

# Guideline

Assessing and managing **children** at primary health-care facilities to prevent overweight and **obesity** in the context of the double burden of **malnutrition**

Updates for the Integrated Management of Childhood Illness (IMCI)





GUIDELINE

**Assessing and managing children  
at primary health-care facilities  
to prevent overweight and obesity  
in the context of the double  
burden of malnutrition**

UPDATES FOR THE INTEGRATED MANAGEMENT  
OF CHILDHOOD ILLNESS (IMCI)



Guideline: assessing and managing children at primary health-care facilities to prevent overweight and obesity in the context of the double burden of malnutrition. Updates for the Integrated Management of Childhood Illness (IMCI)

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# Abbreviations and acronyms

BMI	body mass index
CI	confidence interval
GRADE	Grading of Recommendations Assessment, Development and Evaluation
IMCI	Integrated Management of Childhood Illness
PICO	population, intervention, comparison, outcome
RCT	randomized controlled trial
RR	risk ratio
SD	standard deviation
SMD	standard mean difference
TB	tuberculosis
WHO	World Health Organization



# Definitions and key terms

**Anthropometric measures:** Anthropometric measures may include body composition, especially adiposity (e.g. percentage fat or fat mass/lean body mass, skinfold thickness), growth velocity, rate of change of weight-for-age, weight-for-length/height, body mass index (BMI)-for-age, or mid-upper arm circumference. The nutritional status of children is classified based on the anthropometric measures in the **Table 1** below.

**Table 1. World Health Organization (WHO) classification of nutritional status of infants and children**

Nutritional status	Age: birth to 5 years Indicator and cut-off value compared to the median of the <i>WHO child growth standards</i> <sup>a</sup>
Obese	Weight-for-length/height <sup>b</sup> or BMI-for-age >3 standard deviations (SD) of the median
Overweight	Weight-for-length/height <sup>b</sup> or BMI-for-age >2 SD and ≤3 SD of the median
Moderately underweight	Weight-for-age <-2 SD and ≥-3 SD of the median
Severely underweight	Weight-for-age <-3 SD of the median
Moderate acute malnutrition	Weight-for-length/height <sup>b</sup> or BMI-for-age ≤-2 SD and ≥-3 SD of the median, or mid-upper arm circumference ≥115 mm and <125 mm
Severe acute malnutrition	Weight-for-length/height <sup>b</sup> or BMI-for-age <- 3 SD of the median or mid-upper arm circumference <115 mm, or bilateral pitting oedema
Moderately stunted (moderate chronic malnutrition)	Length/height-for-age <sup>b</sup> ≤-2 SD and ≥-3 SD of the median
Severely stunted (severe chronic malnutrition)	Length/height-for-age <sup>b</sup> <-3 SD of the median
Moderately wasted	Weight-for-length/height ≤-2 SD and ≥-3 SD of the median
Severely wasted	Weight-for-length/height <-3 SD of the median

<sup>a</sup> WHO child growth standards: methods and development. Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age. Geneva: World Health Organization; 2006 ([http://www.who.int/nutrition/publications/childgrowthstandards\\_technical\\_report\\_1/en/](http://www.who.int/nutrition/publications/childgrowthstandards_technical_report_1/en/)).

<sup>b</sup> Weight-for-length used in infants and young children aged 0-23 months and weight-for-height used for children aged 24 months and older.

**Cardiovascular events:** Any incidents that may cause damage to the heart muscle. Cardiovascular events include clinical coronary vascular disease, such as angina or myocardial infarction.

**Double burden of malnutrition:** The double burden of malnutrition is characterized by the coexistence of undernutrition along with overweight and obesity, or diet-related noncommunicable diseases, within individuals, households and populations, and across the life-course.<sup>1</sup>

<sup>1</sup> WHO. Double burden of malnutrition (<http://www.who.int/nutrition/double-burden-malnutrition/en/>) and What is malnutrition? (<http://www.who.int/features/qa/malnutrition/en/>).

**Food insecurity:** A situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life. It may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution or inadequate use of food at the household level. Food insecurity, poor conditions of health and sanitation, and inappropriate care and feeding practices are the major causes of poor nutritional status. Food insecurity may be chronic, seasonal or transitory.<sup>1</sup>

**Lipid-based nutrient supplements:** Lipid-based nutrient supplements are formulated food products where the energy source is mostly from lipids (fats). They provide energy, protein and essential fatty acids, as well as a mix of vitamins and minerals.<sup>2</sup>

**Malnutrition:** Malnutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. The term malnutrition covers two broad groups of conditions. One is 'undernutrition', which includes stunting (low length/height-for-age), wasting (low weight-for-length/height), acute malnutrition (low weight-for-length/height or low MUAC or bilateral pitting oedema), underweight (low weight-for-age) and micronutrient deficiencies or insufficiencies (a lack of important vitamins and minerals). The other is overweight, obesity and diet-related noncommunicable diseases (such as heart disease, stroke, diabetes and cancer).<sup>3</sup>

**Metabolic indicators:** Metabolic indicators may include abnormal glucose tolerance or resting glucose, elevated haemoglobin A<sub>1c</sub> or elevated age-related lipid profiles.

**Physiological indicators:** Physiological indicators may include increased age-specific blood pressure, and thickness and rigidity of the carotid artery intima.

**Ready-to-use therapeutic foods:** Specially formulated foods for the rehabilitation of ill children, from the age of 6 months, with severe acute malnutrition who either do not have medical complications and are managed in the community, or have been admitted as inpatients and are now in the "rehabilitation phase". These foods are soft or crushable and can be consumed easily without adding water or prior preparation.<sup>4</sup> Examples of ready-to-use therapeutic foods include lipid-based nutrient spreads and crushable biscuits.

**Risk factors for cardiovascular disease or diabetes mellitus:** A risk factor is any attribute, characteristic or exposure of an individual that increases the likelihood of developing cardiovascular disease or diabetes mellitus. Risk factors may include any of the anthropometric, metabolic or physiological indicators described above. The most important behavioural risk factors for cardiovascular diseases and diabetes are unhealthy diet, physical inactivity, tobacco use and harmful use of alcohol. Genetic factors are among other non-nutritional risk factors for cardiovascular disease and diabetes mellitus.

**Severe acute malnutrition:** In infants and children aged 6–59 months, refers to weight-for-length/height more than 3 SD below the median of the *WHO child growth standards*,<sup>5</sup> or mid-upper arm circumference <115 mm, or clinical signs of bilateral oedema of nutritional origin (even if other

<sup>1</sup> The Integrated Food Security Phase Classification (IPC) Global Partners. Integrated Food Security Phase Classification. Technical manual version 1.1. Rome: The Food and Agriculture Organization of the United Nations; 2008 (<http://www.fao.org/docrep/010/i0275e/i0275e.pdf>).

<sup>2</sup> iLiNS Project (<http://www.ilins.org/about-ilins/project-overview>).

<sup>3</sup> WHO. What is malnutrition? (<http://www.who.int/features/qa/malnutrition/en/>).

<sup>4</sup> Community-based management of severe acute malnutrition. A joint statement by the World Health Organization, the World Food Programme, the United Nations System Standing Committee on Nutrition and the United Nations Children's Fund. Geneva: World Health Organization; 2007 ([http://apps.who.int/iris/bitstream/10665/44295/1/9789280641479\\_eng.pdf?ua=1&ua=1](http://apps.who.int/iris/bitstream/10665/44295/1/9789280641479_eng.pdf?ua=1&ua=1)).

<sup>5</sup> WHO child growth standards: methods and development. Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age. Geneva: World Health Organization; 2006 ([http://www.who.int/nutrition/publications/childgrowthstandards\\_technical\\_report\\_1/en/](http://www.who.int/nutrition/publications/childgrowthstandards_technical_report_1/en/)).

anthropometric measures are above specified cut-off values). Severe acute malnutrition therefore includes severe wasting as a defining criterion but children may be additionally classified as having severe acute malnutrition if clinical signs of bilateral oedema are present.<sup>1</sup>

**Supplementary foods:** Supplementary foods are specially formulated foods, in ready-to-eat or milled form, which are modified in their energy density, protein, fat or micronutrient composition, to help meet the nutritional requirements of specific populations. Supplementary foods are not intended to be the only source of nutrients and are different from complementary foods, in that the latter are intended for progressive adaptation of infants aged 6 months and older to the food of the family. They are also different from food supplements, which refer to vitamin and mineral supplements in unit dose forms, such as capsules, tablets, powders or solutions, where national jurisdictions regulate these products as food.<sup>2</sup>

Supplementary foods have been used to rehabilitate persons with moderate acute malnutrition or to prevent a deterioration of nutritional status of those most at risk, by meeting their additional needs, focusing particularly on children aged 6–59 months, pregnant women and lactating mothers. Examples of supplementary foods include fortified blended foods (i.e. corn–soy blend, wheat–soy blend) and lipid-based nutrient supplements (ready-to-use supplementary foods).

