commonly used definition is 10-19 years.
- In order to focus efforts to tackle adolescent malnutrition, adolescent-specific nutrition targets are needed, nationally and internationally. These should go beyond anaemia in women of reproductive age.
- To guide programming, routine national surveys, such as demographic and health surveys and multiple indicator cluster surveys, should be age-disaggregated to represent the adolescent population.
- In order to improve adolescent nutrition, health and wellbeing, more research and agreement is required on:
 - Effective interventions, particularly for dietary patterns and overweight/obesity
 - The nutritional needs of subgroups including male adolescents, those out-of-school and adolescents in humanitarian contexts
 - The most useful indicators to identify and classify malnutrition
 - How best to reach adolescents, for example utilising new opportunities via social media platforms
- Greater attention to, and funding from, donor agencies is required to address the research and programmatic gaps identified in this review and to ultimately improve adolescent outcomes.

References

Beal, T., Vossenaar, M., Tumilowicz, A. T., Rasool, F., Badar, A., Munir Pasha, Q., & Global Alliance for Improved Nutrition (GAIN). (2018). *Technical Report: Review of Evidence on the Nutritional Status of Adolescent Girls and Boys in Pakistan* Available: (Accessed:

Benedict, R. K., Schmale, A., & Namaste, S. (2018). *Adolescent Nutrition 2000-2017: DHS Data on Adolescents Age 15-19*.

Bhutta, Z. A., Das, J. K., Rizvi, A., Gaffey, M. F., Walker, N., Horton, S., Webb, P., Lartey, A., & Black, R. E. (2013). Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? *The Lancet*, 382(9890), 452-477. doi: [https://doi.org/10.1016/S0140-6736\(13\)60996-4](https://doi.org/10.1016/S0140-6736(13)60996-4)

Black, R. E., Cousens, S., Johnson, H. L., Lawn, J. E., Rudan, I., Bassani, D. G., Jha, P., Campbell, H., Walker, C. F., & Cibulskis, R. (2010). Global, regional, and national causes of child mortality in 2008: a systematic analysis. *The Lancet*, 375(9730), 1969-1987.

Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., de Onis, M., Ezzati, M., Grantham-McGregor, S., Katz, J., Martorell, R., & Uauy, R. (2013). Maternal and child undernutrition and overweight in low-income and middle-income countries. *The Lancet*, 382(9890), 427-451. doi: [https://doi.org/10.1016/S0140-6736\(13\)60937-X](https://doi.org/10.1016/S0140-6736(13)60937-X)

Bush, A., & Mates, E. (2017). *Synthesis of evidence to date, key gaps and opportunities for adolescent nutrition. ENN Adolescent Synthesis Paper, December 2017* Available: <https://www.ennonline.net/attachments/2793/Adolescent-Synthesis-Report.pdf> (Accessed: November 10, 2020)

Cade, J. E. (2017). Measuring diet in the 21st century: use of new technologies. *Proceedings of the Nutrition Society*, 76(3), 276-282. doi:10.1017/S0029665116002883

Caulfield, L., & Elliot, V. (2015). Nutrition of Adolescent Girls and Women of Reproductive Age in Low-and Middle-Income Countries: Current Context and Scientific Basis for Moving Forward. *Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING): Arlington, VA, USA*.

Darnton-Hill, I., & Mkparu, U. C. (2015). Micronutrients in pregnancy in low-and middle-income countries. *Nutrients*, 7(3), 1744-1768.

GAIN. (2020). *Evaluation of GAIN's Nourishing Dreams Campaign to Improve Adolescent Diets in Bangladesh* Available: <https://www.ids.ac.uk/projects/evaluation-of-gains-nourishing-dreams-campaign-to-improve-a-adolescent-diets-in-bangladesh/> (Accessed: September 3, 2020)

Ghana Health Service, Ghana Education Service, UNICEF-Ghana, Emory University Global Health Institute, & Centers for Disease Control and Prevention (CDC). (2019). *Impact evaluation of a school-based integrated adolescent nutrition and health Programme with Iron and Folic-Acid supplementation intervention among adolescent girls in Ghana* Available: <https://www.unicef.org/ghana/media/3241/file/The%20Girls'%20Iron%20Folate%20Tablet%20Supplementation.pdf> (Accessed: November 9, 2020)

