GUIDELINE:

Implementing effective actions for improving ADOLESCENT NUTRITION

World Health Organization

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Contents

Publication history

This derivative guideline, *Guideline: implementing effective actions for improving adolescent nutrition* is a summary of existing World Health Organization (WHO) evidence-informed guidelines specifically addressing malnutrition in all its forms in adolescents. It complements the *WHO recommendations on adolescent health*, with emphasis on the implementation of nutrition-specific and nutrition-sensitive interventions targeting adolescents. Readers are invited to read in detail the included references as well as the evidence supporting the recommendations in the individual guidelines cited throughout this publication. Additional supporting information and publications supporting country programme implementation in adolescents can be found in *Global accelerated action for the health of adolescents (AA-HA!): guidance to support country implementation*. This publication also presents sections on dissemination as well as on ethical and equity considerations, as summarized in the most recent reviews on these topics.

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GUIDELINE[1]: IMPLEMENTING EFFECTIVE ACTIONS FOR IMPROVING ADOLESCENT NUTRITION

Executive summary

Background

Nutrition has a profound impact on the current and future health of adolescents (ages 10–19 years). A sustainable healthy diet and healthy eating practices during adolescence have the potential to limit any nutritional deficits and linear-growth faltering generated during the first decade of life, and may limit harmful behaviours contributing to the epidemic of noncommunicable diseases in adulthood. Investing in adolescent health brings triple dividends: better health for adolescents now, improved well-being and productivity in their future adult life and reduced health risks for their children. Assuring optimal nutrition among adolescents requires coordinated actions across multiple sectors.

The global strategy for women's, children's and adolescents' health 2016–2030[2] aims to achieve the highest attainable standard of health for all women, children and adolescents in every setting. It envisions a world in which they realize their rights to physical and mental health and well-being, have social and economic opportunities, and are able to participate fully in shaping prosperous and sustainable societies. The *Global accelerated action for the health of adolescents (AA-HA!): Guidance to support country implementation*[3] called for a systematic approach to planning and implementing national programmes that address the specific needs of adolescents. Fortunately, evidence-informed actions exist to address malnutrition in all its forms, characterized by the coexistence of undernutrition along with overweight, obesity or risk factors for diet-related noncommunicable diseases in adolescence and adulthood.

Purpose

This publication is a derivative product summarizing the global, evidence-informed recommendations and principles of the World Health Organization (WHO) that address malnutrition in all its forms in adolescents with the aim of ensuring healthy lives and well-being among this group. The purpose of this publication is to facilitate the implementation of existing WHO guidelines and identify the normative gaps in nutrition-specific or nutrition-sensitive actions required for improving health and well-being of adolescents.

1 This publication is a WHO derivative guideline. A WHO guideline is any document, whatever its title, containing WHO recommendations about health interventions, whether they be clinical, public health or policy interventions. Derivative guideline products are summaries or more succinct documents that may include charts, manuals and other products designed to facilitate implementation of approved WHO guidelines. Such documents or tools may include: a slide set reflecting the guideline content; a "how to" manual or handbook; a flowchart, decision aide or algorithm; fact sheets; quality indicators; checklists; computerized applications; or templates. Implementation of a guideline is taken into account right from the start of the WHO guideline development process. Implementation is generally the responsibility of national or subnational groups. All publications containing WHO recommendations are approved by the WHO Guidelines Review Committee.

2 Every Woman Every Child. The global strategy for women's, children's and adolescents' health (2016–2030): survive, thrive, transform. Every Woman Every Child; 2015 (*http://globalstrategy.everywomaneverychild.org/pdf/EWEC_globalstrategyreport_200915_FINAL_WEB.pdf*, accessed 19 October 2017).

3 Global accelerated action for the health of adolescents (AA-HA!): guidance to support country implementation. Geneva: World Health Organization; 2017 (*http://apps.who.int/iris/bitstream/10665/255415/1/9789241512343-eng.pdf?ua=1*, accessed 30 January 2018).

Methodology

The existing WHO evidence-informed interventions and policies relevant to adolescent nutrition were grouped into eight main actions:

- promoting healthy diets;
- providing additional micronutrients through fortification of staple foods and targeted supplementation;
- managing acute malnutrition;
- preventing adolescent pregnancy and poor reproductive outcomes;
- promoting preconception and antenatal nutrition;
- providing access to safe environment and hygiene;
- promoting physical activity; and
- disease prevention and management.

This publication summarizes the recommendations relevant to the first seven actions. These actions are based on a framework of interventions and determinants which assume that healthy and well-nourished adolescents have the minimum capacity or agency to be able to:

- access a nutritious diet;
- contribute to their health through positive behaviours; and
- access essential health services.

The recommendations and principles presented herein are derived from the cited WHO guidelines, which were developed following the procedures described in the *WHO handbook for guideline development*.[4] The steps in this process include: (i) identification of priority questions and critical outcomes; (ii) retrieval of evidence; (iii) assessment and synthesis of the evidence; (iv) formulation of recommendations, including research priorities; and planning for (v) dissemination; (vi) implementation, equity and ethical considerations; and (viii) impact evaluation and updating of guidelines. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology is followed to prepare evidence profiles related to preselected topics, based on up-to-date reviews. Structured evidence-to-decision frameworks that include intervention effects, values, resources, equity, acceptability and feasibility criteria are used to guide the formulation of recommendations by the guideline development groups.

4 WHO handbook for guideline development, 2nd edition. Geneva: World Health Organization; 2014 (*http://apps.who.int/medicinedocs/documents/s22083en/s22083en.pdf*, accessed 30 January 2018).

Recommendations

Promoting healthy diets in adolescents

Sugars intake in adults and children

- A reduced intake of free sugars throughout the life course in both adults and children is recommended. Reducing the intake of free sugars to less than 10% of total energy intake is recommended. Further reduction of the intake of free sugars to below 5% of total energy intake is suggested.

Potassium intake in adults and children

- Increasing potassium intake from food in children aged 2–15 years to control blood pressure is suggested. The adult recommended potassium intake of at least 90 mmol/day should be adjusted downward for children, based on the energy requirements of children relative to those of adults.

Sodium intake in adults and children

- A reduction in sodium intake in children aged 2–15 years to control blood pressure is recommended. The recommended maximum level of intake of 2 g/day sodium in adults should be adjusted downward based on the energy requirements of children relative to those of adults.

Providing additional micronutrients through fortification of staple foods and targeted supplementation in adolescents

Fortification of maize flour and corn meal with vitamins and minerals

- Fortification of maize flour and corn meal with iron is recommended to prevent iron deficiency in populations, particularly vulnerable groups such as children and women.

- Fortification of maize flour and corn meal with folic acid is recommended to reduce the risk of occurrence of births with neural tube defects.

Fortification of food-grade salt with iodine for the prevention and control of iodine deficiency disorders

- All food-grade salt, used in household and food processing, should be fortified with iodine as a safe and effective strategy for the prevention and control of iodine deficiency disorders in populations living in stable and emergency settings.

Optimal serum and red blood cell folate concentrations in women of reproductive age for prevention of neural tube defects

- At the population level, red blood cell folate concentrations should be above 400 ng/mL (906 nmol/L) in women of reproductive age, to achieve the greatest reduction of neural tube defects.

- The above red blood cell folate threshold can be used as an indicator of folate insufficiency in women of reproductive age.

- No serum folate threshold is recommended for prevention of neural tube defects in women of reproductive age at the population level.

- Microbiological assay is recommended as the most reliable choice to obtain comparable results for red blood cell folate across countries.

Daily iron supplementation in adult women and adolescent girls

- Daily iron supplementation is recommended as a public health intervention in menstruating adult women and adolescent girls living in settings where anaemia is highly prevalent (40% or higher prevalence of anaemia), for the prevention of anaemia and iron deficiency.

Intermittent iron and folic acid supplementation in menstruating women

- Intermittent iron and folic acid supplementation is recommended as a public health intervention in menstruating women living in settings where anaemia is highly prevalent, to improve haemoglobin concentration and iron status and reduce the risk of anaemia in populations where the prevalence of anaemia among non-pregnant women of reproductive age is 20% or higher.

Daily iron supplementation in infants and children

- Daily iron supplementation is recommended as a public health intervention in school-age children aged 60 months and older living in settings where anaemia is highly prevalent, for preventing iron deficiency and anaemia.

- In malaria-endemic areas, the provision of iron supplementation in infants and children should be done in conjunction with public health measures to prevent, diagnose and treat malaria.

Intermittent iron supplementation in preschool and school-age children

- Intermittent iron supplementation is recommended as a public health intervention in preschool and school-age children to improve iron status and reduce the risk of anaemia in settings where the prevalence of anaemia in preschool or school-age children is 20% or higher.

Daily iron supplementation in postpartum women

- Oral iron supplementation, either alone or in combination with folic acid supplementation, may be provided to postpartum women for 6–12 weeks following delivery for reducing the risk of anaemia in settings where gestational anaemia is of public health concern.[5]

Use of multiple micronutrient powders for point-of-use fortification of foods consumed by pregnant women

- Routine use of multiple micronutrient powders during pregnancy is not recommended as an alternative to standard iron and folic supplementation during pregnancy for improving maternal and infant health outcomes.

Vitamin A supplementation in postpartum women

- Vitamin A supplementation in postpartum women is not recommended for the prevention of maternal and infant morbidity and mortality.

5 WHO considers a 20% or higher population prevalence of gestational anaemia to be a moderate public health problem.

Managing acute malnutrition in adolescents

Nutritional care and support for patients with tuberculosis

- Management of severe acute malnutrition
  - School-age children and adolescents (5–19 years), and adults, including pregnant and lactating women with active tuberculosis and severe acute malnutrition should be treated in accordance with WHO recommendations for management of severe acute malnutrition.

- Management of moderate undernutrition
  - School-age children and adolescent (5–19 years), and adults, including lactating women, with active tuberculosis and moderate undernutrition, who fail to regain normal body mass index after 2 months' tuberculosis treatment, as well as those who are losing weight during tuberculosis treatment, should be evaluated for adherence and comorbid conditions. They should also receive nutritional assessment and counselling and, if indicated, be provided with locally available nutrient-rich or fortified supplementary foods, as necessary to restore normal nutritional status.
  - Pregnant women with active tuberculosis and moderate undernutrition, or with inadequate weight gain, should be provided with locally available nutrient-rich or fortified supplementary foods, as necessary to achieve an average weekly minimum weight gain of approximately 300 g in the second and third trimesters.
  - Patients with active multidrug-resistant tuberculosis and moderate undernutrition should be provided with locally available nutrient-rich or fortified supplementary foods, as necessary to restore normal nutritional status.

Preventing adolescent pregnancy and poor reproductive outcomes

WHO guidelines on preventing early pregnancy and poor reproductive outcomes among adolescents in developing countries

- Reducing marriage before the age of 18 years
  - Encourage political leaders, planners and community leaders to formulate and enforce laws and policies to prohibit marriage of girls before 18 years of age.
  - Undertake interventions to delay marriage of girls until 18 years of age by influencing family and community norms. These interventions should be undertaken in conjunction with interventions directed at political leaders/planners.
  - Implement interventions to inform and empower girls, in combination with interventions to influence family and community norms, to delay the age of marriage among girls under 18 years of age.
  - Increase educational opportunities for girls through formal and non-formal channels, to delay marriage until 18 years of age.

- Reducing pregnancy before the age of 20 years
  - Advocate for adolescent pregnancy prevention among all stakeholders through interventions such as: information provision, sexuality and health education, life skills building, contraceptive counselling and service provision, and the creation of supportive environments.
  - Maintain and improve efforts to retain girls in school, at both primary and secondary levels.

- Offer interventions that combine curriculum-based sexuality education with contraceptive promotion to adolescents, in order to reduce pregnancy rates.
- Offer and promote postpartum and post-abortion contraception to adolescents through multiple home visits and/or clinic visits to reduce the chances of second pregnancies among adolescents.