**Therapeutic foods:** Therapeutic foods are specially formulated foods used in the treatment of severe acute malnutrition. Therapeutic foods include feeding formulas such as F-75 and F-100, which are therapeutic milks used in the stabilization and rehabilitation phases in an inpatient setting, and ready-to-use therapeutic foods used in the rehabilitation phase, usually in an outpatient setting.<sup>3</sup>

<sup>1</sup> Updates on the management of severe acute malnutrition in infants and children: guideline. Geneva: World Health Organization; 2013 ([http://apps.who.int/iris/bitstream/10665/95584/1/9789241506328\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/95584/1/9789241506328_eng.pdf?ua=1)).

<sup>2</sup> WHO. Technical note: supplementary foods for the management of moderate acute malnutrition in infants and children 6–59 months of age. Geneva: World Health Organization; 2012 ([http://apps.who.int/iris/bitstream/10665/75836/1/9789241504423\\_eng.pdf?ua=1&ua=1](http://apps.who.int/iris/bitstream/10665/75836/1/9789241504423_eng.pdf?ua=1&ua=1)).

<sup>3</sup> Community-based management of severe acute malnutrition. A joint statement by the World Health Organization, the World Food Programme, the United Nations System Standing Committee on Nutrition and the United Nations Children’s Fund. Geneva: World Health Organization; 2007 ([http://apps.who.int/iris/bitstream/10665/44295/1/9789280641479\\_eng.pdf?ua=1&ua=1](http://apps.who.int/iris/bitstream/10665/44295/1/9789280641479_eng.pdf?ua=1&ua=1)).

# Publication history

This guideline *Assessing and managing children at primary health-care facilities to prevent overweight and obesity in the context of the double burden of malnutrition* focuses specifically on areas prioritized by the guideline development group with respect to infants and children presenting to primary health-care facilities.

In order to produce this current guideline, the standard guideline development process was followed, according to the *WHO handbook for guideline development*.

# Acknowledgements

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# Executive summary

## Background

The global epidemic of child and adolescent obesity affects all world regions, including countries where undernutrition remains common. In 2016, 155 million children were affected by stunting and 52 million children were wasted while 41 million children were overweight. Being underweight or stunted are both associated with increased child mortality and morbidity and impaired child development – about 20% of child deaths are still related to malnutrition. However, being overweight or obese also has immediate physical and mental health implications for a child or adolescent, and both are major risk factors for cardiovascular disease, diabetes and premature death in adults. Paradoxically, a history of low birth weight or stunting is a risk factor for children becoming overweight or obese and developing cardiovascular disease or diabetes in later life. The presence of both obesity and underweight in the same populations, communities and even families is commonly referred to as the “double burden of malnutrition” and highlights the life course consequences of nutrition of women in pregnancy and of children in early life with health and well-being in later life.<sup>1</sup>

## Rationale for guideline development

The World Health Organization (WHO) *Global strategy for infant and young child feeding*<sup>2</sup> addresses the needs of all children and advocates for health workers to be empowered in order to provide effective feeding counselling that will promote, protect and support appropriate infant and young child feeding. This is especially relevant given the magnitude of the child obesity epidemic and its relationship with adult noncommunicable diseases; WHO tools therefore need to provide relevant guidance to the full spectrum of health-care providers.

Children with a history of low birth weight, stunting and inappropriate weight gain in the mid-child years (preschool and school) are known to be at greater risk of obesity in later life.<sup>3</sup> Recommendations regarding the prevention or treatment of moderate malnutrition should consider the long-term health consequences of interventions and not focus only on short-term outcomes.<sup>4</sup> WHO guidelines should be reviewed to ensure that recommendations aimed at mitigating the risks of moderate malnutrition do not inadvertently increase the risk of obesity and noncommunicable diseases in later life.

<sup>1</sup> World Health Organization. Double burden of malnutrition (<http://www.who.int/nutrition/double-burden-malnutrition/en/>).

<sup>2</sup> Global strategy for infant and young child feeding. Geneva: World Health Organization; 2003 (<http://apps.who.int/iris/bitstream/10665/42590/1/9241562218.pdf>).

<sup>3</sup> Adair LS, Fall CHD, Osmond C, Stein AD, Martorell R, Ramirez-Zea M et al.; COHORTS Group. Associations of linear growth and relative weight gain during early life with adult health and human capital in countries of low and middle income: findings from five birth cohort studies. *Lancet*. 2013;382(9891):525–34. doi:10.1016/S0140-6736(13)60103-8.

<sup>4</sup> Report of the Commission on Ending Childhood Obesity. Geneva: World Health Organization; 2016 ([http://apps.who.int/iris/bitstream/10665/204176/1/9789241510066\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/204176/1/9789241510066_eng.pdf?ua=1)).

The WHO Integrated Management of Childhood Illness (IMCI) provides clinical algorithms that guide health workers at primary health-care facilities on the assessment and management of infants and children presenting with illnesses, including assessment and classification of nutritional status. Guidance in IMCI<sup>1</sup> on nutrition counselling has generally focused on preventing undernutrition without overweight or obesity. However, the scope of IMCI is under review, with respect to more fully addressing and including health-promotion activities. Given the scale of the global epidemic of child obesity, and the importance of improving the health status of children, it is important that IMCI provides guidance that will contribute to the global effort to end childhood obesity.

This guideline process focused on the prevention of overweight and obesity at primary health-care facilities where IMCI is implemented, including settings where undernutrition is prevalent. However, the recommendations are not comprehensive with respect to the management of children with acute malnutrition or stunting but consider only some specific nutrition-related interventions that may increase or mitigate the risk of adverse health outcomes in these children.

This guideline is intended to help Member States and their partners in their efforts to make evidence-informed decisions on assessing and managing children at primary health-care facilities, to prevent overweight and obesity in the context of the double burden of malnutrition. It will also support their efforts to achieve the Sustainable Development Goals, the global targets set by the *Comprehensive implementation plan on maternal, infant and young child nutrition*, and the *Global strategy for women's, children's and adolescents' health 2016–2030*.

## Objective

The objective of the guideline is to provide guidance on appropriate assessment and management of infants and children at primary health-care facilities, in order to reduce the risk of overweight and obesity among children, including those living in settings where both undernutrition and overweight/obesity are prevalent. Three specific areas and related questions were prioritized: (i) anthropometric assessment and classification of the nutritional status of infants and children presenting to primary health-care facilities; (ii) management of infants and children with acute or chronic malnutrition presenting to primary health-care facilities; and (iii) management of children who are overweight or obese presenting to primary health-care facilities.

The guideline is intended primarily for use in low- and medium-resource settings.

The primary audience for this guideline includes: (i) national policy-makers in health ministries; (ii) development partners providing financial and/or technical support for child health programmes; (iii) programme managers working in child health and health-worker training; and (iv) health-care providers, researchers and clinicians managing infants and children at various levels of health care; this includes physicians, nurses and auxiliary personnel providing primary health care.

## Guideline development methodology

WHO developed the recommendations using the procedures outlined in the WHO handbook for guideline development.<sup>2</sup> The steps in this process included: (i) identification of priority questions and outcomes; (ii) retrieval of the evidence; (iii) assessment of the quality of the evidence and synthesis of the findings; (iv) formulation of recommendations, including research priorities; and

<sup>1</sup> Integrated Management of Childhood Illness. Chart booklet. Geneva: World Health Organization; 2014 ([http://apps.who.int/iris/bitstream/10665/104772/16/9789241506823\\_Chartbook\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/104772/16/9789241506823_Chartbook_eng.pdf)).

<sup>2</sup> WHO handbook for guideline development, 2nd ed. Geneva: World Health Organization; 2014 ([http://www.who.int/kms/handbook\\_2nd\\_ed.pdf](http://www.who.int/kms/handbook_2nd_ed.pdf)).



planning for (v) dissemination; (vi) implementation, equity and ethical considerations; and (vii) impact evaluation and updating of the guideline. The Grading of Recommendations Assessment, Development and Evaluation (GRADE)<sup>1</sup> methodology was followed, to prepare evidence profiles related to pre-selected topics, based on up-to-date systematic reviews.

A WHO steering committee and a 17-member guideline development group of experts was convened. Informed by evidence reviews and other evidence summaries, the WHO steering committee developed an initial set of draft recommendations. Members of the guideline development group declared potential conflicts of interest. One potential conflict was identified; it was agreed that the member could participate in all discussions but that if a vote was required, then the participant would not be eligible to vote. Members of the guideline development group then reviewed and evaluated the quality of the evidence identified through the systematic reviews, using the GRADE method, and revised and finalized the guideline recommendations. The best practice statements and final recommendations agreed by the WHO Guidelines Review Committee are presented.

### Other related WHO recommendations

These recommendations do not reflect all WHO recommendations related to infant and child nutrition but only for those areas prioritized by the guideline development group with respect to infants and children presenting to primary health-care facilities. They highlight practices to mitigate risks in vulnerable populations, e.g. children with wasting or stunting, and interventions to reduce the risk of overweight and obesity in other children. As such, they do not represent comprehensive guidelines on the management of undernutrition but address one aspect of management that may influence the risk of noncommunicable disease and long-term health outcomes.