Government of Pakistan, & UNICEF. (2019). *National Nutrition Survey 2018 Key findings report Pakistan* Available: <https://www.unicef.org/pakistan/media/1951/file/Final%20Key%20Findings%20Report%202019.pdf> (Accessed: September 5, 2020)

Güngör, N. K. (2014). Overweight and obesity in children and adolescents. *Journal of clinical research in pediatric endocrinology*, 6(3), 129.

Gyawali, M. R., Aryal, K., Neupane, G., Shrestha, K., Kshetri, I. D., Sapkota, F., Rana, P. P., & Cunningham, K. (2019). Breaking the cycle of malnutrition: Designing an adolescent programme in Nepal. *Nutrition Exchange* 12, 21.

Hanbury, C., George, J., & Molgaard, J. (2016). *Children's Participation in Learning and Action for Nutrition (PCAN) A Case Study, July 2016* Available: <https://www.childrenforhealth.org/wp-content/uploads/2017/05/PCAN-Case-Study-FINAL.pdf> (Accessed: September 3, 2020)

Jesson, J., Kouakou, E. K., Hardy-Johnson, P., Ngoran-Theckly, P., Kehoe, S. H., Adonis, L., Fall, C., Leroy, V., Barker, M., & Weller, S. (2020). Adolescent nutrition and physical activity in low-income suburbs of Abidjan, Côte d'Ivoire: the gap between knowledge, aspirations and possibilities. *Public health nutrition*, 1-11.

Keats, E. C., Rappaport, A. I., Shah, S., Oh, C., Jain, R., & Bhutta, Z. A. (2018). The dietary intake and practices of adolescent girls in low-and middle-income countries: A systematic review. *Nutrients*, *10*(12), 1978.

Kerac, M., Lelijveld, N., Crampin, A., Dube, A., Geis, S., Wells, J., Andrew, S., Hargreaves, D., & Nyirenda, M. (2017). *Growth in Adolescence Potential interventions to improve growth, development & health: a cross sectional study in Malawi (GAP study)* Available: unpublished abstract. (Accessed: Author provided)

Maroof, Z., Ludin, M. H., & Fuhrman, S. (2019). Addressing adolescent anaemia in Afghanistan through a school-based programme. *Nutrition Exchange* *12*, 22

Moreno, L. A., Kersting, M., de Henauw, S., González-Gross, M., Sichert-Hellert, W., Matthys, C., Mesana, M. I., & Ross, N. (2005). How to measure dietary intake and food habits in adolescence: the European perspective. *International Journal of Obesity*, *29*(2), S66-S77. doi:10.1038/sj.ijo.0803063

Ng, M., Fleming, T., Robinson, M., Thomson, B., Graetz, N., Margono, C., Mullany, E. C., Biryukov, S., Abbafati, C., & Abera, S. F. (2014). Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013. *The Lancet*, *384*(9945), 766-781.

Parkinson, S., Gonzalez, W., Kumar Deo, A., Bipul, M., & Chowdhury, D. (2019). *Nourishing Dreams: Implementing a social movement with adolescents in Bangladesh* Available: Unpublished abstract. (Accessed: Author provided)

Patton, G. C., Sawyer, S. M., Santelli, J. S., Ross, D. A., Affi, R., Allen, N. B., Arora, M., Azzopardi, P., Baldwin, W., & Bonell, C. (2016). Our future: a Lancet commission on adolescent health and wellbeing. *The Lancet*, *387*(10036), 2423-2478.

Prameshti, I. L., Wangge, G., Ananda, A. J. N., Ermayani, E., & Iswari, D. N. (2019). *Intervention of The Nutrition Goes to School Program for Adolescents in Malang District, East Java: Baseline Report*. Paper presented at the Annals of Nutrition and Metabolism.