➔ Increasing use of contraception by adolescents at risk of unintended pregnancy

- Undertake efforts with political leaders and planners to formulate laws and policies to increase adolescents' access to contraceptive information and services, including emergency contraceptives.
- Undertake interventions to influence community members to support access to contraceptives for adolescents.
- Implement interventions to improve health service delivery to adolescents as a means of facilitating their access to and use of contraceptive information and services.
- Implement interventions at scale that provide accurate information and education about contraceptives, in particular curriculum-based sexuality education, to increase contraceptive use among adolescents.
- Implement interventions to reduce the financial cost of contraceptives to adolescents.

➔ Reducing coerced sex among adolescents

- Continue efforts with political leaders, planners and the community to formulate laws and policies that punish perpetrators of coerced sex involving adolescent girls, to enforce these laws and policies in a way that empowers victims and their families, and to monitor their enforcement.
- Implement interventions to enhance adolescent girls' abilities to resist coerced sex and to obtain support if they experience coerced sex by: building their self-esteem; developing their life skills in areas such as communication and negotiation; and improving their links to social networks and their ability to obtain social support.
- Implement interventions to engage men and boys to critically assess gender norms and normative behaviours (for example, gender transformative approaches) that relate to sexual coercion and violence. Combine these with wider interventions to influence social norms on these issues.

➔ Reducing unsafe abortion among adolescents

- Ensure that laws and policies enable adolescents to obtain safe abortion services.
- Enable adolescents to obtain safe abortion services by informing them and other stakeholders about: the dangers of unsafe methods of interrupting a pregnancy; the safe abortion services that are legally available; and where and under what circumstances these services can be obtained legally.
- Identify and overcome barriers to the provision of safe abortion services to adolescents.
- Ensure access to post-abortion care by adolescents as a life-saving medical intervention, whether or not the abortion or attempted abortion was legal.

➔ Increasing use of skilled antenatal, childbirth and postnatal care among adolescents

- Provide information to all pregnant adolescents and other stakeholders about the importance of utilizing skilled antenatal care.

- Provide information to all pregnant adolescents and other stakeholders about the importance of utilizing skilled childbirth care.
- Promote birth and emergency preparedness in antenatal care strategies for pregnant adolescents (in household, community and health facility settings).
- Expand the availability and access to basic emergency obstetric care and comprehensive emergency obstetric care to all populations, including adolescents.

Promoting preconception and antenatal nutritional care in adolescents

WHO recommendations on antenatal care for a positive pregnancy experience

- Counselling about healthy eating and keeping physically active during pregnancy is recommended for pregnant women to stay healthy and to prevent excessive weight gain during pregnancy.
- In undernourished populations, nutrition education on increasing daily energy and protein intake is recommended for pregnant women to reduce the risk of low-birth-weight neonates.
- In undernourished populations, balanced energy and protein dietary supplementation is recommended for pregnant women to reduce the risk of stillbirths and small-for-gestational-age neonates.
- In undernourished populations, high-protein supplementation is not recommended for pregnant women to improve maternal and perinatal outcomes.
- Daily oral iron and folic acid supplementation with 30–60 mg of elemental iron and 400 µg (0.4 mg) of folic acid is recommended for pregnant women to prevent maternal anaemia, puerperal sepsis, low birth weight and preterm birth.
- Intermittent oral iron and folic acid supplementation with 120 mg of elemental iron and 2800 µg (2.8 mg) of folic acid once weekly is recommended for pregnant women to improve maternal and neonatal outcomes if daily iron is not acceptable due to side-effects, and in populations with an anaemia prevalence among pregnant women of less than 20%.
- In populations with low dietary calcium intake, daily calcium supplementation (1.5–2.0 g oral elemental calcium) is recommended for pregnant women to reduce the risk of pre-eclampsia.
- Vitamin A supplementation is only recommended for pregnant women in areas where vitamin A deficiency is a severe public health problem to prevent night blindness.
- Zinc supplementation for pregnant women is only recommended in the context of rigorous research.
- Multiple micronutrient supplementation is not recommended for pregnant women to improve maternal and perinatal outcomes.
- Vitamin B_6 (pyridoxine) supplementation is not recommended for pregnant women to improve maternal and perinatal outcomes.
- Vitamin E and C supplementation is not recommended for pregnant women to improve maternal and perinatal outcomes.

- Vitamin D supplementation is not recommended for pregnant women to improve maternal and perinatal outcomes.

- For pregnant women with high daily caffeine intake (more than 300 mg per day), lowering daily caffeine intake during pregnancy is recommended to reduce the risk of pregnancy loss and low-birth-weight neonates.

Vitamin A supplementation during pregnancy for reducing the risk of mother-to-child transmission of HIV

- Vitamin A supplementation in HIV-positive pregnant women is not recommended as a public health intervention for reducing the risk of mother-to-child transmission of HIV.

WHO recommendations on health promotion interventions for maternal and newborn health

- Birth preparedness and complication readiness
  - Birth preparedness and complication readiness interventions are recommended to increase the use of skilled care at birth and to increase the timely use of facility care for obstetric and newborn complications.

- Male involvement interventions for maternal and newborn health
  - Interventions to promote the involvement of men during pregnancy, childbirth and after birth are recommended to facilitate and support improved self-care of women, improved home care practices for women and newborns, improved use of skilled care during pregnancy, childbirth and the postnatal period for women and newborns, and increase the timely use of facility care for obstetric and newborn complications.
  - These interventions are recommended provided that they are implemented in a way that respects, promotes and facilitates women's choices and their autonomy in decision-making and supports women in taking care of themselves and their newborns. In order to ensure this, rigorous monitoring and evaluation of implementation is recommended.

- Partnership with traditional birth attendants
  - Where traditional birth attendants remain the main providers of care at birth, dialogue with traditional birth attendants, women, families, communities and service providers is recommended in order to define and agree on alternative roles for traditional birth attendants, recognizing the important role they can play in supporting the health of women and newborns.
  - Use of lay health workers including trained traditional birth attendants is recommended for promoting the uptake of a number of maternal- and newborn-related health-care behaviours and services, providing continuous social support during labour in the presence of a skilled birth attendant, and administering misoprostol to prevent postpartum haemorrhage.
  - Use of lay health workers including trained traditional birth attendants to deliver the following interventions is recommended, with targeted monitoring and evaluation: distribution of certain oral supplement-type interventions to pregnant women (calcium supplementation in women living in areas with known low levels of calcium intake; routine iron and folate supplementation in pregnant women; intermittent presumptive therapy for malaria in pregnant women living in endemic areas; vitamin A supplementation in pregnant women living in areas where severe vitamin A deficiency is a serious public health problem); and the initiation and maintenance of injectable contraceptives using a standard syringe.

- Providing culturally appropriate skilled maternity care
  - Ongoing dialogue with communities is recommended as an essential component in defining the characteristics of culturally appropriate, quality maternity care services that address the needs of women and newborns and incorporate their cultural preferences. Mechanisms that ensure women's voices are meaningfully included in these dialogues are also recommended.

- Companion of choice at birth
  - Continuous companionship during labour and birth is recommended for improving women's satisfaction with services.
  - Continuous companionship during labour and birth is recommended for improving labour outcomes.

- Community mobilization through facilitated participatory learning and action cycles with women's groups
  - Implementation of community mobilization through facilitated participatory learning and action cycles with women's groups is recommended to improve maternal and newborn health, particularly in rural settings with low access to health services.
  - Implementation of facilitated participatory learning and action cycles with women's groups should focus on creating a space for discussion where women are able to identify priority problems and advocate for local solutions for maternal and newborn health.

- Community participation in quality-improvement processes
  - Community participation in quality-improvement processes for maternity care services is recommended to improve quality of care from the perspectives of women, communities and health-care providers.
  - Communities should be involved in jointly defining and assessing quality. Mechanisms that ensure women's voices are meaningfully included are also recommended.

- Community participation in programme planning and implementation
  - Community participation in programme planning, implementation and monitoring is recommended to improve use of skilled care during pregnancy, childbirth and the postnatal period for women and newborns, increase the timely use of facility care for obstetric and newborn complications and improve maternal and newborn health. Mechanisms that ensure women's voices are meaningfully included are also recommended.

- Maternity waiting homes
  - Maternity waiting homes are recommended to be established close to a health facility where essential childbirth care and/or care for obstetric and newborn complications is provided to increase access to skilled care for populations living in remote areas or with limited access to services.

- Community-organized transport schemes
  - Community-organized transport schemes are recommended in settings where other sources of transport are less sustainable and not reliable. However, measures should be taken to ensure the sustainability, efficacy and reliability of these schemes while seeking long-term solutions to transport.

Providing access to safe environment and hygiene for adolescents

Preventive chemotherapy to control soil-transmitted helminth infections in at-risk population groups

- Preventive chemotherapy (deworming), using annual or biannual single-dose albendazole (400 mg) or mebendazole (500 mg), is recommended as a public health intervention for all young children (12–23 months), preschool (24–59 months) and school-age children living in areas where the baseline prevalence of any soil-transmitted infection is 20% or higher among children, in order to reduce the worm burden of soil-transmitted helminth infections.

- Preventive chemotherapy (deworming), using annual or biannual single-dose albendazole (400 mg) or mebendazole (500 mg), is recommended as a public health intervention for all non-pregnant adolescent girls (10–19 years) and non-pregnant women of reproductive age (15–49 years) living in areas where the baseline prevalence of any soil-transmitted helminth infection is 20% or higher among non-pregnant adolescent girls and non-pregnant women of reproductive age, in order to reduce the worm burden of soil-transmitted helminth infection.

- Preventive chemotherapy (deworming) using single-dose albendazole (400 mg) or mebendazole (500 mg), is recommended as a public health intervention for pregnant women, after the first trimester, living in areas where both: (i) the baseline prevalence of hookworm and/or *Trichuris trichiura* infection is 20% or higher among pregnant women, and (ii) anaemia is a severe public health problem, with a prevalence of 40% or higher among pregnant women, in order to reduce the worm burden of hookworm or *T. trichiura* infection.

Promoting physical activity in adolescents

Global recommendations on physical activity for health

- For children and young people of this age group (5–17 years) physical activity includes play, games, sports, transportation, recreation, physical education or planned exercise, in the context of family, school and community activities. In order to improve cardiorespiratory and muscular fitness, bone health, cardiovascular and metabolic health biomarkers, and reduced symptoms of anxiety and depression, the following are recommended:
  - Children and young people aged 5–17 years should accumulate at least 60 minutes of moderate- to vigorous-intensity physical activity daily.
  - Physical activity of amounts greater than 60 minutes daily will provide additional health benefits.
  - Most of the daily physical activity should be aerobic. Vigorous-intensity activities should be incorporated, including those that strengthen muscle and bone, at least three times per week.

- For adolescents and adults in this age group (18–64 years), physical activity includes recreational or leisure-time physical activity, transportation (for example, walking or cycling), occupational (that is, work), household chores, play, games, sports or planned exercise, in the context of daily, family and community activities. In order to improve cardiorespiratory and muscular fitness, bone health, and reduce the risk of noncommunicable diseases and depression, the following are recommended:
  - Adolescents and adults aged 18–64 years should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week, or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week, or an equivalent combination of moderate- and vigorous-intensity activity.

- Aerobic activity should be performed in bouts of at least 10 minutes' duration.
- For additional health benefits, adolescents and adults in this age group should increase their moderate-intensity aerobic physical activity to 300 minutes per week, or engage in 150 minutes of vigorous-intensity aerobic physical activity per week, or an equivalent combination of moderate- and vigorous-intensity activity.
- Muscle-strengthening activities involving major muscle groups should be done on two or more days a week.