### Updating this guideline

This guideline will be reviewed and updated in 4–5 years, when WHO will constitute a guideline development group to review the literature and update the recommendations as needed.

### Equity and human right perspectives

The members of the guideline development group considered it important to emphasize the principle of equity and human rights within health care, and the context of infants and children presenting to primary health-care facilities within which recommendations will be implemented. The group formulated the following points:

- It is the right of every child to grow normally and be healthy; WHO is committed to this principle.
- WHO recognizes that, in this guideline development process, we are primarily dealing with the child presenting with a clinical problem, and looking at the process of ill-health within a medical model only. Although ill-health is often the consequence of a broader context for health and nutrition, here, in this guideline, we are not focusing our consideration on this broader context; comprehensive solutions are, hence, beyond this guideline's immediate remit.
- Nevertheless, WHO recognizes and notes these broader considerations, and their importance for informing the wider discussions of the guideline development group.

<sup>1</sup> GRADE (<http://gradeworkinggroup.org/>).

## Assessing and managing children attending primary health-care facilities in order to prevent overweight and obesity

### Best practice statements and Recommendations

#### Best practice statements

1. All infants and children aged less than 5 years presenting to primary health-care facilities should have both weight and length/height measured, in order to determine weight-for-length/height and to classify nutritional status according to *WHO child growth standards*.<sup>1</sup>

Note: The measurement of mid-upper arm circumference both at health facilities and in the community can be used to identify children with severe or moderate acute malnutrition.<sup>2</sup> However, mid-upper arm circumference cannot be used to determine overweight or obesity, as there are no validated cut-off values as yet. The best practice statement therefore only makes reference to weight and length/height.

2. Caregivers and families of infants and children aged less than 5 years presenting to primary health-care facilities should receive general nutrition counselling, including promotion and support for exclusive breastfeeding in the first 6 months and continued breastfeeding until 24 months or beyond.

Note: Against the background of best practice that caregivers of all infants and children aged less than 5 years should receive general nutrition counselling, no recommendation is made regarding providing nutrition counselling that is specific to children with stunting only.

#### Recommendations

1. Routinely providing supplementary foods to moderately wasted infants and children (i.e. with acute undernutrition) presenting to primary health-care facilities is not recommended (**strength of recommendation: conditional; low quality evidence**).

Note: There may be a role for the provision of supplementary foods in settings where there is a high prevalence of wasting or food insecurity,<sup>3</sup> at community or household level, and as part of the continuum of care for the individual child that includes appropriate treatment of clinical conditions and other modifiable factors, provision of nutritional counselling and subsequent follow-up to assess response.

2. The provision of supplementary foods for treating stunting (chronic undernutrition) among infants and children who present to primary health-care facilities is not recommended (**strength of recommendation: conditional; low quality evidence**).
3. At primary health-care facilities, health workers should provide nutrition counselling to caregivers of overweight children aged less than 5 years (**strength of recommendation: conditional; very low quality evidence**).

<sup>1</sup> WHO child growth standards: methods and development. Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age. Geneva: World Health Organization; 2006 ([http://www.who.int/nutrition/publications/childgrowthstandards\\_technical\\_report\\_1/en/](http://www.who.int/nutrition/publications/childgrowthstandards_technical_report_1/en/))

<sup>2</sup> Updates on the management of severe acute malnutrition in infants and children: guideline. Geneva: World Health Organization; 2013 ([http://apps.who.int/iris/bitstream/10665/95584/1/9789241506328\\_eng.pdf?ua=1](http://apps.who.int/iris/bitstream/10665/95584/1/9789241506328_eng.pdf?ua=1)).

<sup>3</sup> Indicators for assessing food insecurity are available in the following publication: The Integrated Food Security Phase Classification (IPC) Global Partners. Integrated Food Security Phase Classification. Technical manual version 1.1. Rome: The Food and Agriculture Organization of the United Nations; 2008 (<http://www.fao.org/docrep/010/i0275e/i0275e.pdf>).

4. At primary health-care facilities, health workers should provide counselling on physical activity to caregivers of overweight children aged less than 5 years (*strength of recommendation: conditional; very low quality evidence*).
5. At primary health-care facilities, children aged less than 5 years who are identified as obese should be assessed and an appropriate management plan should be developed. This can be done by a health worker at primary health-care level, if adequately trained, or at a referral clinic or local hospital (*strength of recommendation: conditional; moderate quality evidence*).

*Note:* Against the background of best practice that caregivers of all children aged less than 5 years should receive general nutrition counselling, no recommendation is made regarding providing nutrition counselling that is specific to children with stunting only.

# Background

The global epidemic of child and adolescent obesity affects all world regions, including countries where undernutrition remains common. In 2016, an estimated 41 million children under the age of 5 years (6.0%), were affected by overweight or obesity (1), defined as the proportion of children with weight-for-length/height z-score<sup>1</sup> values between 2 and 3 standard deviations (SDs) and more than 3 SDs respectively above the median of the World Health Organization (WHO) *Child growth standards* (2). This represents an increase of about 11 million since 2000 (1). In 2016, of children under 5 years of age who were overweight, 49% lived in Asia and 24% lived in Africa (1). Between 2000 and 2016 the proportion of children who were overweight in Asia increased by 40% (14.2 million to 19.9 million) and in Africa by 48% (6.6 million to 9.8 million) (1).

In the 2012 Global Burden of Disease study (3), it was reported for the first time that more people died of overnutrition than undernutrition. Demographic and nutrition transitions are occurring within low-income countries, even where undernutrition is common. Being overweight or obese has immediate physical and mental health implications for a child or adolescent, and both are major risk factors for cardiovascular disease, diabetes and premature death in adults.

The prevalence of obesity in children reflects changing patterns towards unhealthy diets and physical inactivity. Urbanization, market liberalization, increased incomes, availability of fast foods, educational demands, increased motorized transport, television viewing and gaming have led to a rise in the consumption of foods that are high in fats, sugar and salt and lower levels of physical activity.

At the individual level, the drivers of child and adolescent obesity include factors related to nutrition in pregnancy; infant and child feeding practices; population dietary patterns, including the quality and frequency of family foods; and lifestyle issues such as decreased physical activity, increased sedentary behaviour and school and family health-promotion programmes. While there have been major public health interventions to promote improved diet and patterns of physical activity in adults, the contribution of antenatal and young-child interventions to reducing the risk of obesity in later life have not been significantly reviewed.

Paradoxically, children who were born with low birth weight, have suffered from undernutrition and/or have a low length/height-for-age (stunting) are at greater risk of developing overweight and obesity when faced by energy-dense diets and a sedentary lifestyle later in life (4). This highlights the life course consequences of nutrition of women in pregnancy and of children in early life with health and well-being in later life.

In May 2012, the 65th World Health Assembly endorsed the *Comprehensive implementation plan on maternal, infant and young child nutrition*, including six global nutrition targets (5), and urged Member States to put it into practice by including proven nutrition interventions relevant to their country. The political declaration of the Second Conference on Nutrition, held in Rome, Italy, in November

<sup>1</sup> A z-score value is the number of standard deviations above or below the reference median value.

2014 (6), addressed the multiple challenges of malnutrition in all its forms in relation to inclusive and sustainable development and health. The normative mandate of WHO aims to strengthen the evidence base of effective and safe nutrition actions to counteract the public health effects of the dual burden of malnutrition, and to describe good practices for successful implementation.

In 2014, the WHO Commission on Ending Childhood Obesity noted the double burden of malnutrition, i.e. undernutrition and obesity coexisting, in many countries (4, 7, 8). The commission commented that attempts to deal with undernutrition and stunting during childhood may have led to the unintended consequence of increased obesity risk for these children (4).

Interventions to treat or prevent one form of malnutrition need to be understood and implemented in the context of other recommendations related to protecting and promoting optimal infant and child feeding in the general population. The WHO *Global strategy for infant and young child feeding* (9) describes the essential interventions to protect, promote and support breastfeeding and complementary feeding. In many settings where infant and child undernutrition is common, the use of commercial breast-milk substitutes and other replacement feeds is associated with significantly increased morbidity and mortality. In these settings and elsewhere, the evidence for the long-term benefits of breastfeeding for both maternal and child health outcomes, including child development and prevention of noncommunicable diseases, highlights the relevance of protecting, promoting and supporting breastfeeding in high- and low-income settings alike (10).

# The Integrated Management of Childhood Illness

The Integrated Management of Childhood Illness (IMCI) is an integrated approach to child health that focuses on the well-being of the whole child (11). IMCI aims to reduce death, illness and disability, and to promote improved growth and development among infants and children aged less than 5 years. IMCI includes both preventive and therapeutic elements that are implemented by families and communities as well as by health workers in facilities.

In health facilities, the IMCI strategy focuses on infants and children presenting with an illness and promotes the accurate identification of childhood illnesses in outpatient settings, ensures appropriate combined treatment of all major illnesses, strengthens the counselling of caregivers, and speeds up the referral of severely ill children.