Prentice, A. M., Ward, K. A., Goldberg, G. R., Jarjou, L. M., Moore, S. E., Fulford, A. J., & Prentice, A. (2013). Critical windows for nutritional interventions against stunting. *The American of Clinical Nutrition*, *97*(5), 911-918.

Roche, M. L., Bury, L., Yusadiredja, I. N., Asri, E. K., Purwanti, T. S., Kusyuniati, S., Bhardwaj, A., & Izwardy, D. (2018). Adolescent girls' nutrition and prevention of anaemia: a school based multisectoral collaboration in Indonesia. *Bmj*, *363*, k4541. doi:10.1136/bmj.k4541

Salam, R. A., Hooda, M., Das, J. K., Arshad, A., Lassi, Z. S., Middleton, P., & Bhutta, Z. A. (2016). Interventions to improve adolescent nutrition: a systematic review and meta-analysis. *Journal of Adolescent Health*, *59*(4), S29-S39.

Sawyer, S. M., Affi, R. A., Bearinger, L. H., Blakemore, S.-J., Dick, B., Ezech, A. C., & Patton, G. C. (2012). Adolescence: a foundation for future health. *The Lancet*, *379*(9826), 1630-1640.

Sawyer, S. M., Azzopardi, P. S., Wickremarathne, D., & Patton, G. C. (2018). The age of adolescence. *The Lancet Child & Adolescent Health*, *2*(3), 223-228.

Tarannum, T. (2019). Factors Affecting Social Determinants of Female Adolescent Malnutrition in Bangladesh. Available at SSRN 3405584.

UNICEF. (2018). Forging an anaemia-free future The path to India's nationwide adolescent anaemia control programme Available: https://anemiamukt Bharat.info/wp-content/uploads/2019/09/Field_report_nutrition-web3.pdf (Accessed: September 3, 2020)

UNICEF. (2019). *The Girls Iron Folate Supplementation initiative (GIFTS)* Available: <https://www.unicef.org/ghana/stories/girls-iron-folate-supplementation-initiative-gifts> (Accessed: September 3, 2020)

WFP. (2018). *Bridging the Gap: Engaging Adolescents for Nutrition, Health and Sustainable Development* Available: https://docs.wfp.org/api/documents/WFP-0000071272/download/?_ga=2.200811566.1048429785.1599329741-1092411342.1586262885 (Accessed: September 5, 2020)

WHO. (2014a). *Global nutrition targets 2025* Available: <https://www.who.int/nutrition/global-target-2025/en/> (Accessed: September 3, 2020)

WHO. (2014b). *Health for the World's Adolescents A second chance in the second decade* Available: https://apps.who.int/adolescent/second-decade/files/1612_MNCAH_HWA_Executive_Summary.pdf (Accessed: September 3, 2020)

WHO. (2015). *The global strategy for women's, children's and adolescents' health (2016-2030)* Available: <https://www.who.int/life-course/partners/global-strategy/globalstrategyreport2016-2030-lowres.pdf> (Accessed: September 3, 2020)

Woodruff, B., & Duffield, A. (2002). Anthropometric assessment of nutritional status in adolescent populations in humanitarian emergencies. *European Journal Of Clinical Nutrition*, 56(11), 1108-1118.

Woodruff, B., & Duffield, A. (2002). Anthropometric assessment of nutritional status in adolescent populations in humanitarian emergencies. *European Journal Of Clinical Nutrition*, 56(11), 1108-1118. .

Woodruff, B. A., Blanck, H. M., Slutsker, L., Cookson, S. T., Larson, M. K., Duffield, A., & Bhatia, R. (2006). Anaemia, iron status and vitamin A deficiency among adolescent refugees in Kenya and Nepal. *Public health nutrition*, 9(1), 26-34.

Woodruff, B. A., & Duffield, A. (2000). Assessment of nutritional status in emergency-affected populations. Geneva: *United Nations/Sub-Committee on Nutrition*.

Wrottesley, S. V., Bosire, E. N., Mukoma, G., Motlathledi, M., Mabena, G., Barker, M., Hardy-Johnson, P., Fall, C., & Norris, S. A. (2019). Age and gender influence healthy eating and physical activity behaviours in South African adolescents and their caregivers: Transforming Adolescent Lives through Nutrition Initiative (TALENT). *Public health nutrition*, 1-20.