Research gaps

Several evidence-informed actions exist to address nutrition actions relevant to adolescents. However, there is limited evidence available in some knowledge areas. Based on the gaps identified in previous WHO guidelines, discussions with stakeholders working in the field of adolescent nutrition, and the framework of interventions and determinants of adolescent nutrition, further research is merited in the areas listed below:

- addressing the coexistence of undernutrition along with overweight, obesity or risk factors for diet-related noncommunicable diseases in adolescence and adulthood across different regions, countries and contexts;
- gaining further understanding of needs, preferences and circumstances of different groups of adolescents on which to strengthen existing and build new service delivery mechanisms that ensure health equity, non-discrimination and active participation of adolescents;
- assessment of behavioural profiles, dietary patterns and main influencers of adolescents in the context of their social and psychosocial development in order to inform programmes and policy-making;
- follow-up research on implementation to help identify innovations and delivery platforms that reach and affect adolescents in order to achieve scale-up, health systems integration and sustainability;
- assessment, diagnosis, prevention and detailed management of all forms of malnutrition among adolescents, particularly on the prevention and management of overweight and obesity;
- evaluation of large-scale sustainable services that are appropriate for all groups of adolescents including, for example, services related to the promotion of healthy diets, distribution of micronutrient supplementation and access to contraceptives, as well as urban planning to increase physical activity; and
- assessment of impact of interventions and policies on autonomy, positive development, empowerment and engagement of adolescents, as well as the ethical and socio-cultural acceptability or intrusiveness of interventions for this age group.

Member States and partners should ensure that health information systems gather, analyse and use age- and sex-disaggregated data on the social determinants of adolescent nutrition, as well as the preventive and curative actions taken to address nutritional health problems.

Implementation considerations

Implementation of these actions should explicitly take into account the heterogeneity in adolescents in general (for instance, in their state of physical growth and social development), as well as the diversity within their country (for instance, in terms of existing social norms and expected responsibilities in the family, and numbers out of school or out of work). The needs and responses required to address adolescent nutrition may vary with the context. In addition, designing and implementing programmes to address adolescent nutrition should allow participation of adolescents in governance and programme design, implementation, monitoring and evaluation. Adolescent-friendly health services need to be accessible, equitable, acceptable, appropriate, comprehensive, effective and efficient.

Introduction

This publication summarizes the global, evidence-informed recommendations and principles of the World Health Organization (WHO) on malnutrition in all its forms in adolescents[1] for the purpose of ensuring well-being and a healthy life among this age group. In general, the recommendations presented herewith are taken from guidelines developed following the procedures described in the *WHO handbook for guideline development (1)* although some principles mentioned herein pre-date the adoption of the handbook.

This derivative guideline aims to help Member States and their partners in their efforts to make informed decisions on the appropriate nutrition actions to achieve the targets set in the *2030 Agenda for sustainable development (2)*, *The global strategy for women's, children's, and adolescents' health (2016–2030) (3)*, the *Comprehensive implementation plan on maternal, infant and young child nutrition (4)*, and the *Global action plan for the prevention and control of noncommunicable diseases 2013–2020 (5)*. It complements and expands on the guidance presented in the *Global accelerated action for the health of adolescents (AA-HA!): guidance to support country implementation (6)*.

The recommendations and principles presented in this derivative guideline are intended for a wide audience, including policy-makers, their expert advisers, and technical and programme staff at organizations involved in the design, implementation and scaling-up of programmes for adolescent health and nutrition. The guideline presents some key aspects to consider when selecting, prioritizing and implementing adolescent health and nutrition programmes at national or regional level, highlighting the importance of effective coordination across sectors and stakeholders. As nutritional problems are complex, with many diverse and interrelated causes, this guidance is intended for use by stakeholders from across the range of sectors that are concerned with nutrition, including health, food and agriculture, social welfare, and water and sanitation.

1 The term adolescent refers to young people between the ages of 10 and 19 years.

Background

The nutritional status of adolescents (ages 10–19 years) has a profound impact on their immediate and future health *(7)*. A sustained healthy diet and healthy eating practices during this period have the potential to address nutritional deficits and linear growth faltering generated during the first decade of life, and may limit harmful behaviours contributing to the epidemic of noncommunicable diseases (NCDs) in adulthood *(8, 9)*. Investing in adolescent health brings triple dividends: better health for adolescents now, for their future adult life and for their children.

Nutrient needs increase in adolescence to meet the demands of pubertal growth. Numerous factors influence the dietary habits and behaviours of adolescents, including brain development and understanding of matters that might affect health as well as the broader familial, socio-cultural and economic environment in which an adolescent lives, eats, studies, works and plays *(10–14)*. In addition, given that 16 million girls between the ages of 15 and 19 years enter motherhood every year, their nutritional status is important not only for their own health, but also for the health of their offspring *(15)*.

The second decade of life marks a period of rapid physical, cognitive, social, emotional and ethical transformation. It is a time of increased engagement with the environment and receptivity to new ideas *(16)*. It is also a time when identities, values, capacities and attitudes are formed, including those that may shape an individual's lifelong health, diet and eating practices. Early adolescence (10–14 years) is dominated by pubertal, sexual and brain development, while late adolescence (15–19 years) is characterized by continuing physiological development and brain maturation *(17, 18)*.

After infancy, growth during adolescence is faster than in any other period of life *(19, 20)*. There is a 15–20% increase in height, 40–60% of peak bone mass is attained and up to 50% of adult body weight is gained. At the same time, the adolescent brain undergoes tremendous growth and development and is partially shaped by social, emotional and behavioural exposures *(8, 20–22)*. Often referred to as an additional window of opportunity for growth and development in the lifecycle *(9)*, the period of adolescence offers a unique chance to address nutritional problems generated during the first decade of life and to develop healthy and long-lasting dietary and lifestyle habits (including accessing safe water, sanitation and hygiene (WASH), and physical activity).

Puberty typically commences between the ages of 8 and 14 years in girls and between 9 and 15 years in boys. Although variations exist internationally, the median age of menarche is between 12 and 13 years, that is, about 2–2.5 years after breast development begins *(23, 24)*. Girls who are taller or who have a greater body mass index (BMI) in childhood (especially those who are already overweight or obese) tend to attain puberty and menarche at an earlier age and have subnormal gains in height during adolescence *(25–28)*. In contrast, girls who are stunted in childhood tend to enter puberty and reach menarche later. However, these girls may have greater potential for catch-up growth during adolescence *(9, 25, 29, 30)*. Some studies suggest that the reverse is apparent in adolescent boys *(27)*.

Growth rates in girls typically increase between the ages of 10 and 12 years, approximately 1.5–2 years before menarche. Boys usually show the first physical changes of puberty between the ages of 10 and 16 years. They tend to grow most quickly between 12 and 15 years. The growth spurt in boys is, on average, about 2 years later than that in girls *(20, 31)*. While all adolescents follow a similar growth sequence during puberty, there is variability in the timing, duration and intensity of the pubertal growth spurt, when height and weight increase rapidly *(32–34)*.

Nutrient needs during adolescence rise incrementally and correlate more closely with growth patterns (often referred to as the Tanner stages) and growth rates, rather than with chronological age *(33, 34)*. When an adolescent's overall energy and nutrient needs are not met, linear growth may be slowed, stunting may occur, and sexual development and menarche may be delayed *(19, 21, 22, 31)*.

Both macro- and micronutrient requirements increase in adolescence. In particular, during periods of peak physical growth, need increases for iron, calcium, zinc, vitamin A and vitamin D (calcitriol) *(21, 31, 35, 36)*. It is estimated that a moderately active adolescent girl requires a caloric intake of 2300 kcal/day *(31)*.

In addition to physical changes, adolescence is also a time when the brain develops adult capabilities and skills needed for goal-directed behaviour. During early adolescence, the brain experiences considerable cell growth, which affects how emotions are regulated, information is processed and decisions are made *(37)*. These changes increase the capacity for greater social and emotional engagement, and shape adolescents' orientation towards peer-based interactions, including increased exploration, experimentation, sensation-seeking and risk-taking *(37, 38)*.

Brain development also naturally steers adolescents towards exciting, arousing and stressful situations, which can result in impulsive behaviours or conditions that undermine health, such as depression, social anxiety, violence, accidents and injuries, substance abuse, and unprotected sex *(38, 39)*. While brain orientation for risk-taking may be seen as a liability, moderate forms of risk-taking can lead to adaptive behaviours that promote acquisition of new skills, autonomy and long-term survival *(38)*. As the brain develops throughout adolescence, so does the ability to exert control over thoughts and actions, and more appropriately engage in and respond to social situations *(40)*.

Global trends in adolescent nutrition

Malnutrition during adolescence manifests in three broad groups of conditions: undernutrition (wasting, stunting or chronic undernutrition and thinness or underweight); micronutrient deficiency or excess (inadequate or excessive intake of vitamins or minerals); and overweight or obesity. The latter increases the risk for diet-related NCDs such as heart disease, stroke, diabetes and some cancers *(41)*.

In adolescence, underweight or thinness is defined as BMI-for-age Z-score below –2, severe thinness as BMI-for-age Z-score below –3, overweight as a BMI-for-age Z-score above 1, and obesity as having a Z-score greater than 2 of the WHO growth reference standard *(42)*. Adolescents aged 10–14 years who have a mid-upper arm circumference of less than 160 mm and have signs of severe visible wasting or bilateral pitting oedema are diagnosed as having severe acute malnutrition *(43)*.

The double burden of malnutrition is characterized by the coexistence of undernutrition with overweight, obesity or diet-related NCDs in the same community, nation or region. This double burden tends to affect women disproportionally and is higher in urban areas *(44, 45)*. Trends from 1975 to 2016 in BMI, underweight, overweight and obesity among over 31 million children and adolescents aged 5–19 years in 200 countries showed mean BMI and the prevalence of overweight and obesity in most

regions of the world are increasing. Despite this rise, more children and adolescents are moderately or severely underweight than obese. The burden of underweight is increasingly concentrated in south Asia and central, east and west Africa, while BMI has plateaued at high levels in many high-income countries and is accelerating in parts of Asia *(46)*.

Chronic undernutrition among adolescents is commonly associated with poverty, poor maternal health and nutrition, recurring illness, or inappropriate infant and young child feeding and care in early life *(41, 47)*. In some countries, up to half of all adolescents are stunted *(48)*. Micronutrient malnutrition is high among adolescents, specifically iron, iodine or vitamin A deficiency, and contributes substantially to overall reduced health *(49)*.

Two-thirds of premature deaths and one-third of the total disease burden in adulthood are associated with environments, conditions or behaviours experienced, initiated or consolidated during adolescence *(16)*. In 2015, there were 1.2 million largely preventable adolescent deaths globally *(50)*. Malnutrition factors into many of the causes of mortality in adolescence, either as a determinant or exacerbating factor. The majority of all adolescent deaths occur in low- and middle-income countries in Africa (45%) and Southeast Asia (26%), the regions hosting 19% and 30% of the world's adolescent population, respectively *(50)*.

Poor dietary intake in adolescents, resulting in inadequate or excessive amounts and proportions of energy, protein, vitamins and minerals, is associated with micronutrient deficiencies such as iron deficiency anaemia, diarrhoeal diseases, high fasting plasma glucose, high blood pressure, preconception nutrient deficiencies, and in pregnant adolescents, poor maternal health and birth outcomes *(47, 51–55)*.

Overweight and obesity in adolescence, resulting from an unhealthy diet and inadequate physical activity, poses risks for future health, including NCDs such as diabetes, hypertension, coronary heart disease, stroke, certain cancers and obstructive sleep apnoea *(56)*. Globally, disability-adjusted life years (DALYs) in adolescents are most commonly attributable to iron deficiency anaemia, especially in the 10–14-year age group *(53)*, and, in particular, in South East Asia, Europe, Western Pacific and high-income countries. Iron deficiency anaemia is also highly prevalent in Africa, eastern Mediterranean, and in the Americas *(53)*. Inadequate nutrition combined with rapid physical growth (especially during early adolescence), menstruation and/or potential infections that cause blood loss, such as hookworm, malaria and urinary schistosomiasis, is associated with iron depletion and iron deficiency in adolescents *(57, 58)*.