IMCI consists of numerous clinical algorithms and training materials that assist nurses and other primary health-care workers to manage sick infants and children presenting to health facilities, and were developed largely to suit low-resource settings. IMCI includes growth charts for infants aged 0–2 months and 2–59 months. Nutrition assessment is integral to the evaluation of sick infants and children and is also central to the care of the well child and promoting their health and development. IMCI therefore includes algorithms for use by health workers based at primary health-care facilities

**Fig. 1. IMCI flow chart on anthropometric assessment and classification of nutritional status (12)**

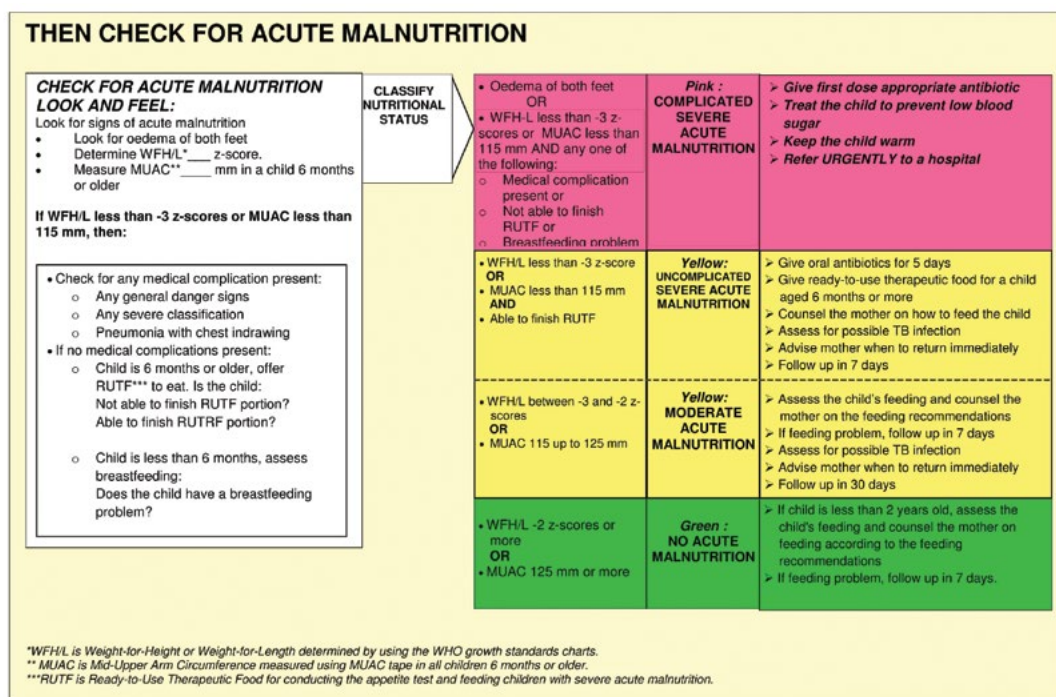








Fig. 2. IMCI counselling on infant and child feeding practices (12)

### Feeding Recommendations

Feeding recommendations FOR ALL CHILDREN during sickness and health, including HIV EXPOSED children on ARV prophylaxis

Newborn, birth up to 1 week	1 week up to 6 Months	6 up to 9 months	9 up to 12 months	12 months up to 2 years	2 years and older
 <ul style="list-style-type: none"> <li>Immediately after birth, put your baby in skin to skin contact with you.</li> <li>Allow your baby to take the breast within the first hour. Give your baby colostrum, the first yellowish, thick milk. It protects the baby from many illnesses.</li> <li>Breastfeed day and night, as often as your baby wants, at least 8 times in 24 hours. Frequent feeding produces more milk.</li> <li>If your baby is small (low birth weight), feed at least every 2 to 3 hours. Wake the baby for feeding after 3 hours, if baby does not wake self.</li> <li>DO NOT give other foods or fluids. Breast milk is all your baby needs. This is especially important for infants of HIV positive mothers. Mixed feeding increases the risk of HIV mother-to-child transmission when compared to exclusive breastfeeding.</li> </ul>	 <ul style="list-style-type: none"> <li>Breastfeed as often as your child wants. Look for signs of hunger, such as beginning to fuss, sucking fingers, or moving lips.</li> <li>Breastfeed day and night whenever your baby wants, at least 8 times in 24 hours. Frequent feeding produces more milk.</li> <li>Do not give other foods or fluids. Breast milk is all your baby needs.</li> </ul>	 <ul style="list-style-type: none"> <li>Breastfeed as often as your child wants.</li> <li>Also give thick porridge or well mashed foods, including animal source foods and vitamin A-rich fruits and vegetables.</li> <li>Start by giving 2 to tablespoons of food. Gradually increase to 1/2 cups (1 cup = 250 ml).</li> <li>Give 2 to 3 meals each day.</li> <li>Offer 1 or 2 snacks each day between meals when the child seems hungry.</li> </ul>	 <ul style="list-style-type: none"> <li>Breastfeed as often as your child wants.</li> <li>Also give a variety of mashed or finely chopped family food, including animal source foods and vitamin A-rich fruits and vegetables*.</li> <li>Give 1/2 cup at each meal (1 cup = 250 ml).</li> <li>Give 3 to 4 meals each day.</li> <li>Offer 1 or 2 snacks between meals. The child will eat if hungry.</li> <li>For snacks, give small chewable items that the child can hold. Let your child try to eat the snack, but provide help if needed.</li> </ul>	 <ul style="list-style-type: none"> <li>Breastfeed as often as your child wants.</li> <li>Also give a variety of mashed or finely chopped family food, including animal source foods and vitamin A-rich fruits and vegetables.</li> <li>Give 3/4 cup at each meal (1 cup = 250 ml).</li> <li>Give 3 to 4 meals each day.</li> <li>Offer 1 to 2 snacks between meals.</li> <li>Continue to feed your child slowly, patiently. Encourage—but do not force— your child to eat.</li> </ul>	 <ul style="list-style-type: none"> <li>Give a variety of family foods to your child, including animal source foods and vitamin A-rich fruits and vegetables.</li> <li>Give at least 1 full cup (250 ml) at each meal.</li> <li>Give 3 to 4 meals each day.</li> <li>Offer 1 or 2 snacks between meals.</li> <li>If your child refuses a new food, offer "tastes" several times. Show that you like the food. Be patient.</li> <li>Talk with your child during a meal, and keep eye contact.</li> </ul>

**Feeding Recommendations For a Child Who Has PERSISTENT DIARRHOEA**

- If still breastfeeding, give more frequent, longer breastfeeds, day and night.
- If taking other milk:
  - Replace with increased breastfeeding OR
  - Replace with fermented milk products, such as yoghurt OR
  - Replace half the milk with nutrient-rich semisolid food.
- For other foods, follow feeding recommendations for the child's age.

that reflect WHO recommendations on anthropometric assessment and infant and child feeding. These are summarized in Fig. 1 and Fig. 2.

However, the scope of IMCI algorithms for assessment and treatment is under review, in order to identify additional opportunities for promoting good health.

# Rationale for guideline development

This guideline process was prompted by three main considerations:

1. The strong relationship between child overweight/obesity and adult noncommunicable diseases and premature mortality.

The global epidemic of childhood obesity is likely to fuel an increasing burden of cardiovascular disease and type 2 diabetes mellitus in adults. While interventions at primary health-care facilities will not in themselves reverse this trend, it is important that health workers at all levels contribute to the overall effort. Health workers therefore need guidance on how to appropriately respond as part of their daily activities.

2. Interventions to treat or prevent moderate malnutrition, i.e. wasting and stunting, may increase the risk of overweight or obesity in children

While moderate wasting and stunting are associated with increased morbidity and mortality in some children, there is emerging evidence that inappropriate weight gain in childhood, especially the mid-child years, is associated with increased obesity in adolescence and adulthood. It is therefore important that recommendations regarding the prevention or treatment of moderate acute malnutrition should consider the long-term health consequences of interventions and not focus only on short-term outcomes. WHO guidelines should be reviewed to ensure that recommendations aimed at mitigating the risks of moderate acute malnutrition do not inadvertently increase the risk of obesity and noncommunicable diseases in later life.

3. IMCI does not provide guidance on the assessment and management of children who are already overweight or obese.

IMCI is extensively used globally as a resource for health-care workers at primary health-care level. It is dependent on evidence-informed WHO recommendations. Despite the magnitude of the global epidemic of childhood obesity, IMCI does not make reference to assessment or management of overweight or obesity in infants and children. While a single guideline process will not be able to provide comprehensive guidelines for the prevention and treatment of overweight and obesity in infants and children, it is important to start a process whereby actions can be taken and interventions offered by primary health-care workers. It is noted that these should be complemented by actions and interventions offered at referral centres. However, these are beyond the scope of this guideline process.

While this guideline has been developed to support health workers at primary health-care facilities where undernutrition is prevalent, it does not comprehensively address the management of infants and children with acute malnutrition or stunting. The recommendations consider only some specific nutrition-related interventions that may increase or mitigate the risk of later adverse health outcomes in these children.