Wrottesley, S. V., Pedro, T. M., Fall, C. H., & Norris, S. A. (2019). A review of adolescent nutrition in South Africa: transforming adolescent lives through nutrition initiative. *South African Journal of Clinical Nutrition*, 1-39.



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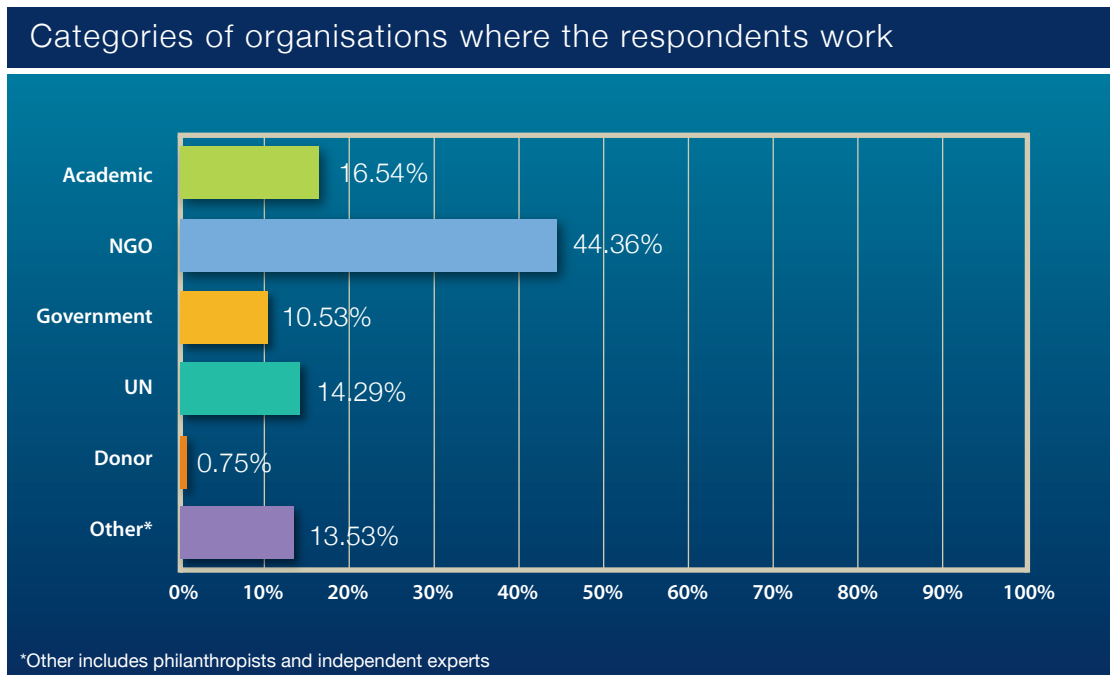
Adolescent girls leaving classes at the "Kaushalya youth center" in Dugri, India

Annex 1

| Country | Responses |
|----------------------------------|-----------|
| Albania | 1 |
| Australia | 4 |
| Bangladesh | 13 |
| Cameroon | 2 |
| Canada | 3 |
| Chad | 1 |
| Democratic Republic of the Congo | 1 |
| Ethiopia | 4 |
| France | 4 |
| Ghana | 4 |
| Guatemala | 1 |
| India | 5 |
| Indonesia | 5 |
| Iraq | 1 |
| Ireland | 1 |
| Italy | 2 |
| Jordan | 1 |
| Kenya | 7 |
| Lao People's Democratic Republic | 1 |
| Liberia | 3 |
| Malawi | 2 |
| Nepal | 2 |

| Country | Responses |
|--|------------|
| Netherlands | 1 |
| Niger | 3 |
| Nigeria | 3 |
| Pakistan | 13 |
| Philippines | 2 |
| Senegal | 2 |
| Sierra Leone | 1 |
| Somalia | 3 |
| South Africa | 1 |
| South Sudan | 6 |
| Spain | 1 |
| Mozambique | 5 |
| Sudan | 1 |
| Switzerland | 2 |
| Syrian Arab Republic | 1 |
| Uganda | 1 |
| United Kingdom of Great Britain and Northern Ireland | 8 |
| United Republic of Tanzania | 4 |
| United States of America | 6 |
| Yemen | 1 |
| Total | 133 |