Other global leading contributors of DALYs among adolescents aged 10–14 years are lower respiratory infections (influenza, pneumococcal pneumonia and Haemophilus influenza type B), diarrhoeal diseases (caused by viruses, protozoa and pathogenic and other foodborne bacteria), anxiety disorders and meningitis *(53)*. Among older adolescents (aged 15–19 years), DALYs are mainly attributable to depressive disorders; maternal conditions (including, in this context, haemorrhage, sepsis, hypertensive disorders, obstructed labour, complications of abortion, indirect maternal deaths, late maternal deaths, and maternal deaths aggravated by AIDS, tuberculosis and other infections or NCDs), self-harm and anxiety disorders are other leading contributors of DALYs *(53)*.

Evidence-informed interventions and policies for adolescent nutrition

A logical framework for national adolescent health programming was presented in *Global AA-HA! (6)*. The framework takes a unified approach to the planning and evaluation of adolescent programmes, and illustrates that adolescent programming will need government leadership, adolescent participation, adequate financing and national accountability, the four overarching conditions for successful programming. Health is a key sector in achieving universal coverage but will need coordinated actions across multiple sectors.

While recognizing that the overarching factors of leadership, participation, financing and accountability are necessary for any national programme to succeed, national governments set their national health priorities with specific implications for selected interventions and key activities. This entails an assessment of needs, an analysis of the landscape and setting of priorities. Therefore, based on country context, national governments will require identifying needs related to adolescent well-being and risk factors, determining which interventions are most appropriate and effective, and thus implement a tailored package of policies and interventions with a monitoring and evaluation plan.

Well-nourished adolescents protected from disease, infection and early pregnancy are less likely to develop malnutrition in all its forms during adolescence and adulthood, and are more likely to avoid NCDs, have optimal maternal and birth outcomes, and enjoy increased work capacity and productivity. The conceptual framework of malnutrition, originally propounded in 1990 by UNICEF and later adapted by The Lancet's 2008 Maternal and Child Undernutrition series and 2013 Maternal and Child Nutrition series *(48, 55, 59)*, enlists the underlying causes of malnutrition as:

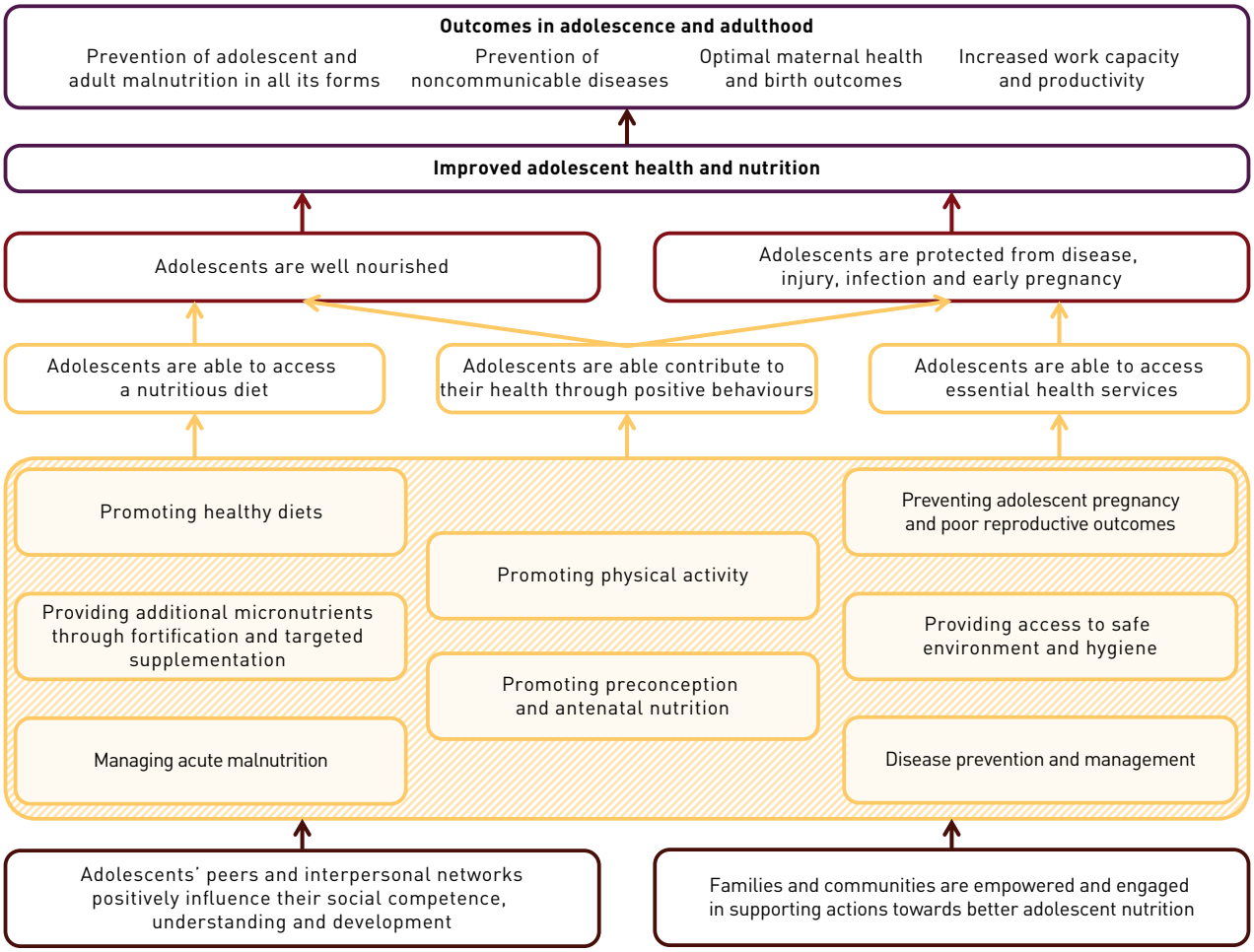
- household food insecurity;
- inadequate feeding and care practices; and
- environment factors and health services.

Conversely, for adolescents to enjoy health and well-being and improved nutrition, they should have the following minimum capacity or agency:

- they are able to access a nutritious diet;
- they are able to contribute to their health through positive behaviours; and
- they are able to access essential health services.

Based on the underlying causes of malnutrition and their corresponding solutions listed above, eight evidence-based nutrition interventions and policies have been identified that could affect adolescent nutrition (Fig. 1).

Fig. 1. Framework of interventions and determinants of adolescent nutrition



Many recommendations that address adolescent health target these individuals directly (for example, human papillomavirus immunization and comprehensive sex education). Several other guidelines that are aimed at a wider age group or the population as a whole also benefit adolescents. Because the period of adolescence (10–19 years) overlaps with both childhood (0–17 years) and young adulthood (18–24 years), many recommendations targeted specifically towards children (for example, related to management of acute malnutrition) or women (for example, related to reproductive health) also address major adolescent health conditions. However, adolescents may not benefit as much as they should from these recommendations if the implementation of these recommendations ignore the specific needs of adolescents. For example, an iron supplementation programme targeting both non-pregnant women and adolescent girls may require separate distribution systems to reach both groups effectively and equitably.

Policies and interventions can be aimed at three broad ecological levels *(60)*, as follows:

1. Macro or public policy level: these policies seek to address health across whole populations.

2. Mesa or community level: these policies aim to reduce vulnerabilities of at-risk groups and reduce exposure to health-damaging factors.

3. Micro or individual level: these policies target disadvantaged persons and aim to reduce consequences of illness.

In the following subsections, actions for adolescent nutrition-related policies and interventions listed in the logical framework (see Fig. 1) are presented for each ecological level.

Promoting healthy diets in adolescents

Healthy diets have a critical role in protecting against all forms of malnutrition (that is, undernutrition, overweight and obesity, and micronutrient deficiency or excess) and reducing the risk of cardiovascular diseases, type 2 diabetes, and certain types of cancer *(61–63)*. A healthy diet provides adequate energy, protein, vitamins and minerals (macro- and micronutrients) obtained through the consumption of foods such as fruits, vegetables, legumes, nuts and whole grains; has less than 10% of total energy intake from free sugars; has less than 30% of total energy intake from fats (with unsaturated fats preferable to saturated fats, and no trans fats); and decreased salt intake *(63, 64)*. Foods to be avoided include those that are high in fat (saturated and trans fat), foods with added sodium and sugars (including sweetened beverages), and fast foods high in energy, fat and sodium, and low in nutrient density *(32, 63, 65)*.

Population nutrient intake goals as percentage of total energy should include between 15% and 30% of calories from fat, between 55% and 75% of calories from carbohydrate (with no more than 5–10% of these derived from added sugars) and between 10% and 15% of calories from protein *(66)*. Many adolescents consume inadequate amounts of fruits, vegetables and whole grains, insufficient vitamins and minerals (including folic acid, vitamins A, D, E and B_6, calcium, iron, zinc, magnesium) and fibre, and excess fat, sodium, cholesterol and added sugars *(32, 67–70)*. Barriers to healthy diets may include, but are not limited to the physical, economic and socio-cultural environment, knowledge, and a sense of self-efficacy.

Eating disorders, such as anorexia nervosa and bulimia, often begin in adolescence, especially among girls, and are more widespread in high-income countries *(47)*. They are characterized by abnormal eating behaviours, a preoccupation with food and an obsession with weight and body shape. They can lead to serious physical and mental health outcomes, and are associated with high levels of comorbidities such as depression, anxiety and substance abuse *(43)*. Multidimensional programmes that integrate traditional health education approaches within broader mental health promotion strategies appear to have promising outcomes *(71)*.

Adolescents are increasingly exposed to unhealthy food environments and aggressive marketing of unhealthy foods (on television, in films, social media and point-of-sale advertising). They are consuming greater amounts of cheap, energy-dense, nutrient-poor foods that are high in sugar, sodium and fat (including processed and ultra-processed foods). They lack access to affordable fresh fruits and vegetables, and may not have the nutritional knowledge, skills, or control of resources to buy and prepare foods needed for a healthy diet *(10, 72, 73)*.

Special attention may be needed to promote intake of fruits and vegetables and discourage intake of energy-dense micronutrient-poor foods and sugar-sweetened beverages. Limiting the exposure of adolescents to heavy marketing of these products and providing necessary information and skills to make healthy food choices are additional measures to enhance adolescent nutrition. Some examples of foods rich in micronutrients are listed in Table 1.

Table 1. Micronutrient-rich foods for a healthy diet

Food sources and considerations for absorption	Micronutrients
• Haem iron: meat, poultry and fish • Non-haem iron: cereals, pulses, legumes, fruits and vegetables • Haem iron is absorbed more efficiently than non-haem iron. Consuming foods containing non-haem iron with food that contains vitamin C can improve the absorption of non-haem iron in a meal • Calcium inhibits iron absorption and they should not be consumed together	Iron
• Leafy green vegetables (bok choy, Chinese cabbage, broccoli, kale, mustard greens), fish eaten whole, soy products (tofu and soy millk), dairy • Oxalic acid limits the bioavailability of calcium contained in spinach, beetroot and sweet potatoes • Diets high in animal protein and/or phytates (phytates are found in most plant foods, particularly whole grains and legumes, unleavened bread) limit calcium absorption • Diets high in processed foods containing sodium provide less useable calcium because sodium causes calcium loss in urine	Calcium
• Leafy green vegetables, root vegetables, beans and peas, fruits from vine-based plants (for example, tomatoes, cucumbers, courgettes, aubergines and pumpkin), and tree fruits	Potassium
• Nuts, legumes, whole grains, watermelon, blackberries, seeds, shellfish, poultry, eggs, red meat and dairy products • Consumption of phytates (see note for calcium above), which are present in diets with little or no meat consumption, limits zinc absorption • Iron and calcium supplements decrease zinc absorption	Zinc
• Deeply coloured fruits and vegetables, oily fruits, and red palm oil • Intestinal infection and diarrhoea limit vitamin A absorption, as does consumption of alcohol	Vitamin A
• Citrus fruits, bell peppers, green beans, strawberries, papaya, guava, kiwi fruit, potatoes, broccoli, and tomatoes	Vitamin C
• Oily fish, liver, egg yolks, yeast and mushrooms • The most potent source of vitamin D is the sun	Vitamin D

Source: Reference (74).