# Scope and purpose of the guideline

This guideline aims to provide guidance on the appropriate assessment and management of infants and children at primary health-care facilities, in order to reduce the risk of overweight and obesity among children, including those living in settings where both undernutrition and overweight/obesity are prevalent. Recommendations from the guideline will be used to update WHO-related tools and training materials, in particular IMCI.

The guideline addresses the following three areas:

- anthropometric assessment and classification of the nutritional status of infants and children presenting to primary health-care facilities;
- management of infants and children with acute or chronic malnutrition presenting to primary health-care facilities;
- management of children who are overweight or obese presenting to primary health-care facilities.

The guideline is intended primarily for use in low- and medium-resource settings.

The primary audience for this guideline is (i) national policy-makers in health ministries; (ii) development partners providing financial and/or technical support for child health programmes; (iii) programme managers working in child health and health-worker training; and (iv) health-care providers, researchers and clinicians managing infants and children at various levels of health care. This includes physicians, nurses and auxiliary personnel providing primary health care.

It will also inform revisions to current WHO training and reference materials, including: *Integrated Management of Childhood Illness (12)*; *Infant and young child feeding counselling: an integrated course (13)*; *Essential newborn care course (14)*; and *Caring for newborns and children in the community: a training course for community health workers*, which includes courses on *Caring for the newborn at home*, *Caring for the sick child* and *Caring for the child's healthy growth and development (15–17)*.

This guideline should not be considered as comprehensive guidance for the management of either undernutrition or overweight/obesity. Additional guidance will be developed by WHO in the future to complement and expand this guideline.

Successful implementation will require appropriate training and capacity development of health-care workers, to enable them to acquire the necessary skills. Systematic monitoring and evaluation of programmes will also be needed to identify and document challenges to implementation.

At a higher level, the guideline will contribute to the efforts of Member States and their partners to make informed decisions on the appropriate nutrition actions to achieve the Sustainable Development Goals (SDGs), the global targets set in the *Comprehensive implementation plan on maternal, infant and young child nutrition (5)* and the *Global strategy for women's, children's and adolescents' health (2016–2030) (18)*.

## **Population of interest**

This guideline focuses on infants and children aged less than 5 years and their caregivers presenting to primary health-care facilities in settings where the IMCI approach is in place.

Complementary guideline processes will address guidance on prevention and treatment of overweight and obesity at referral centres and in older populations of children and adolescents.

# Programmatic questions for review

The following questions were identified as priorities where existing recommendations, especially those incorporated in IMCI should be reviewed and updated, or new guidance developed.

## **1. Anthropometric assessment of infants and children presenting to primary health-care facilities**

- a. Should primary health-care workers assess infants and children in order to identify stunting in addition to wasting?
- b. Should primary health-care workers assess infants and children in order to identify overweight and obesity?
- c. Which anthropometric measures should primary health-care workers use to assess nutritional status?

## **2. Care of infants and children with acute or chronic malnutrition presenting to primary health-care facilities**

- a. Should primary health-care workers counsel caregivers of, or otherwise intervene among, infants and children who are moderately wasted?
- b. Should primary health-care workers counsel caregivers of, or otherwise intervene among, infants and children who are stunted?

## **3. Care of children who are overweight or obese presenting to primary health-care facilities**

- a. Should primary health-care workers counsel caregivers of children who are overweight or obese regarding nutrition or other dietary measures?
- b. Should primary health-care workers counsel caregivers of children who are overweight or obese regarding physical activity?
- c. Should primary health-care workers refer children who are obese?

## **4. Care of infants and children with a history of low birth weight**

- a. Should infants and children with a history of low birth weight (<2500 g) be fed differently than other children, in order to prevent overweight and obesity?

Prior to the guideline meeting, the WHO steering committee decided not to include question 4 in the review process, as the evidence and programmatic issues related to the question were deemed too complex to address within the timeline of the guideline meeting and it was felt that they should be considered as a stand-alone exercise.

For each question, outcomes that were deemed to be either “Critical” or “Important” were evaluated.

In preparation for the meeting, and to inform the guideline development group:

- each priority guideline question was described in terms of the population, intervention, comparison and outcome (PICO; [Annex 5](#)) and systematic reviews were commissioned to examine the available evidence;
- a meta-analysis of demographic and health survey data was commissioned to provide relevant contextual data ([Annex 1](#));
- a survey of IMCI chart booklets and clinical algorithms used in different countries was conducted to inform the guideline development group regarding current uptake and adaptations of IMCI at national level – information from the survey is included in relevant sections of the decision-making information presented for each recommendation.

The guideline process is more fully described in the [Methods](#) section.

# Equity and human right perspectives

The members of the guideline development group considered it important to emphasize the principle of equity and human rights within health care, and the context of infants and children presenting to primary health-care facilities within which recommendations will be implemented. The group formulated the following points:

- It is the right of every child to grow normally and be healthy; WHO is committed to this principle.
- WHO recognizes that, in this guideline development process, we are primarily dealing with the child presenting with a clinical problem, and looking at the process of ill-health within a medical model only. Although ill-health is often the consequence of a broader context for health and nutrition, here, in this guideline, we are not focusing our consideration on this broader context; comprehensive solutions are, hence, beyond this guideline's immediate remit.
- Nevertheless, WHO recognizes and notes these broader considerations, and their importance for informing the wider discussions of the guideline development group.

# Evidence and recommendations

## 1. Anthropometric assessment of infants and children presenting to primary health-care facilities

### *Programmatic questions*

- a. Should primary health-care workers assess infants and children in order to identify stunting (chronic malnutrition) in addition to wasting (acute malnutrition)?
- b. Should primary health-care workers assess infants and children in order to identify overweight and obesity?
- c. Which anthropometric measures should primary health-care workers use to assess nutritional status?

### *Background*

IMCI provides clinical algorithms that guide health workers at primary health-care facilities on the assessment and management of infants and children presenting with illnesses, including assessment and classification of nutritional status. The algorithms reflect WHO guidelines on interventions to treat the most common and serious conditions causing mortality or serious morbidity among neonates and infants and children. An underlying principle of IMCI is that an assessment provides a classification and that classifications should translate into an appropriate care and treatment response. An assessment that does not result in a classification and relevant treatment would not therefore be included.

WHO classifications of nutrition conditions in children based on anthropometry are provided in the earlier section “Definitions and key terms”. Definitions of wasting are based on weight-for-length in children under 2 years of age or weight-for-height in older children, or an assessment of the mid-upper arm circumference. The presence of bilateral oedema is a further criterion for identifying children with severe acute malnutrition. WHO definitions for overweight and obesity are also based on both weight and length/height estimates, i.e. weight-for-length/height and body mass index (BMI) but not mid-upper arm circumference.

Children with severe wasting or severe acute malnutrition have significantly increased mortality risk, though appropriate treatment significantly reduces mortality (19, 20). Children with moderate wasting and/or stunting also have increased mortality risk, although less than for severe wasting or wasting and stunting combined (21).

In an individual patient meta-analysis of 53 607 participants and 1306 deaths, the risk of all-cause mortality was elevated among children with one, two or three anthropometric deficits. In comparison with children with no deficits, the mortality hazard ratios were 3.4 (95% confidence interval [CI]: 2.6 to 4.3) among children who were stunted and underweight but not wasted; 4.7 (95% CI: 3.1 to 7.1) in those who were wasted and underweight but not stunted; and 12.3 (95% CI: 7.7 to 19.6) in those who were stunted, wasted and underweight (21).

In children, moderate acute malnutrition (moderate wasting) may be transient and experienced by children in the course of an acute illness. Moderate wasting may also be due to chronic illnesses such as tuberculosis (TB) or HIV, or can also be the result of food insecurity and inadequate dietary intake. Management of moderate wasting should include a range of essential nutrition actions such as breastfeeding promotion and support, education and nutrition counselling for families, and other activities that identify and prevent the underlying causes of malnutrition, including nutrition insecurity. Interventions to improve food insecurity include the provision of conditional or non-conditional cash transfers and support to agriculture, such as crop diversification (22). Children with moderate wasting need nutrient-rich foods to meet their extra needs for full recovery (22). In the context of food insecurity, food supplements may have a role and food programmes have been established in many humanitarian crises or other settings of chronic food insufficiency.

Historically, anthropometric assessments and nutrition classifications in IMCI focused on identifying infants and children with undernutrition because of the associated health consequences. The classification of undernutrition included in IMCI focused on assessing weight-for-age because it is simpler to measure than the length or height of children. Children whose weight-for-age was less than the third percentile were classified as “very low weight”. However, this classification did not necessarily reflect the relevant risks of morbidity and mortality. For example, one child may have a very low weight-for-age because he or she is stunted or has a history of low birth weight. In contrast, another child who is taller may have the same weight-for-age and is wasted because he or she has suffered a recent acute or serious illness. Similar considerations are relevant for children and classifications for overweight and obesity.

Therefore, with respect to both wasting and overweight and obesity, it is important to relate a child’s weight-for-age to their length/height, in order to correctly interpret their nutritional status.

In the context of the double burden of malnutrition, it is therefore important that a public health approach, such as IMCI, correctly identifies children who are at risk of clinically important undernutrition (severe or moderate wasting, or severe acute malnutrition) and also children who are at risk of overweight and obesity.