Annex 2



Annex 3

Table 4

Summary of respondents' uploads on their research into burden, consequences and indicators of adolescent nutrition

| Author/ Organisation | Title of uploaded file | Year | Sample size | Country (context) | Objective | Target population | Methods and results | Focus |
|--|--|------|---------------------|----------------------------------|---|--|---|-------------------------|
| 1 BA Woodruff, A Duffield | Anthropometric assessment of nutritional status in adolescent populations in humanitarian emergencies | 2002 | NA | Humanitarian settings | To outline the difficulties and suggest potential solutions in the anthropometric assessment of adolescents during humanitarian emergencies | Adolescents in humanitarian emergencies | A literature review. Study suggests weight-for-height could be used for pre-pubertal adolescents and BMI could be used for post-pubertal adolescents. Because cut-off points are age-specific, age should be collected as accurately as possible for all adolescents measured during screening or survey activities. | Indicators |
| 2 Bradley A. Woodruff & Arabella Duffield | Assessment of Nutritional status in Emergency-affected Populations | 2000 | NA | Global | To assess the use of anthropometry in assessing nutritional status of adolescents: challenges and possible solutions | Adolescents | Report. Use of previous WHO recommendation to use BMI for a 5th percentile of a reference population made up of US children has resulted in unrealistic high estimates of adolescent undernutrition. A possible solution is that better methods for determining the age of attainment of pubertal landmarks can be used to adjust for variances in different populations. Cosmic indices could be used to adjust for ethnic differences. A new international reference and different method for determining cut-offs can remove some biases of using a single population data. | Indicators |
| 3 Bradley A Woodruff, Heidi Michels Blanck, Laurence Slutsker, Susan T Cookson, Mary Kay Larson, Arabella Duffield and Rita Bhatia | Anaemia, iron status and vitamin A deficiency among adolescent refugees in Kenya and Nepal | 2006 | 950 | Kenya and Nepal | To investigate prevalence of anaemia and vitamin A deficiency in refugee adolescents | Adolescent refugees | A cross-sectional survey. Prevalence of anaemia was 46% vs 24% in Kenya and Nepal respectively. Prevalence of vitamin A deficiency was 15% vs 30% in Kenya and Nepal respectively. Night blindness was not more common in adolescents with vitamin A deficiency than in those without vitamin A deficiency. In Kenya, one of seven adolescents with Bitot's spots had vitamin A deficiency. | Burden/ Consequences |
| 4 Caulfield, Laura E., Victoria Elliot (USAID-SPRING) | Nutrition of Adolescent Girls and Women of Reproductive Age (WRA) in Low- and Middle-Income Countries: Current Context and Scientific Basis for Moving Forward | 2015 | NA | Low- and middle-income countries | To assess micronutrient status, undernutrition, overweight and obesity and diets | Adolescents and pregnant and lactating women | Literature review. The majority of estimated prevalence of obesity across LMICs was between 9% and 18%. Overall, non-pregnant adolescent girls and WRA do not appear to have dietary intake concerns distinct from one another. | Burden |
| 5 Emily C. Keats, Aviva I. Rappaport, Shailja Shah, Christina Oh, Reena Jain and Zulfiqar A. Bhutta | The Dietary Intake and Practices of Adolescent Girls in Low- and Middle-Income Countries: A Systematic Review | 2018 | 227 papers included | Low- and middle-income countries | To assess dietary intake and practices | Adolescent girls (10-19 years) | Systematic review. Mean energy intake was high in urban (1906 ± 507 kcal/day) settings compared to rural (1621 ± 312 kcal/day). Self-reported daily consumption of nutritious foods was low (16% of girls consumed dairy, 46% consumed meats, 44% consumed fruits and 37% consumed vegetables). In contrast, energy-dense and nutrient-poor foods like sweet snacks (63%), salty snacks (78%), fast foods (23%) and sugar-sweetened beverages (49%) were consumed four to six times per week by adolescent girls. 40% of them reported skipping breakfast. | Burden |
| 6 GAIN (Beal, Ty Vossenaar, Marieke Tumilowicz, Alison T Rasool, Faiz Badar, Asma Munir Pasha, Qaiser) | Technical Report: Review of evidence on the nutritional status of adolescent girls and boys in Pakistan | 2018 | National | Pakistan | To provide detailed assessment of adolescent nutrition, micronutrient status, undernutrition and overweight/obesity | Adolescents (10-19 years) | Review of evidence. Stunting was 5% and 11% in boys and girls respectively. Thinness was 12% and 10% for boys and girls respectively. Overweight was higher in girls (8%) than in boys (5%). Anaemia, zinc, folic acid and vitamin A deficiencies were measured only in girls and were 54%, 42%, 49% and 40% respectively. Key determinants of adolescent nutrition included household food insecurity, poor diets lacking diversity, adolescent girls having little control on household food purchase (their mothers who have less nutritional knowledge do this) and poor access to sexual and reproductive health care. | Burden |