The WHO recommendations related to the promotion of healthy diets (Table 2) may be applied in conjunction with national-level food-based dietary guidelines to guide effective public health and nutrition policies and programmes to promote a healthy diet.

Table 2. WHO recommendations for promoting healthy diets in adolescents

Ecological level	Actions and implementation considerations	Guideline title (year)	WHO recommendations on nutrition-related policies and interventions for adolescents
Macro (public policy) level	Develop food policies and standards Set clear definitions for the key components of food policies, thereby allowing for a standard implementation process Ensure government regulatory policies support healthier composition of staple foods	*Sugars intake for adults and children* (2015) *(75)*	• WHO recommends a reduced intake of free sugars throughout the life course. • In both adults and children, WHO recommends reducing the intake of free sugars to less than 10% of total energy intake. • WHO suggests a further reduction of the intake of free sugars to below 5% of total energy intake.
		Potassium intake for adults and children (2012) *(76)*	• WHO suggests an increase in potassium intake from food to control blood pressure in children aged 2–15 years. The recommended potassium intake of at least 90 mmol/day in adults should be adjusted downward for children, based on the energy requirements of children relative to those of adults.
		Sodium intake for adults and children (2012) *(77)*	• WHO recommends a reduction in sodium intake to control blood pressure in children aged 2–15 years. The recommended maximum level of intake of 2 g/day sodium in adults should be adjusted downward based on the energy requirements of children relative to those of adults.

Additional guidance on macro or policy level actions that can be taken to promote healthy diets include recommendations to reduce the impact of marketing of unhealthy foods and beverages such as foods high in saturated fats, *trans*-fatty acids, free sugars or salt *(78–80)*. This includes ensuring that settings where children gather are free from all forms of marketing of foods high in saturated fats, *trans*-fatty acids, free sugars or salt. Settings include, but are not limited to, schools, school grounds and playgrounds, family and child clinics, paediatric services and religious settings, and during any sporting and cultural activities that are held on these premises.

At the mesa or community level, policy-makers can create healthy food environments in schools and other public institutions by promoting weight management interventions for obese adolescents or those at risk of developing NCDs; developing and implementing high-intensity school-based interventions that focus on diets and include supportive school environment and policies and healthy food options available through school food services, including sale of competitive foods in school kiosks; and implementing high-intensity school-based interventions that include a curriculum on diet taught by trained teachers and contains a parental or family component *(78, 81)*.

Global frameworks such as the Health Promoting Schools or the Nutrition-friendly Schools Initiative (NFSI) guide countries designing appropriate school health and nutrition programmes to ensure that policies, curriculum, environment and services are conducive to good nutrition.

At a micro or individual level, policy-makers can promote healthy dietary habits and eating practices in settings where adolescents gather through the development and implementation of multicomponent programmes that provide healthy food and beverages, including safe water, in schools, communities and workplace facilities. According to the global strategy for diet, physical activity and health, recommendations for diets of populations and individuals should aim to achieve energy balance and a healthy weight, limit energy intake from total fats and shift fat consumption away from saturated fats to unsaturated fats and towards the elimination of *trans*-fatty acids, increase consumption of fruits, vegetables and legumes, whole grains and nuts, limit the intake of free sugars, and limit salt (sodium) consumption from all sources and ensure that salt is iodized *(82)*. As part of a healthy diet low in fat, sugars and sodium, WHO suggests consuming more than 400 g of fruits and vegetables per day to improve overall health and reduce the risk of certain NCDs. Less than 30% of total energy intake should come from fats. Unsaturated fats are preferable to saturated fats. Industrial *trans*-fats are not part of a healthy diet *(66)*.

Providing additional micronutrients through fortification of staple foods and targeted supplementation in adolescents

Poor nutrition is often associated with inadequate intake of healthy foods and includes multiple micronutrient deficiencies, such as iron, folic acid, vitamin A and vitamin B_{12}. Requirements for iron, vitamin A, calcium, zinc and vitamin D increase during adolescence, and consuming fortified foods and supplements can help provide the essential micronutrients that adolescents need when access to a healthy, diverse and nutrient-rich diet is neither feasible nor affordable *(35)*.

Among adolescents, micronutrient deficiencies are highest for iron, with rates nearly reaching or exceeding 40% among girls aged 15–19 years in several countries including Mozambique, Senegal, India, Cambodia and Haiti *(83)*. Iron deficiency anaemia reduces physical capacity and work performance and is the leading cause of DALYs for adolescents globally *(53)*. In addition, when entering pregnancy with suboptimal iron reserves, there is a higher risk of adverse maternal and neonatal outcomes *(84, 85)*. Iron deficiency and iron deficiency anaemia among adolescent girls contribute to more than 2500 DALYs lost per 100 000 adolescents

in some areas, and is highest in South Asia and sub-Saharan Africa *(49)*. Risk factors for anaemia include iron, folate and vitamin A deficiencies, infection such as malaria and hookworm infestation and genetic blood disorders. Severe anaemia is associated with an increased risk of maternal and infant mortality *(86)*.

Iodine deficiency disorders are the second largest micronutrient burden among adolescents, with the highest levels in South Asia, sub-Saharan Africa, and the Middle East and North Africa regions. Iodine deficiency can result in goitre, and in pregnancy, iodine deficiency can interfere with the neurological development of the fetus and with birth outcomes.

Vitamin A deficiency ranks among the 15 leading causes of global mortality and morbidity. Due to a lack of nationally representative data on adolescent micronutrient deficiencies, global prevalence of zinc, calcium and vitamin D deficiencies are more difficult to estimate *(49)*.

Table 3 presents relevant WHO recommendations for the provision of additional micronutrients including fortification of staple foods and oral supplementation. The recommendations should complement efforts to promote a healthy diet, which, as described above, includes the consumption of diverse foods rich in micronutrients and bioavailable iron.

Table 3. WHO recommendations on micronutrients including fortification and supplementation in adolescents

Ecological level	Actions and implementation considerations	Guideline title (year)	WHO recommendations on nutrition-related policies and interventions for adolescents
Macro (public policy) level	Prevent and control iron deficiency and iron deficiency anaemia Prevent and control iodine deficiency disorders Reduce the risk of folic acid deficiencies and occurrence of births with neural tube defects Fortify staple foods such as flour with micronutrients Fortify condiments such as salt with appropriate fortificants	*Fortification of maize flour and corn meal with vitamins and minerals* (2016) *(87)*	• Fortification of maize flour and corn meal with iron is recommended to prevent iron deficiency in populations, particularly vulnerable groups such as children and women. • Fortification of maize flour and corn meal with folic acid is recommended to reduce the risk of occurrence of births with neural tube defects.
		Fortification of food-grade salt with iodine for the prevention and control of iodine deficiency disorders (2014) *(88)*	• All food-grade salt, used in household and food processing, should be fortified with iodine as a safe and effective strategy for the prevention and control of iodine deficiency disorders in populations living in stable and emergency settings.
		Optimal serum and red blood cell folate concentrations in women of reproductive age for prevention of neural tube defects (2015) *(89)*	• At the population level, red blood cell folate concentrations should be above 400 ng/mL (906 nmol/L) in women of reproductive age, to achieve the greatest reduction of NTDs. • The above red blood cell folate threshold can be used as an indicator of folate insufficiency in women of reproductive age. Because low folate concentrations cannot explain all cases of NTDs, this threshold cannot predict the individual risk of having a NTD-affected pregnancy, and thus it is only useful at the population level. • No serum folate threshold is recommended for prevention of NTDs in women of reproductive age at the population level. Countries interested in using this indicator may consider first establishing the relationship between both serum and red blood cell folate and use the threshold value for red blood cell folate to establish the corresponding threshold in serum. • Microbiological assay is recommended as the most reliable choice to obtain comparable results for red blood cell folate across countries.

(continued)

Ecological level	Actions and implementation considerations	Guideline title (year)	WHO recommendations on nutrition-related policies and interventions for adolescents
Mesa (community) level	Prevent and control micronutrient deficiency among vulnerable groups Set distribution mechanisms to reach menstruating adolescent girls in areas where anaemia is a significant public health problem	*Daily iron supplementation in adult women and adolescent girls* (2016) *(90)*	• Daily iron supplementation is recommended as a public health intervention in menstruating adult women and adolescent girls, living in settings where anaemia is highly prevalent (40% or higher prevalence of anaemia), for the prevention of anaemia and iron deficiency.
		Intermittent iron and folic acid supplementation in menstruating women (2011) *(91)*	• Intermittent iron and folic acid supplementation is recommended as a public health intervention in menstruating women living in settings where anaemia is highly prevalent, to improve haemoglobin concentration and iron status and reduce the risk of anaemia in populations where the prevalence of anaemia among non-pregnant women of reproductive age is 20% or higher.
		Daily iron supplementation in infants and children (2016) *(92)*	• Daily iron supplementation is recommended as a public health intervention in school-age children aged 60 months and older living in settings where anaemia is highly prevalent, for preventing iron deficiency and anaemia. • In malaria-endemic areas, the provision of iron supplementation in infants and children should be done in conjunction with public health measures to prevent, diagnose and treat malaria.
		Intermittent iron supplementation in preschool and school-age children (2011) *(93)*	• Intermittent iron supplementation is recommended as a public health intervention in preschool and school-age children to improve iron status and reduce the risk of anaemia in settings where the prevalence of anaemia in preschool or school-age children is 20% or higher.
		Iron supplementation in postpartum women (2016) *(94)*	• Oral iron supplementation, either alone or in combination with folic acid supplementation, may be provided to postpartum women for 6–12 weeks following delivery for reducing the risk of anaemia in settings where gestational anaemia is of public health concern.

(continued)

Ecological level	Actions and implementation considerations	Guideline title (year)	WHO recommendations on nutrition-related policies and interventions for adolescents
		Use of multiple micronutrient powders for point-of-use fortification of foods consumed by pregnant women (2015) *(95)*	• Routine use of multiple micronutrient powders during pregnancy is not recommended as an alternative to standard iron and folic supplementation during pregnancy for improving maternal and infant health outcomes.
		Vitamin A supplementation in postpartum women (2011) *(96)*	• Vitamin A supplementation in postpartum women is not recommended for the prevention of maternal and infant morbidity and mortality.
Micro (individual) level	Treat anaemia among those diagnosed		• Follow national guidelines for the treatment of anaemia.

NTD, neural tube defect.

Managing acute malnutrition in adolescents

Malnutrition in all its forms includes undernutrition, micronutrient deficiency or excess, and overweight and obesity. Undernutrition among adolescents takes the form of severe acute malnutrition or thinness (low weight-for-height or low BMI-for-age), usually caused by recent and severe weight loss due to extreme deprivation and famine; or micronutrient-related malnutrition due to inadequate micronutrient intake or absorption. Undernutrition limits growth and the body's ability to combat disease or to heal following an injury. Undernutrition may develop consequent to an illness or infection that impairs nutrient intake or the metabolism (such as gastrointestinal disorders and malabsorption, pneumonia, parasitic infections, tuberculosis and HIV) and an inadequate diet or both.

WHO publications such as the *Management of severe malnutrition: a manual for physicians and other senior health workers (97)* and the *IMAI district clinician manual: hospital care for adolescents and adults: guidelines for the management of common illnesses with limited resources (98)* include guidance on identifying, assessing and managing adolescents with severe acute malnutrition. Community empowerment and engagement help facilitate the assessment and follow-up of severely acutely malnourished adolescents. In humanitarian and fragile settings, assess conditions and ensure adequate rations for adolescent population groups according to age, gender, weight, physical activity levels and other key factors, considering both energy and micronutrient requirements. Table 4 presents WHO recommendations on management of acute malnutrition relevant to the nutritional care and support for patients with tuberculosis.