### Summary of the evidence

Three reviews of relevant information were completed to contextualize the environment in which recommendations may be implemented and to assist the guideline development group to make informed decisions. Details of the review teams and references are presented in [Annex 1](#), [Annex 2a](#) and [Annex 2b](#).

- A meta-analysis of epidemiological anthropometric data of infants and children from different regions. This shows regional differences in rates of undernutrition and stunting in infants and children (23).
- A systematic review of the relationship between anthropometric measures in childhood and short- and long-term health outcomes (24).

*Note:* Grading of Recommendations, Assessment, Development and Evaluation (GRADE) tables (25) were not developed but comprehensive tables summarizing the evidence for associations between anthropometric measures in early childhood and anthropometric and health outcomes in adulthood are included in the report.

- A survey of IMCI chart booklets and clinical algorithms used in different countries, reporting current uptake and adaptations of IMCI at national level (26).

The first, an epidemiological analysis of surveys conducted in 63 low- and middle-income countries (1993–2012) (23) reported that between 0.4% and 18.6% of children (aged 6–59 months) would be

classified as “very low weight”, i.e. weight-for-age more than 3 SD below the *WHO child growth standards* (2) (Bangladesh 14.1%, Chad 15.7%, India 18.6%, Niger 16.3%, Timor Leste 16%). The vast majority of these children are also stunted (low length/height-for-age). The proportion who were “very low weight” and also wasted varied by region. In Central and South American and Caribbean countries, 0.4–2% of stunted children were concurrently wasted, whereas in Africa and South Asia 0.5–11% were also wasted (see distributions by regions in [Annex 1](#) (23)). The analyses highlight the regional differences in rates of undernutrition and stunting in infants and children, and the importance of correct classification of nutritional status for individual-based recommendations.

The second, a systematic review (24), analysed data from 52 studies (36 cohorts or longitudinal studies) that reported data on the association of anthropometric measures during infancy and childhood and the risk of developing obesity in later life (childhood, adolescence or adulthood). A meta-analysis using a random-effects model showed a significant inverse association of correlation coefficients. The pooled analysis of BMI showed a decreasing trend when tracked from early childhood (3–6 years) to mid childhood (9–11 years;  $r = 0.79$ , 95% CI: 0.71 to 0.87), adolescence (12–18 years;  $r = 0.66$ , 95% CI: 0.53 to 0.78), adulthood (19–40 years;  $r = 0.39$ , 95% CI: 0.29 to 0.50) and late adulthood (>40 years;  $r = 0.26$ , 95% CI: 0.18 to 0.34); mid childhood (9–11 years to adolescence (12–18 years;  $r = 0.81$ , 95% CI: 0.73 to 0.88), adulthood (19–40 years;  $r = 0.58$ , 95% CI: 0.50 to 0.66). BMI tracking showed similar trends in low- and middle-income countries and high-income countries. Thirteen studies showed that high BMI in childhood or adolescence was associated with a high risk of overweight or obesity in later life. The majority of the studies predicted a high risk of becoming overweight or obese with higher weight status during infancy and childhood.

Rapid weight gain in infancy and childhood was also strongly associated with the risk of overweight or obesity in adolescence or adulthood. Evidence from cohort studies showed that children who gained excess weight in “mid-child years” (age 4 years in four of the birth cohorts and age 8 years in one birth cohort) are at significant risk of obesity, diabetes and cardiovascular disease in adult life (27).

Eleven articles (including two consortia) from 13 cohorts discussed the associations of various anthropometric measures during infancy or childhood and cardiovascular morbidity and mortality in later life.

Four cohort studies showed that higher BMI during childhood was associated with cardiovascular disease morbidity and mortality during adult life. One cohort study (Helsinki Birth Cohort) showed that lower BMI during early childhood was associated with higher risk of cardiovascular disease during adult life. However, this finding was not consistent across all cohort studies. Two cohort studies, one each from Great Britain and the United States of America, did not find any association between childhood BMI and adult cardiovascular disease. The pooled results from three British cohorts found a significant relationship between being persistently overweight throughout childhood until adult life and coronary artery disease in later life. Pooled results from three historical British birth cohorts attributed minimal risk for ischaemic heart disease when childhood BMI was high. One cohort study (Helsinki) showed that lower weight and/or shorter length at 1 year of age increased the morbidity and mortality due to cardiovascular disease in adult life. Low weight-for-age at 1 year may have been due to low birth weight or being small for gestational age.

Findings regarding associations between childhood weight and height and systolic and diastolic blood pressure were not consistent. Among 29 283 subjects in 12 cohorts, 9 studies reported positive associations between BMI in childhood (2–12 years) and adolescence (12–18 years) and raised adult systolic and diastolic blood pressure measured between 19 and 50 years. One study, however, reported no association after adjusting for adult BMI.



In summary, there were strong correlations between high weight-for-length/height/BMI (and other markers of adiposity such as skinfold thickness) in early to mid-childhood and the prevalence of obesity, cardiovascular disease and diabetes in adolescents and adults (24).

The third review was a brief survey carried out by WHO in 2015 for the purpose of this guideline process (26), which found that anthropometric assessment of infants and children in the national IMCI chart booklet had been updated in 19 countries. In these versions, the combination of measurement most frequently included to assess nutritional status was weight-for-age + weight-for-length/height + mid-upper arm circumference, whereas in previous versions only assessments of weight-for-age were included. Clinical signs were used more frequently than anthropometric measurements to define acute malnutrition; “visible severe wasting” is still being used as a criterion in 39 countries despite no longer being recommended by WHO since 2013.

A separate growth-monitoring programme is carried out in 39 countries, mostly together with routine immunizations. Growth monitoring is most commonly performed in children below the age of 5 years. The anthropometric measurement used most frequently for growth monitoring was weight-for-age, then weight-for-length/height and length/height-for-age. Data on coverage of growth monitoring among children (up to 12 months of age) were available in 23 countries; high coverage of growth monitoring (80–100%) was reported in 12 countries (26).

### **Best practice statement**

With respect to anthropometric assessment of infants and children presenting to primary health-care facilities, a statement on best practice was agreed.

**Best practice statement:** All infants and children aged less than 5 years presenting to primary health-care facilities should have both weight and length/height measured, in order to determine weight-for-length/height and to classify nutritional status according to *WHO child growth standards* (2).

*Note:* The measurement of mid-upper arm circumference both at health facilities and in the community can be used to identify children with severe or moderate acute malnutrition (19). However, mid-upper arm circumference cannot be used to determine overweight or obesity, as there are no validated cut-off values as yet. The best practice statement therefore only makes reference to weight and length/height.

### **Justification/remarks**

The guideline development group considered that the statement did not constitute a recommendation that could be supported by comparative clinical studies. Instead, they considered it is self-evident that a child with acute undernutrition or who is overweight or obese must be identified, in order for appropriate interventions to be provided. No evidence was presented regarding the ability of health workers to effectively measure and interpret length/height and weight measurements to appropriately classify children. While growth monitoring is a common part of child health services, it is often challenging to do accurately (28, 29).

The group agreed, however, that they should make a formal statement that assessment of anthropometric status is important and provides the critical background against which several other important care and treatment decisions would be made. The group therefore decided that it was appropriate to formulate and present a best practice statement.

The group noted that using weight alone to inform clinical decisions leads to significant misclassification of nutritional status. One way to minimize this misclassification would be to standardize

measurement of length/height in the context of IMCI. With this information, health workers would be able to provide appropriate nutrition counselling, e.g. information about food quality, and avoid inappropriate guidance such as advising parents whose children are underweight but of low length/height (therefore normal weight-for-length/height) to eat more.

An evidence base on health outcomes associated with reduced weight-for-length/height is available but there is no evidence on the impact of performing the assessment in routine conditions. Some members of the guideline development group felt that measuring length/height is not useful unless it is done properly. Also, it may not always be possible to measure length/height, and it could be an extra task carried out at the expense of some other health-worker activity.

Countries in the WHO Region of the Americas measure length/height routinely. Implementation was done with sensitization and advocacy for its importance, which has helped to put it into practice.

The arguments in favour of a recommendation were that if there were a recommendation to measure length/height routinely, then the strategy for implementation, including training, would be established.

Suggesting a “best practice” was considered to give flexibility to countries and reflect that measuring length/height may not always be possible.

#### *Implementation considerations*

Considerable initial training and feedback will be required to establish good measurement processes at health-care facilities.

#### *Research priorities*

A better understanding of the use and feasibility of biomarkers present in childhood to predict obesity and the risk of cardiovascular disease or diabetes mellitus in adolescence and adulthood.

## **2. Care of infants and children with acute or chronic malnutrition presenting to primary health-care facilities**

### *Programmatic questions*

- a. Should primary health-care workers counsel caregivers of, or otherwise intervene among, infants and children who are moderately wasted?
- b. Should primary health-care workers counsel caregivers of, or otherwise intervene among, infants and children who are stunted?