Table 4 cont'd

| | Author/Organisation | Title of uploaded file | Year | Sample size | Country (context) | Objective | Target population | Methods and results | Focus |
|----|---|--|------|-------------|-----------------------|---|---|--|--------------|
| 7 | Indriya Laras Pramesthi, Grace Wangge Aziz Jati Nur Ananda, Evi Ermayani, Dwi Nastiti Iswari | Intervention of The Nutrition Goes to School Program for Adolescents in Malang District, East Java: Baseline Report | 2019 | 658 | Indonesia | To assess the influence of dietary choice, nutritional status and physical activity in schools | Adolescents in school | School based intervention study of training for teachers on how to deliver nutrition education/promotion to students by strengthening the school's healthy canteen and development of school nutrition gardens, strengthening school policy and introducing information system for monitoring. There were no statistically significant differences after six months of intervention between adolescents in intervention and control. Overall prevalence of overweight was 12.0% and obesity was 7.8%. Consumption of vitamin A rich and green vegetables was 35% vs 27.2 for intervention and control groups respectively. Consumption of eggs and milk was 44.7% vs 30.1% for intervention and control groups respectively. | Consequences |
| 8 | Julie Jesson, Egnon KV Kouakou, Polly Hardy-Johnson, Patricia Ngoran-Theckly, Sarah H Kehoe, Laurence Adonis, Caroline Fall, Valérie Leroy, Mary Barker and Susie Weller, on behalf of the TALENT Collaboration | Adolescent nutrition and physical activity in low-income suburbs of Abidjan, Côte d'Ivoire: the gap between knowledge, aspirations and possibilities | 2020 | 46 | Côte d'Ivoire | To explore adolescents' perceptions, knowledge and behaviours regarding nutrition and physical activity in a low-income setting | Adolescents in school and caregivers in communities | Focus group discussion. Participants demonstrated good nutrition knowledge, relating nutritional health to a balanced diet and hygiene. Sustained physical activity was reported. However, adopting good practices was challenging due to participants' economic circumstances. Their environment was a barrier to improving health due to dirtiness and violence with a lack of space limiting the possibility of practicing sport. Adolescents were more likely to suggest creative solutions to their constraints than caregivers who felt political help was best. | Indicators |
| 9 | Marko Kerac, Natasha Lelijveld, Amelia Crampin, Albert Dube, Steffen Geis, Jonathan Wells, Andrew Seal, Dougal Hargreaves, Moffat Nyirenda | Growth in Adolescence Potential interventions to improve growth, development & health: a cross sectional study in Malawi (GAP study) | 2017 | 1169 | Malawi | To determine stunting prevalence and its determinants in adolescents | Adolescent boys and girls aged 10-19 years | A cross-sectional survey. 23% prevalence of stunting (31% in rural vs 20% in urban areas). Stunting was 13% vs 9% in boys and girls respectively. Lower socio-economic status was associated with high stunting. Stunted adolescents were behind at school (6.0 vs 6.9), they were more likely to go hungry than their counterparts (49% vs 42%) and ate less dairy products (16% vs 39%). | Burden |
| 10 | Government of Pakistan, United Nations Children's Fund (UNICEF) | National Nutrition Survey 2018 Key findings report | 2019 | National | Pakistan | To assess the nutrition state of Pakistan | All age groups including a specified adolescent section (10-19 years) | National nutrition survey. Only 5.2% of adolescent girls were married. For boys, there was 21.1%, 10.2% and 7.7% prevalence of underweight, overweight and obesity respectively. For girls, it was 11.8%, 11.4% and 5.4% underweight, overweight and obesity respectively. Overweight and obesity were more prevalent in urban areas than in rural areas (underweight was higher in rural areas than in urban areas). National prevalence of anaemia in adolescent girls was 56.6% which was higher (58.1%) in rural areas compared to urban (54.2%). | Burden |
| 11 | Rukundo Kambarami Benedict, Allison Schmale, Sorrel Namaste | Adolescent nutrition 2000-2017: DHS data on adolescents age 15-19 | 2018 | NA | Global (87 countries) | To assess micronutrient status, undernutrition, overweight and obesity and diets | Adolescents (15-19 years) | Data analysis. Trends in global adolescent nutrition show the prevalence of the double burden of malnutrition for both non-pregnant girls and boys. Girls were more than 10% overweight which was a larger problem than thinness. For boys, more than 10% were thin in over half of countries and thinness was a larger problem than overweight and obesity. Short stature in girls was prevalent across all regions but most prevalent in South Asia. More than 40% non-pregnant girls had anaemia which was higher among those pregnant. The data show a lack of diversity in the diets of girls. | Burden |