Table 4. WHO recommendations on management of acute malnutrition

Ecological level	Implementation considerations	Guideline title (year)	WHO recommendations on nutrition-related policies and interventions for adolescents
Micro (individual) level	All adolescents presenting with weight loss should be assessed for underlying causes and managed accordingly Offer nutritional counselling and information on optimal, healthy weight If available, enrol adolescents at risk of malnutrition in programmes where nutritional assessment, counselling and support are available An adequate diet, containing all essential macro- and micronutrients, is necessary for the well-being and health of all people, including those with tuberculosis or other infections. All people with active tuberculosis should receive tuberculosis diagnosis, treatment and care according to WHO guidelines and international standards of care	*Nutritional care and support for patients with tuberculosis* (2013) *(99)*	Management of severe acute malnutrition • School-age children and adolescents (5–19 years), and adults, including pregnant and lactating women, with active tuberculosis and severe acute malnutrition should be treated in accordance with the WHO recommendations for management of severe acute malnutrition. Management of moderate undernutrition • School-age children and adolescents (5–19 years), and adults, including lactating women, with active tuberculosis and moderate undernutrition, who fail to regain normal body mass index after 2 months' tuberculosis treatment, as well as those who are losing weight during tuberculosis treatment, should be evaluated for adherence and comorbid conditions. They should also receive nutrition assessment and counselling and, if indicated, be provided with locally available nutrient-rich or fortified supplementary foods, as necessary to restore normal nutritional status. • Pregnant women with active tuberculosis and moderate undernutrition or with inadequate weight gain should be provided with locally available nutrient-rich or fortified supplementary foods, as necessary to achieve an average weekly minimum weight gain of approximately 300 g in the second and third trimesters. • Patients with active multidrug-resistant tuberculosis and moderate undernutrition should be provided with locally available nutrient-rich or fortified supplementary foods, as necessary to restore normal nutritional status.

Preventing adolescent pregnancy and poor reproductive outcomes

Preventing unintended pregnancies and reducing adolescent childbearing through universal access to sexual and reproductive health care is crucial to the health and well-being of women, children and adolescents. Globally, the adolescent birth rate among females aged 15–19 years declined by 21% from 2000 to 2015; in North America and South Asia, it dropped by more than 50%. However, the adolescent birth rate remains high in two thirds of all countries, with more than 20 births per 1000 adolescent girls in 2015 *(100)*.

The leading causes of death in adolescent girls aged 15–19 years are related to maternal conditions including haemorrhage, sepsis, hypertensive disorders, obstructed labour, complications of abortion, indirect maternal deaths, late maternal deaths, and maternal deaths aggravated by AIDS, tuberculosis and other infections or NCDs.

Compared with women, adolescent girls are five times more likely to die during pregnancy and childbirth, with an estimated 70 000 adolescent girls in developing countries dying each year from pregnancy- and childbirth-related causes *(100, 101)*. Complications during adolescent pregnancy and childbirth also include fetal growth retardation, preterm delivery, low birthweight, pre-eclampsia, cephalopelvic disproportion (obstructed labour, fistula), stillbirth and neonatal death *(102)*.

While some adolescent pregnancies are planned and wanted, many are not. In low- and middle-income countries, more than 30% of girls are married by the age of 18 years and 14% before 15 years *(15)*. Interventions aimed at empowering girls and supporting communities to reduce pregnancy before the age of 20 years and marriage before the age of 18 years are important strategies to address maternal mortality and complications from pregnancy and childbirth. Table 5 presents the WHO reproductive health recommendations for delaying pregnancy in adolescent girls.

Table 5. WHO recommendations on preventing adolescent pregnancy and poor reproductive outcomes

Ecological level	Implementation considerations	Guideline title (year)	WHO recommendations on nutrition-related policies and interventions for adolescents
Mesa (community) level	Undertake interventions to reduce unintended and/or early pregnancy, unsafe abortions and detrimental health consequences among adolescents Prohibit and reduce child marriage and coerced sex Prohibit and reduce unintended and/or early pregnancy and unsafe abortions Expand adolescents' access to high-quality contraceptive, antenatal, abortion and post-abortion information and services Empower communities to prevent early marriage, coerced sex and unintended pregnancy Empower individuals to prevent early marriage, coerced sex and unintended pregnancy Eliminate social and non-medical restrictions on the provision of contraceptives to adolescents	*Preventing early pregnancy and poor reproductive outcomes among adolescents in developing countries* (2011) *(103)*	Reducing marriage before the age of 18 years • Encourage political leaders, planners and community leaders to formulate and enforce laws and policies to prohibit marriage of girls before 18 years of age. • Undertake interventions to delay marriage of girls until 18 years of age by influencing family and community norms. These interventions should be undertaken in conjunction with interventions directed at political leaders/planners. • Implement interventions to inform and empower girls, in combination with interventions to influence family and community norms, to delay the age of marriage among girls younger than 18 years of age. • Increase educational opportunities for girls through formal and non-formal channels, to delay marriage until 18 years of age. Reducing pregnancy before the age of 20 years • Advocate for adolescent pregnancy prevention among all stakeholders through interventions such as: information provision, sexuality and health education, life skills building, contraceptive counselling and service provision, and the creation of supportive environments. • Maintain and improve efforts to retain girls in school, at both primary and secondary levels. • Offer interventions that combine curriculum-based sexuality education with contraceptive promotion to adolescents, in order to reduce pregnancy rates. • Offer and promote postpartum and post-abortion contraception to adolescents through multiple home visits and/or clinic visits to reduce the chances of second pregnancies among adolescents. Increasing use of contraception by adolescents at risk of unintended pregnancy

(continued)

Ecological level	Implementation considerations	Guideline title (year)	WHO recommendations on nutrition-related policies and interventions for adolescents
Mesa (community) level			• Undertake efforts with political leaders and planners to formulate laws and policies to increase adolescents' access to contraceptive information and services, including emergency contraceptives. • Undertake interventions to influence community members to support access to contraceptives for adolescents. Implement interventions to improve health service delivery in adolescents as a means of facilitating their access to and use of contraceptive information and services. • Implement interventions at scale that provide accurate information and education about contraceptives, in particular curriculum-based sexuality education, to increase contraceptive use among adolescents. • Implement interventions to reduce the financial cost of contraceptives to adolescents. Reducing coerced sex among adolescents • Continue efforts with political leaders, planners and the community to formulate laws and policies that punish perpetrators of coerced sex involving adolescent girls, to enforce these laws and policies in a way that empowers victims and their families, and to monitor their enforcement. • Implement interventions to enhance adolescent girls' abilities to resist coerced sex and to obtain support if they experience coerced sex by: building their self-esteem; developing their life skills in areas such as communication and negotiation; and improving their links to social networks and their ability to obtain social support. • The above interventions should be combined with interventions to create supportive social norms that do not condone coerced sex.

(continued)

Ecological level	Implementation considerations	Guideline title (year)	WHO recommendations on nutrition-related policies and interventions for adolescents
Mesa (community) level			• Implement interventions to engage men and boys to critically assess gender norms and normative behaviours (for example, gender transformative approaches) that relate to sexual coercion and violence. Combine these with wider interventions to influence social norms on these issues. Reducing unsafe abortion among adolescents • Ensure that laws and policies enable adolescents to obtain safe abortion services. • Enable adolescents to obtain safe abortion services by informing them and other stakeholders about: the dangers of unsafe methods of interrupting a pregnancy; the safe abortion services that are legally available; and where and under what circumstances these services can be obtained legally. • Identify and overcome barriers to the provision of safe abortion services to adolescents. • Ensure access to post-abortion care by adolescents as a life-saving medical intervention, whether or not the abortion or attempted abortion was legal. • Ensure that adolescents who have had abortions can obtain post-abortion contraceptive information and services, whether or not the abortion was legal. Increasing use of skilled antenatal, childbirth and postnatal care among adolescents • Provide information to all pregnant adolescents and other stakeholders about the importance of utilizing skilled antenatal care. • Provide information to all pregnant adolescents and other stakeholders about the importance of utilizing skilled childbirth care. • Promote birth and emergency preparedness in antenatal care strategies for pregnant adolescents (in household, community and health facility settings). • Expand the availability and access to basic emergency obstetric care and comprehensive emergency obstetric care to all populations, including adolescents.

A WHO brief on expanding contraceptive services to adolescents *(104)* also recommends enacting policies that include the following policy actions:

- provision of accurate, age-appropriate and comprehensive sexuality education for all adolescents;
- elimination of social and non-medical restrictions on the provision of contraceptives to adolescents; and
- enabling adolescents to obtain a full range of contraceptive methods and services through delivery mechanisms that are appropriate and acceptable to them including, among others, social marketing outlets and health facilities.

The recommended programme actions are as follows *(104)*:

- engage adolescents as full partners in designing, implementing and monitoring contraceptive information and service provision;
- draw on the support of parents and other influential adults in providing contraceptive services;
- make available a full range of contraceptive methods through outlets that different groups of adolescents are likely to frequent, including social marketing outlets, educational and social facilities and the health system;
- use traditional and innovative ways of providing contraceptive information and services to both girls and boys;
- link the provision of contraceptive services to the provision of wider sexual and reproductive health service for adolescents, notably information and clinical services related to sexually transmitted infections and HIV, as an integral component of a comprehensive response to sexual violence; and
- require contraceptive service providers to be and support them in being respectful of adolescents, regardless of whether or not they are in formal unions.

A framework and an implementation guide have been published to ensure human rights within contraceptive information and services *(105, 106)*.

Secondary school education is an important protective factor against child marriage. Girls with secondary school education are six times less likely to marry as children compared with girls with no education. Married and/or out-of-school adolescents are difficult to reach through school-based, peer-led or work-based programmes. Furthermore, they may not know which services they need or how to access them. Safe spaces, such as those provided to adolescent girls in times of crises, can provide opportunities for girls to access information and services in a confidential and non-stigmatizing way *(5, 107, 108)*.

Promoting preconception and antenatal nutrition in adolescents

Globally, approximately 11% of births occur among girls between the ages of 15 and 19 years *(15)*. Adequate nutrition before and during pregnancy is essential for meeting maternal and fetal growth needs, optimal birth outcomes, and reducing the risk of later NCDs *(109)*. When a growing adolescent becomes pregnant, there is competition for nutrients between the mother and the fetus. This can result in cessation of the prospective mother's linear growth and increase her risk of stunting, and can also lead to fetal growth restriction and low birthweight *(110–113)*.

Anaemia is estimated to affect 38.2% of pregnant women globally, with the highest prevalence in the WHO regions of South-East Asia (48.7%) and Africa (46.3%). Pregnant women require sufficient amounts of iron, vitamin B_9 (folic acid is the synthetic form of this vitamin, folate), calcium, zinc and vitamin A (especially during the third trimester). Consistent availability of and access to healthy foods, knowledge about diet and healthy eating, including food sources of vitamins and minerals, and dietary diversity, are vital to ensure that adolescents have the ability to maintain an adequate diet throughout pregnancy. However, many girls cannot access a

diet sufficient in vegetables, meat, dairy and fruit to meet the demands of pregnancy, especially in low- and middle-income countries where numerous micronutrient deficiencies coexist *(86)*.

Micronutrient supplementation, such as iron for anaemia prevention, and folate for the prevention of neural tube defects (ideally prior to conception), are recommended in all contexts; additionally, calcium to reduce the risk of pre-eclampsia, and vitamin A to prevent night blindness are recommended only in contexts where dietary calcium intake is low or where vitamin A deficiency is a severe public health problem, respectively. These are included in the WHO recommendations for the promotion of adolescent preconception and antenatal nutrition listed in Table 6, can help address nutritional deficiencies in pregnancy, and improve both fetal and maternal outcomes.