### *Background*

Children with a history of low birth weight, or acute or chronic undernutrition, are at increased risk of morbidity and mortality during childhood (21) and are also at increased risk of overweight, obesity and cardiovascular disease in later life (30). They are also at greater risk of metabolic syndrome, including type 2 diabetes mellitus (31). The basis for the additional risk is not fully understood; however, it is thought that infants born with low birth weight have adapted to an in-utero environment in which fetal nutrition is suboptimal, such that their energy needs in infancy and childhood are reduced (32, 33). However, later, if presented with high-energy diets containing sugar or fat, these children may gain excess adipose tissue without gaining additional lean tissue or

achieving improved linear growth (34). This concept is sometimes referred to as the developmental origins of health and development. Infants who experience moderate degrees of wasting and become stunted for whatever reason, may similarly have altered energy requirements in early childhood.

For these reasons, there is a potential, inadvertent risk of promoting overweight and obesity, or inappropriate gains in adipose tissue, if high-energy food supplements are given in response to stunting in childhood populations, or as part of efforts to treat or prevent moderate wasting.

The management of children presenting with moderate wasting is further complicated by the range of conditions that may decrease normal dietary intake or increase catabolic, physiological processes that can cause wasting. Acute illnesses may cause a child to lose their appetite and experience transient losses in weight. As such, children who experience moderate wasting may fully recover both nutritionally and functionally, as long as they receive adequate, high-quality nutrient-dense foods (22). If illnesses are severe or recurrent, then acute wasting may follow. Chronic infections such as TB or HIV infection may increase metabolic demands and also result in acute wasting. If appropriate anti-tuberculous or antiretroviral treatment is not given, then these children may experience severe wasting and are at high risk of death. Moderate wasting may also be the result of food insecurity and prolonged periods of inadequate dietary intake. In crisis settings, where there is a high prevalence of wasting or food insecurity (7), at community or household level, family food programmes may be implemented to avert increased infant and child mortality.

IMCI has historically emphasized dietary counselling as part of routine care of all infants and children presenting to primary health-care facilities with an illness. When the nutritional status of a child is normal, a mother is encouraged and reminded of good infant and child feeding practices, including exclusive and continued breastfeeding, appropriate complementary foods and family foods (see Figs. 1 and 2). If a child is found to have severe acute malnutrition, he or she is assessed for complications and either treated with therapeutic foods as an outpatient or admitted for additional treatment if found to have signs of sepsis. There has been no explicit guidance for health workers when they identify a child with moderate wasting and stunting.

### **Summary of the evidence**

- A systematic review was commissioned for this guideline and contributed to the GRADE tables and evidence for this question (see [Annex 2c](#)) (35).

*Note:* The summary of evidence presented next reflects the terminology used by authors of the original scientific publications.

#### ***Counselling of caregivers of children with moderate wasting***

One randomized controlled trial (RCT) reported on outcomes related to the effect of counselling and education to caregivers versus no education (36). The study methods were poorly described and hence the risk of bias is unclear. The authors investigated the effect of a home-based nutrition-education programme versus no education on the growth and psychological performance of moderately underweight ( $\leq 72\%$  of expected weight-for-age without oedema or  $\leq 79\%$  of expected weight-for-age with oedema) children aged 7–36 months. The nutrition-education programme was provided to the mothers for a few months. The authors did not report on the short-term outcomes of the investigation, but instead on the growth and psychological functioning of the children 3 years later. The counselling did not address breastfeeding practices in younger children. There were no statistically significant differences in physical growth or psychological functioning of the children whose mothers had or had not received the nutrition-education programme.

*Counselling of caregivers of children who are stunted but not wasted*

No studies were identified that reported on the effectiveness of providing nutrition counselling to caregivers of children with stunting but no wasting.

*Supplementary foods for young children (<24 months) who are severely underweight with moderate wasting*

**Short-term outcomes:** Hossain and colleagues (37) evaluated the effect of supplementary foods plus standard care and counselling compared to standard care and counselling without supplementary foods among 162 children, aged 12–13 months, who presented with “very low weight”. Of these children, 81% were moderately wasted (z-scores, mean weight-for-age ± SD,  $-3.8 \pm 0.1$ ; length-for-age  $-3.5 \pm 1.0$ ; weight-for-length  $-2.7 \pm 0.8$ ); 67% were severely stunted; and 27% were moderately stunted. Despite weight and height gains, the children were still severely underweight at the end of the treatment period (see **Table 1**).

**Table 1. Effect of supplementary foods and counselling on growth outcomes compared with counselling alone (37)**

Anthropometric measure	MEAN CHANGE ± SD AFTER 3 MONTHS OF SUPPLEMENTATION <sup>a</sup>		MEAN CHANGE ± SD 3 MONTHS AFTER SUPPLEMENTATION FINISHED <sup>a</sup>	
	Supplemented group	Non-supplemented group	Supplemented group	Non-supplemented group
Weight-for-age, z-score <sup>b</sup>	$-3.3 \pm 0.7$	$-3.4 \pm 0.7$	$-3.4 \pm 0.8$	$-3.3 \pm 0.8$
Height-for-age, z-score <sup>b</sup>	$-3.8 \pm 1.0$	$-3.7 \pm 0.9$	$-3.9 \pm 1.1$	$-3.9 \pm 1.0$
Weight-for-length, z-score <sup>b</sup>	$-1.8 \pm 0.8$	$-2.0 \pm 0.8$	$-1.8 \pm 0.8$	$-1.8 \pm 1.0$
Mid-upper arm circumference, mm	$12.6 \pm 0.1$	$12.6 \pm 0.8$	NA	NA

NA: not available; SD: standard deviation.

<sup>a</sup> Effect of supplementary food plus counselling, compared to counselling alone.

<sup>b</sup> Compared to the median of the WHO child growth standards (2).

**Long-term outcomes:** No evidence was identified on the long-term effect of providing supplementary food to children with moderate wasting on outcomes such as the development of overweight and obesity or the development of, and/or risk factors for, cardiovascular disease or diabetes during adolescence or adulthood.

*Supplementary foods for young children (<24 months) with moderate wasting and stunting*

**Short-term outcomes:** Nikiema and colleagues (38) evaluated outcomes in 1974 stunted children aged 6–24 months presenting with moderate wasting, randomized to receive either 3 months of supplementation with fortified corn–soy blend or ready-to-use supplementary food, or child-centred counselling only. After 3 months of supplementation, children in the supplementation arm had some increase in weight and length (see **Table 2**). There were no outcome data for growth or mortality at later time points.

**Table 2. Effects of supplementary food on growth outcomes compared with counselling alone (38)**

ANTHROPOMETRIC MEASURE	MEAN DIFFERENCE AFTER 3 MONTHS <sup>a</sup>	95% CI	P VALUE
Weight gain, g/kg/day	+0.6	+0.3 to +0.8	0.0001
Length gain, mm/day	+0.0	-0.0 to +0.1	Not significant
Height-for-age, z-score <sup>b</sup>	+0.4	+0.1 to +0.7	0.003
Weight-for-age, z-score <sup>b</sup>	+0.2	-0.0 to +0.4	Not significant
Mid-upper arm circumference, mm/day	+0.0	+0.0 to +0.1	0.01

CI: confidence interval.

<sup>a</sup> Effect of supplementary food plus counselling, compared to counselling alone.

<sup>b</sup> Compared to the median of the *WHO child growth standards* (2).

No evidence was identified on the benefits or harms of providing supplementary food for children older than 24 months of age presenting with moderate wasting.

**Long-term outcomes:** No evidence was identified on the long-term effect of providing supplementary food to children with moderate wasting on outcomes such as the development of overweight and obesity or the development of, and/or risk factors for, cardiovascular disease or diabetes, during adolescence or adulthood.

#### *Supplementary foods for children who are stunted but not wasted*

Six studies reported on the effect of providing supplementary foods to children with stunting but who were not wasted.

#### *Young children less than 24 months of age*

**Short-term outcomes:** Four studies (39–42) in moderately stunted children aged 6–24 months contributed to a meta-analysis of outcomes assessed after 3 months of supplementary foods (see [Table 3](#)). There was significant heterogeneity between the studies. The supplementary foods provided to children were quite different between studies: high-energy milk-based supplements/milk and soy-fortified spread/lipid-based supplements/corn–soy blend.

**Table 3. Outcomes assessed after 3 months of supplementary foods in children aged 6–24 months**

ANTHROPOMETRIC MEASURE	REPORTED DIFFERENCE AFTER 3 MONTHS <sup>a</sup>	95% CI
Length, cm	+0.3	-0.1 to +0.7
Length-for-age, z-score <sup>b</sup>	+0.1	-0.1 to +0.3
Weight, kg	+0.1	+0.0 to +0.2
Weight-for-age, z-score <sup>b</sup>	+0.1	-0.0 to +0.2
Weight-for-length, z-score <sup>b</sup>	+0.1	-0.0 to +0.2

CI: confidence interval.

<sup>a</sup> Compared to no supplementation.

<sup>b</sup> Compared to the median of the *WHO child growth standards* (2).