Table 4 cont'd

| | Author/Organisation | Title of uploaded file | Year | Sample size | Country (context) | Objective | Target population | Methods and results | Focus |
|----|--|---|------|--------------------|-------------------|---|---------------------------|---|------------|
| 12 | Stephanie V Wrottesley, Edna N Bosire, Gudani Mukoma, Molebogeng Motlathledi, Gugulethu Mabena, Mary Barker, Polly Hardy-Johnson, Caroline Fall and Shane A Norris | Age and gender influence healthy eating and physical activity behaviours in South African adolescents and their caregivers: Transforming Adolescent Lives through Nutrition Initiative (TALENT) | 2019 | NA | South Africa | To assess adolescent eating practices and physical activity | Adolescent boys and girls | Semi-structured focused group discussion. Adolescents were not motivated to eat healthily and failed to appreciate the need to develop consistent patterns of both healthy eating and physical activity for their long-term health. They commonly attributed unhealthy food choices to a lack of autonomy and, therefore, to the influence of their caregivers. | Indicators |
| 13 | Stephanie V Wrottesley, Titilola M Pedro, Caroline H Fall & Shane A Norris | A review of adolescent nutrition in South Africa: transforming adolescent lives through nutrition initiative | 2019 | 67 papers included | South Africa | To review the nutritional status and dietary intakes and practices, as well as their determinants, in adolescents | Adolescents | Review of evidence. Overweight and obesity prevalence increased in South African adolescents over the reference period (1994-2018). Girls and urban dwellers were more vulnerable to excess adiposity. Dietary intakes showed a transition towards energy-dense, processed foods high in sugar and fat but low in essential micronutrients. Food choices included irregular breakfast consumption and fewer family meals, increased snacking and low levels of physical activity. | Burden |
| 14 | Tazkia Tarannum, | Factors Affecting Social Determinants of Female Adolescent Malnutrition in Bangladesh | 2019 | 15 papers included | Bangladesh | To determine the social determinants of adolescent malnutrition | Adolescent girls | A review of social determinants of adolescent malnutrition. 10 social determinants of health affecting female adolescent malnutrition were social position, education, marital status, gender, age, access to media, state of habitat, religion and/or belonging to marginalised community, food intake and seasonal variation with regards to first period. The most important determinant was poverty. | Indicators |

NA: Not applicable