Table 6. WHO recommendations for the promotion of preconception and antenatal nutrition in adolescents

Ecological level	Actions and implementation considerations	Guideline title (year)	WHO recommendations on nutrition-related policies and interventions for adolescents
Mesa (community) level	Ensure access to adolescent-friendly antenatal, maternity and newborn services Address delays in seeking and receiving appropriate maternal health care Ensure the availability of adolescent-friendly antenatal health services that are accessible, acceptable and appropriate for adolescents Expand availability of antenatal, childbirth and postnatal care to adolescents	*WHO recommendations on health promotion interventions for maternal and newborn health* (2015) *(114)*	Birth preparedness and complication readiness • Birth preparedness and complication readiness interventions are recommended to increase the use of skilled care at birth and to increase the timely use of facility care for obstetric and newborn complications. Male involvement interventions for maternal and newborn health • Interventions to promote the involvement of men during pregnancy, childbirth and after birth are recommended to facilitate and support improved self-care of women, improved home care practices for women and newborns, improved use of skilled care during pregnancy, childbirth and the postnatal period for women and newborns, and increase the timely use of facility care for obstetric and newborn complications. • These interventions are recommended provided that they are implemented in a way that respects, promotes and facilitates women's choices and their autonomy in decision-making and supports women in taking care of themselves and their newborns. In order to ensure this, rigorous monitoring and evaluation of implementation is recommended. Partnership with traditional birth attendants • Where traditional birth attendants remain the main providers of care at birth, dialogue with traditional birth attendants, women, families, communities and service providers is recommended in order to define and agree on alternative roles for traditional birth attendants, recognizing the important role they can play in supporting the health of women and newborns. • Use of lay health workers, including trained traditional birth attendants, is recommended for promoting the uptake of a number of maternal- and newborn-related health-care behaviours and services, providing continuous social support during labour in the presence of a skilled birth attendant, and administering misoprostol to prevent postpartum haemorrhage. • Use of lay health workers, including trained traditional birth attendants, to deliver the following interventions is recommended, with targeted monitoring and evaluation: distribution of certain oral supplement-type interventions to pregnant women (calcium supplementation in women living in areas with known low levels of calcium intake; routine iron and folate supplementation in pregnant women; intermittent presumptive therapy in malaria in pregnant women living in endemic areas; vitamin A supplementation in pregnant women living in areas where severe vitamin A deficiency is a serious public health problem); and the initiation and maintenance of injectable contraceptives using a standard syringe.

(continued)

Ecological level	Actions and implementation considerations	Guideline title (year)	WHO recommendations on nutrition-related policies and interventions for adolescents
Mesa (community) level			Providing culturally appropriate skilled maternity care • Ongoing dialogue with communities is recommended as an essential component in defining the characteristics of culturally appropriate, quality maternity care services that address the needs of women and newborns and incorporate their cultural preferences. Mechanisms that ensure women's voices are meaningfully included in these dialogues are also recommended. Companion of choice at birth • Continuous companionship during labour and birth is recommended for improving women's satisfaction with services. • Continuous companionship during labour and birth is recommended for improving labour outcomes. Community mobilization through facilitated participatory learning and action cycles with women's groups • Implementation of community mobilization through facilitated participatory learning and action cycles with women's groups is recommended to improve maternal and newborn health, particularly in rural settings with low access to health services. • Implementation of facilitated participatory learning and action cycles with women's groups should focus on creating a space for discussion where women are able to identify priority problems and advocate for local solutions for maternal and newborn health. Community participation in quality-improvement processes • Community participation in quality-improvement processes for maternity care services is recommended to improve quality of care from the perspectives of women, communities and health-care providers. • Communities should be involved in jointly defining and assessing quality. Mechanisms that ensure women's voices are meaningfully included are also recommended. Community participation in programme planning and implementation • Community participation in programme planning, implementation and monitoring is recommended to improve use of skilled care during pregnancy, childbirth and the postnatal period for women and newborns, increase the timely use of facility care for obstetric and newborn complications and improve maternal and newborn health. Mechanisms that ensure women's voices are meaningfully included are also recommended.

(continued)

Ecological level	Actions and implementation considerations	Guideline title (year)	WHO recommendations on nutrition-related policies and interventions for adolescents
Mesa (community) level			Maternity waiting homes • Maternity waiting homes are recommended to be established close to a health facility where essential childbirth care and/or care for obstetric and newborn complications is provided to increase access to skilled care for populations living in remote areas or with limited access to services. Community-organized transport schemes • Community-organized transport schemes are recommended in settings where other sources of transport are less sustainable and not reliable. However, measures should be taken to ensure the sustainability, efficacy and reliability of these schemes while seeking long-term solutions to transport.
Micro (individual) level	Improve the use of antenatal, childbirth and postnatal care of pregnant adolescents Provide nutritional support during pregnancy	*WHO recommendations on antenatal care for a positive pregnancy experience* (2016) *(115)*	• Maternity waiting homes are recommended to be established close to a health facility where essential childbirth care and/or care for obstetric and newborn complications is provided to increase access to skilled care for populations living in remote areas or with limited access to services.
		Vitamin A supplementation in pregnancy for reducing the risk of mother-to-child transmission of HIV (2011) *(116)*	Community-organized transport schemes
			• Community-organized transport schemes are recommended in settings where other sources of transport are less sustainable and not reliable. However, measures should be taken to ensure the sustainability, efficacy and reliability of these schemes while seeking long-term solutions to transport.

Providing access to safe environment and hygiene for adolescents

Inadequate access to safe water, hygiene and sanitation services, and the consumption of contaminated food and water are risk factors associated with malnutrition, diarrheal disease and enteric diarrheal disease, soil-transmitted helminth infections (ascariasis, trichuriasis and hookworm), lymphatic filariasis, trachoma, schistosomiasis, and malaria *(117–119)*. Food and waterborne diarrheal diseases rank as the second and fourth leading cause of death globally in younger and older adolescents, respectively *(50)*.

In approximately half of households worldwide, women and girls are the primary water collectors. This task uses energy that might have been spent on other activities, including education, and it increases exposure to sources of infection such as intestinal helminths, which may lead to anaemia *(120)*. WHO recommendations that pertain to preventive chemotherapy, or the periodic large-scale administration of anthelminthic medications to populations at risk (deworming) are listed in Table 7.

Table 7. WHO recommendations on access to safe environment and hygiene

Ecological level	Implementation considerations	Guideline title (year)	WHO recommendations on nutrition-related policies and interventions for adolescents
Mesa (community) level	Improve access to safe water, sanitation and hygiene services, and practices to reduce the incidence of infections and improve nutritional outcomes Promote preventive chemotherapy, or the periodic large-scale administration of anthelminthic medicines to populations at risk, to dramatically reduce the burden of worms caused by soil-transmitted helminth infections	*Preventive chemotherapy to control soil-transmitted helminth infections in at-risk population groups* (2017) *(121)*	• Preventive chemotherapy (deworming), using annual or biannual single-dose albendazole (400 mg) or mebendazole (500 mg), is recommended as a public health intervention for all young children (12–23 months), preschool (24–59 months) and school-age children living in areas where the baseline prevalence of any soil-transmitted infection is 20% or higher among children, in order to reduce the worm burden of soil-transmitted helminth infections. • Preventive chemotherapy (deworming), using annual or biannual single-dose albendazole (400 mg) or mebendazole (500 mg), is recommended as a public health intervention for all non-pregnant adolescent girls (10–19 years) and non-pregnant women of reproductive age (15–49 years) living in areas where the baseline prevalence of any soil-transmitted helminth infection is 20% or higher among non-pregnant adolescent girls and non-pregnant women of reproductive age, in order to reduce the worm burden of soil-transmitted helminth infection. • Preventive chemotherapy (deworming) using single-dose albendazole (400 mg) or mebendazole (500 mg), is recommended as a public health intervention for pregnant women, after the first trimester, living in areas where both: (i) the baseline prevalence of hookworm and/or *Trichuris trichiura* infection is 20% or higher among pregnant women, and (ii) anaemia is a severe public health problem, with a prevalence of 40% or higher among pregnant women, in order to reduce the worm burden of hookworm or *T. trichiura* infection.

Access to nearby, safe, separate and private sanitation facilities is essential for menstrual hygiene management, dignity, comfort and health of the adolescent girl. With reliable facilities at home, within the school grounds, in the community and the workplace, girls can more reliably engage in their daily routines. Without adequate facilities, girls may feel constrained about when or how much to eat and drink and when to venture outside the home. Lack of adequate school sanitation facilities contributes to sporadic school attendance and increases chances of dropping out, which, in turn, makes the adolescent girl more vulnerable to early marriage and early childbearing *(122)*.

WHO publications on health-promoting schools relevant to physical environment and nutrition note that children are more susceptible to environmental diseases than adults. Children's health can improve with low-cost interventions to the physical environment at schools. Policy-makers should ensure that action is taken in schools to protect drinking water (that is, ensure clean and safe water) and store water safely; provide sanitation facilities; dispose waste quickly, properly and safely; and ensure safe school food services *(122, 123)*. The presence of all these conditions and facilities in schools is essential to good health and nutrition. For example, adequate sanitation contributes to reducing the risk of foodborne and other infections related to health and nutrition. Such conditions are supported by good standards of hygiene, cleanliness, tidiness and adequate ventilation *(81)*.

Promoting physical activity in adolescents

Appropriate levels of physical activity in adolescence are important. Physical activity contributes to the development of musculoskeletal tissues and enhances bone health, the cardiovascular system and neuromuscular awareness, and can help reduce symptoms of anxiety and depression *(56, 124)*. Regular physical activity is fundamental to energy balance, weight control and prevention of obesity *(56)*.

As adolescents age, sedentary behaviours tend to increase while routine daily physical activity tends to decline *(32)*. Insufficient physical activity exacerbates the effects of unhealthy diets and contributes to over 3 million deaths and 69 million DALYs each year. Data from the 2003–2008 Global School-based Student Health Surveys in 36 low- and middle-income countries show that 86% of 13–15 year olds do not meet the recommended levels of physical activity. Globally, 84% of adolescents aged 11–17 years were insufficiently physically active in 2010 *(56)*.

In many low- and middle-income countries, available leisure time for physical activity may be limited, and moderate to vigorous physical activity may be performed in the context of transport, occupational or domestic activities *(124)*. In some contexts, girls may have fewer opportunities than boys to engage in play, sport or other physical activities. They may be expected to stay indoors because of social norms on modesty *(56)*. Tailoring, targeting and implementing interventions aimed at promoting physical activity among adolescents will need to consider the cultural context, gender issues and burden of disease relevant to the country in order to achieve the recommended levels of physical activity (Table 8).

Table 8. WHO recommendations to promote physical activity in adolescents

Ecological level	Actions and implementation considerations	Guideline title (year)	WHO recommendations on nutrition-related policies and interventions for adolescents

Macro (public policy) level	Enact urban planning policies
	Develop and implement policies that reduce barriers to physical activity, transport policies and policies to increase safe spaces for recreational activity
	Provide public awareness programmes on physical activity
		Global recommendations on physical activity for health (2010) *(125)*	Age group: 5–17 years
			• For children and young people in this age group, physical activity includes play, games, sports, transportation, recreation, physical education or planned exercise, in the context of family, school and community activities.
			• In order to improve cardiorespiratory and muscular fitness, bone health, cardiovascular and metabolic health biomarkers, and reduced symptoms of anxiety and depression, the following are recommended:
			  ◦ Children and young people aged 5–17 years should accumulate at least 60 minutes of moderate- to vigorous-intensity physical activity daily.
			  ◦ Physical activity of amounts greater than 60 minutes daily will provide additional health benefits.
			  ◦ Most of the daily physical activity should be aerobic. Vigorous-intensity activities should be incorporated, including those that strengthen muscle and bone, at least three times per week.
			Age group: 18–64 years
			• For adolescents and adults in this age group, physical activity includes recreational or leisure-time physical activity, transportation (for example, walking or cycling), occupational (that is, work), household chores, play, games, sports or planned exercise, in the context of daily, family and community activities.
			• In order to improve cardiorespiratory and muscular fitness, bone health, and reduce the risk of noncommunicable diseases and depression, the following are recommended:
			  ◦ Adolescents and adults aged 18–64 years should do at least 150 minutes of moderate-intensity aerobic physical activity throughout the week, or do at least 75 minutes of vigorous-intensity aerobic physical activity throughout the week, or an equivalent combination of moderate- and vigorous-intensity activity.
			  ◦ Aerobic activity should be performed in bouts of at least 10 minutes' duration.
			  ◦ For additional health benefits, adolescents and adults in this age group should increase their moderate-intensity aerobic physical activity to 300 minutes per week, or engage in 150 minutes of vigorous-intensity aerobic physical activity per week, or an equivalent combination of moderate- and vigorous-intensity activities.
			  ◦ Muscle-strengthening activities involving major muscle groups should be done on two or more days a week.

At the mesa or community level, policy-makers should ensure availability of school and public spaces for physical activity and devise multicomponent programmes to promote and encourage structured sports and physical activity in schools, the community and the workplace *(126)*. WHO's global policy on physical activity and diet also recommends encouraging regular, structured sports activities, providing guidance on physical activity for younger adolescents, and developing and implementing appropriate and accessible group-based physical activity programmes or classes for groups of individuals *(82, 125, 126)*.

Research gaps

Several evidence-informed actions exist to address adolescent nutrition. However, there is limited evidence available in some knowledge areas. Based on research gaps identified in previous WHO guidelines, discussions with stakeholders working in the field of adolescent nutrition, and on the framework of interventions and determinants of adolescent nutrition, further research is merited in the following areas:

- addressing the coexistence of undernutrition along with overweight, obesity or risk factors for diet-related NCDs in adolescence and adulthood across different regions, countries and contexts;
- gaining further understanding of needs, preferences and circumstances of different groups of adolescents to strengthen existing and build new service delivery mechanisms that ensure health equity, non-discrimination and active participation of adolescents;
- assessment of behavioural profiles, dietary patterns and main influencers of adolescents in the context of their social and psychosocial development in order to inform programmes and policy-making;
- follow-up research on implementation to help identify innovations and delivery platforms that reach and affect adolescents in order to achieve scale-up, and health systems integration and sustainability;
- assessment, diagnosis, prevention and detailed management of all forms of malnutrition among adolescents, particularly on the prevention and management of overweight and obesity.
- evaluation of large-scale sustainable services that are appropriate for all groups of adolescents including, for example, services related to the promotion of healthy diets, distribution of micronutrient supplementation and access to contraceptives, as well as urban planning to increase physical activity; and
- assessment of the impact of interventions and policies on the autonomy, positive development, empowerment and engagement of adolescents, as well as the ethical and socio-cultural acceptability or intrusiveness of interventions for this age group.

Member States and partners should ensure that health information systems gather, analyse and use age- and sex-disaggregated data on the social determinants of adolescent nutrition, as well as the preventive and curative actions taken to address nutritional health problems.

Implementation considerations

Health services for adolescents are often highly fragmented, poorly coordinated and uneven in quality. Adolescents often find mainstream primary care services unacceptable because of perceived lack of respect, privacy and confidentiality, fear of stigma and discrimination, and imposition of the moral values of health-care providers.

Building on country experiences, WHO has produced publications on global standards for quality of care in health-care services for adolescents, implementation guides and monitoring tools *(127–130)*. *Global AA-HA!* goes further by using the "adolescent health in all policies" approach to take into account adolescent-specific programming across the multiple sectors involved in national, regional and global health *(6)*.

Adolescent-friendly health services

For health services to be considered adolescent friendly, they must be accessible, acceptable, equitable, appropriate and effective. Health services are accessible when adolescents are able to obtain them; acceptable when adolescents are willing to obtain available services; equitable when all adolescents are able to obtain available services; appropriate when the right health services are provided; and effective when the right health services are provided in the right way *(127, 128)*. Table 9 lists the eight global standards set to improve the quality of adolescent-friendly health-care services.

Table 9. Global standards to improve the quality of adolescent friendly health-care services

Standard	Definition
Adolescents' health literacy	The health facility implements systems to ensure that adolescents are knowledgeable about their own health, and they know where and when to obtain health services.
Community support	The health facility implements systems to ensure that parents, guardians and other community members and community organizations recognize the value of providing health services to adolescents and support such provision and the utilization of services of adolescents.
Appropriate package of services	The health facility provides a package of information, counselling, diagnostic, treatment and care services that fulfils the needs of all adolescents. Services are provided in the facility and through referral linkages and outreach. Service provision in the facility should be linked, as relevant, with service provision in referral-level health facilities, schools and other community settings.
Providers' competencies	Health-care providers demonstrate the technical competence required to provide effective health services to adolescents. Both health-care providers and support staff respect, protect and fulfil adolescents' rights to information, privacy, confidentiality, non-discrimination, non-judgemental attitudes and respect.
Facility characteristics	The health facility has convenient operating hours, a welcoming and clean environment and maintains privacy and confidentiality. It has the equipment, medicines, supplies and technology needed to ensure effective service provision to adolescents.
Equity and non-discrimination	The health facility provides quality services to all adolescents irrespective of their ability to pay, age, sex, marital status, education level, ethnic origin, sexual orientation or other characteristics.
Data and quality improvement	The health facility collects, analyses and uses data on service utilization and quality of care, disaggregated by age and sex, to support quality improvement. Health facility staff are supported to participate in continuous quality improvement.
Adolescents' participation	Adolescents are involved in the planning, monitoring and evaluation of health services and in decisions regarding their own care, as well as in certain appropriate aspects of service provision.

The global standards require action at national, district and facility levels in areas of governance, workforce capacity, financing and drug supplies technology. At the national level, an essential first step entails reviewing existing laws, policies and systems with regard to issues related to: assessing and defining a comprehensive package of health services; financial protection measures; provisions for confidentiality; standards and requirements for age of consent; equitable service provision to adolescents; adolescents' participation in planning, monitoring, evaluation and provision of services; provisions to ensure that services are welcoming; and data collection and age and sex disaggregation within the health management information system *(130)*.

Equity considerations

Policy actions can address social determinants of health as well as of inequities in health. Three broad approaches to reduce health inequities that may inform policies are: targeted programmes for disadvantaged populations; closing health gaps between worse-off and better-off groups; and addressing the social health gradient across the whole population. By combining approaches that reduce health inequities and the ecological framework, adolescent well-being becomes the outcome of the interaction of several complementary levels:

- The macro or societal level: where policies can address health of and reduce risks or exposures to health-damaging factors across the whole population.
- The mesa or community level: where policies can address vulnerabilities of specific disadvantaged population groups.
- The micro or individual and interpersonal level: where policies can help target and mitigate consequences or likelihood of ill health.

Coherence across policies developed in different sectors and at different levels is important so that they complement rather than contradict each other.

As adolescents grow older, they are likely to have an increasing desire for confidentiality and autonomy, and greater capacity to seek health care in comparison with younger children. Many of the actions required to improve adolescent nutrition require changes in behaviours, such as improving dietary intake, balancing physical activity, reducing injury and infection, and avoiding early pregnancy. As powerful societal assets, the contributions of adolescents to their communities and to their own health care can be nurtured and augmented through meaningful engagement and participation.

Respecting adolescent views regarding their own health care promotes their right to participate in decision-making, ensures that more adolescents will seek and remain engaged in care, and is also a way to promote health equity *(6, 131)*. Adolescent participation in policy decisions not only acknowledges their capacity for self-determination but it is also pragmatic. It allows decision-makers to tap into adolescents' unique perspectives, knowledge and experience for a better understanding of the latter's needs and problems. This then leads to better-suited solutions, and benefits from immediate feedback in tracking progress.

Policy considerations

Improving adolescent nutrition requires multisectoral policies and laws that both understand and consider adolescent needs in the societal context in relation to their physical, psychological and psychosocial development. This begins with developing policies that meet the needs of adolescents, so that they can be well-nourished and protected from disease, injury, infection and early pregnancy. An effective response must engage the sectors of food and agriculture, health, WASH, education, social protection and others.

Investing in and consulting with key stakeholders from different sectors to identify common interests, creates a vision, and shared understanding is important for successful collaboration. This involves identifying focal points within all relevant ministries to coordinate efforts related to adolescent nutrition, develop a shared language and sense of purpose, and establish a mechanism to exchange information regularly *(6, 132, 133)*. Nutrition requires champions to catalyse and raise awareness of nutrition-related issues within the ministry of health and other sectors, including agriculture, education, WASH, and public awareness, at national and sub-national levels.

Although there is a strong case for multisectoral planning and visioning in nutrition, actions remain sectoral. This is because each sector follows its own objectives, operating environments, budget allocation and accountability structure. Anticipating environmental and structural barriers in intersectoral cooperation is an important step in designing effective action *(6, 132, 133)*. National leadership pulls together the different sectors into one coherent cross-sectoral approach.

A three-step national-level prioritization process involves: (1) needs assessment, (2) landscape analysis and (3) priority setting. The needs assessment evaluates the health situation and problems among adolescents; the landscape analysis reviews existing adolescent health programmes, polices and related legislation; and the prioritization exercise identifies the highest priority conditions requiring attention as well as the most feasible, evidence-based interventions *(134)*. Priority setting approaches include the WHO Stepwise Framework for preventing chronic diseases and the problem-and-solution tree process *(60, 135–139)*.

Macro (public policy) level

At the societal level, policies can include clear standards to support healthier foods, regulate the marketing of unhealthy foods and beverages, and fortification of foods that adolescents are likely to consume, ensure availability of and access to safe water, and plan public spaces that reduce the barriers to physical activity. The environment in which adolescents are raised has an important influence on their diet, health and nutrition practices. The food system affects the availability, affordability and convenience of foods, which are key determinants of diet. Appropriate policies, dietary guidelines, standards for food safety and labelling, and high-quality information and communication can be effective tools for influencing diets.

Mesa (community) level

Social structures and norms mediate individual actions and interpersonal interactions. To empower adolescents to adopt and maintain optimal nutrition and health practices, community stakeholders (including teachers and health workers) need to support those practices. It is at the organizational and community level – within schools, health facilities, places of work, religious institutions and community groups or associations – that many social norms, roles and relationships are established. These, in turn, influence perceptions of and access to resources and services, as well as nutrition-related behaviours and decisions.

At the community level, policies can ensure a healthy food environment in schools and other places where adolescents gather, create nutrition literacy, prevent and control micronutrient deficiency among vulnerable groups through distribution mechanisms that reach menstruating adolescent girls, undertake measures that reduce or eliminate early marriage, early pregnancy and unsafe abortions among adolescents, establish and expand access to adolescent-friendly antenatal and maternal care services, and provide safe water and sanitation facilities in schools and other public institutions. Considerations for strengthening the organizational and community level for the promotion of adolescent nutrition include community values, and norms around and stigmatization of health issues, which exert a strong influence and may deter adolescents from seeking care.

Micro (individual) level

At the micro or individual and interpersonal level, policies can promote healthy dietary habits, ensure assessment, diagnosis and treatment of anaemia among adolescents; manage acute malnutrition and other forms of malnutrition; ensure nutritional support during the antenatal period; and encourage regular physical activity in forms that are accessible and acceptable to adolescents.

Monitoring and evaluation

Monitoring and evaluation should be built into the implementation process, in order to provide important lessons for uptake and further implementation. Countries should conduct periodic evaluations to assess the degree to which their adolescent health programme is meeting its goals and targets, on both coverage and quality *(140, 141)*.

Ideally, monitoring and evaluation of programmes designed to improve the health of adolescents should always include the opinions of adolescents themselves. Such engagement may include active and meaningful participation by adolescents in formulating the recommendations emerging from the periodic programme evaluations. This means extra consultation is often required with adolescents, their families and their communities prior to data collection. When evaluating data on sensitive topics, legal and ethical provision of protection and access to services should be considered. All monitoring and evaluation should take account of adolescents' evolving capacity and provide appropriate protection.

For evaluation at the global level, the WHO Department of Nutrition for Health and Development has developed a centralized platform for sharing information on nutrition actions in public health practice implemented around the world. By sharing programmatic details, specific country adaptations and lessons learnt, this platform provides examples of how guidelines are being translated into actions. The Global database on the Implementation of Nutrition Action (GINA) *(142)* provides valuable information on the implementation of numerous nutrition policies and interventions.

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