One study (43) provided evidence for the effect of providing moderately stunted children aged 6–24 months with 6 months of supplementary food (see [Table 4](#)).

**Table 4. Outcomes assessed after 6 months of supplementary foods in children aged 6–24 months**

ANTHROPOMETRIC MEASURE	REPORTED DIFFERENCE AFTER 6 MONTHS <sup>a</sup>	95% CI
Length, cm	+1.3	+0.3 to +2.4
Length-for-age, z-score <sup>b</sup>	NA	NA
Weight, kg	+0.2	–0.3 to +0.7
Weight-for-age, z-score <sup>b</sup>	NA	NA
Weight-for-length, z-score <sup>b</sup>	0.0	–0.4 to +0.4

CI: confidence interval; NA: not available.

<sup>a</sup> Compared to no supplementation.

<sup>b</sup> Compared to the median of the *WHO child growth standards* (2).

One study (44) provided outcome data on height, collected 3 months after a 3-month supplementation period in moderately stunted children aged 6–24 months. There was no statistically significant difference in length between the supplemented and non-supplemented children with moderate stunting ( $n = 82$ ; mean difference = +2.3 cm, 95% CI: –0.86 cm to 5.46 cm;  $P = 0.15$ ).

**Long-term outcomes:** There were no data on whether providing supplementary food to moderately underweight young children with moderate stunting improves linear growth, or has an impact on blood pressure or measures of body fat in late childhood (age 7–8 years) (45). Providing supplementary food to moderately underweight children with moderate stunting did not lead to any improvement in linear growth measured in adolescence (45). However, increased BMI in childhood is correlated with increased BMI in both adolescence and adulthood (24).

#### *Children aged 24–59 months*

**Short-term outcomes:** Among children aged 24–59 months, two studies provided outcome data at several time points during and after the supplementation period ( $n = 148$  and 65) (43, 46). After 3 months of supplementation in children aged 36–59 months with moderate stunting, the supplemented children were significantly taller than the non-supplemented children ( $n = 148$ ; mean difference = 2.4 cm, 95% CI: 0.1 cm to 4.7 cm;  $P = 0.04$ ) (46). After 6 months of supplementation, the supplemented children were significantly taller than the non-supplemented children (46) ( $n = 148$ ; mean difference = 2.4 cm, 95% CI: 0.1 cm to 4.7 cm;  $P = 0.04$ ). Walker et al. (43) provided supplementary food for 24 months to children aged 18–42 months with moderate stunting. After 12 months of supplementary food, the supplemented children were statistically significantly taller than the non-supplemented children (43) ( $n = 65$ ; mean difference = 1.3 cm; 95% CI: 0.0 cm to 2.6 cm;  $P = 0.04$ ). However, after 24 months of supplementary food, there was no significant difference between the length/height of the supplemented and non-supplemented children (43) ( $n = 63$ ; mean difference = 1.2 cm, 95% CI: –0.8 cm to 3.2 cm;  $P = 0.23$ ).

Available outcome data from the two studies (43, 46) measured at the same time points are summarized in **Table 5**.

**Table 5. Summary of outcome data comparing moderately stunted but not wasted children (24–59 months) who received or did not receive supplementary foods (43, 46)**

ANTHROPOMETRIC MEASURE	MEAN DIFFERENCES AFTER SUPPLEMENTATION GIVEN FOR SPECIFIED DURATION <sup>a</sup>								QUALITY OF EVIDENCE
	3 MONTHS	95% CI	6 MONTHS	95% CI	12 MONTHS	95% CI	24 MONTHS	95% CI	
Height, cm	+2.4	+0.1 to +0.8	+2.4	+0.1 to +4.7	+1.3	+0.0 to +2.6	+1.2	-0.8 to +3.2	Low
Height-for-age, z-score <sup>b</sup>	+0.3	+0.1 to +0.5	+0.3	+0.1 to +0.6	NA		+0.3	-0.1 to +0.7	Low
Weight, kg	+1.0	+0.3 to +1.7	+0.9	+0.3 to +1.6	+0.3	-0.3 to +0.9	+0.3	-0.5 to +1.0	Low
Weight-for-age, z-score <sup>b</sup>	+0.4	+0.1 to +0.6	+0.3	+0.0 to +0.6	NA		NA		Low
Weight-for-height, z-score <sup>b</sup>	+0.3	+0.0 to +0.6	+0.30	+0.0; +0.6	0.0	-0.4 to +0.4	0.0	-0.4 to +0.4	Low

CI: confidence interval; NA: not available.

<sup>a</sup> Compared to no supplementation.

<sup>b</sup> Compared to the median of the *WHO child growth standards* (2).

### Best practice statement and Recommendation

With respect to counselling, a statement on best practice was agreed.

**Best practice statement:** Caregivers and families of infants and children aged less than 5 years presenting to primary health-care facilities should receive general nutrition counselling, including promotion and support for exclusive breastfeeding in the first 6 months and continued breastfeeding until 24 months or beyond.

*Note:* Against the background of best practice that caregivers of all infants and children aged less than 5 years should receive general nutrition counselling, no recommendation is made regarding providing nutrition counselling that is specific to children with stunting only.

With respect to supplementary foods among children presenting to primary health-care facilities with either moderate wasting or stunting, two recommendations were agreed.

**Recommendation:** Routinely providing supplementary foods to moderately wasted infants and children presenting to primary health-care facilities is not recommended (*strength of recommendation: conditional; low-quality evidence*).

*Note:* There may be a role for the provision of supplementary foods in settings where there is a high prevalence of wasting or food insecurity,<sup>1</sup> at community or household level, and as part of the continuum of care for the individual child that includes appropriate treatment of clinical conditions and other modifiable factors, provision of nutritional counselling and subsequent follow-up to assess response.

**Recommendation:** The provision of supplementary foods for treating stunting among children who present to primary health-care facilities is not recommended (*strength of recommendation: conditional; low-quality evidence*).

<sup>1</sup> Indicators for assessing food insecurity are available in reference (47).

*Justification/remarks*

**Counselling for moderate wasting and stunting**

The deliberations of the guideline development group were constrained because there was only one RCT examining the effect of counselling, and this was not directly relevant to the population in question; nor did the RCT address breastfeeding practices, which may be relevant in younger populations of children. However, the group was satisfied that the benefits of providing nutrition counselling to caregivers of children with moderate wasting outweighed any risk. Extending counselling beyond young children to the group up to 5 years of age was regarded as a benefit.

The guideline development group considered that offering counselling to caregivers of stunted children may have unintended consequences, especially if the quality of counselling is inadequate or misdirected. Specifically, the group noted that counselling may infer that caregivers of children who are stunted should give additional energy-dense foods or products in response to chronic malnutrition. The evidence available does not show any sustained improvement in length/height-for-age over time in response to counselling or provision of supplementary foods for a limited period. The guideline development group noted, however, that giving additional energy to children who are stunted may increase adiposity and the likelihood of overweight/obesity both in childhood and in later years.

Nearly all caregivers are likely to value nutrition counselling in most settings, and health workers generally accept it as part of their interaction with clients. This counselling may contribute to children catching up weight after an illness.

The guideline development group acknowledged, however, that some nongovernmental organizations engaged in humanitarian work have opted to provide supplementary food products. The WHO *Essential nutrition actions* (22) recognize that children with moderate wasting need adequate nutrient-dense foods to meet their extra needs for nutritional and functional recovery. Also, caregivers of children with moderate wasting may benefit from nutrition counselling and other interventions to improve food security, including the provision of conditional or non-conditional cash transfers and support to agriculture such as crop diversification. However, the efficacy of individual interventions and the detailed nature of a full package of care required to achieve full nutritional and functional recovery are not clear, owing to the lack of evidence.

Some participants were concerned with the resources required. However, counselling of some kind is already in place in most settings; the issue will be to enhance and improve it.

The group concluded that health workers should address nutritional risks through counselling of caregivers of children presenting to a health facility. The recommendation was conditional, owing to the lack of relevant evidence.

**Supplementary foods for moderate wasting**

In reaching a recommendation, the guideline development group was concerned that most of the evidence was based on a single trial from some time ago, and thus the overall quality of the evidence was low. The group considered that there would be major variability in acceptability, values and preferences in terms of whether providing supplementary foods would be appropriate or even feasible, depending on the local context, especially whether the household or the community was food insecure. In some cases, families might worry about the quality of supplementary foods compared to identifying approaches for improving the quality and adequacy of local family foods.

The group also acknowledged there is a range of supplementary foods available, some of which are high in energy content while others have lower energy content but perhaps have a higher micronutrient content. The lack of data contrasting the benefit of these respective types of



supplementary foods compared to no intervention limited discussions among the guideline development group.

The resources required for providing supplementary foods, even only for children presenting to primary health-care facilities, were assessed as being major. The needs would be not only for the food itself, but also for distribution, storage, staff training, etc. There was some preference expressed for home-made supplements, but some of the same issues might apply, depending on the context.

The group concluded against routinely providing supplementary feeding to moderately wasted children presenting to primary health-care facilities. It noted that exceptions could be made in the face of local food insecurity.

### Supplementary foods for stunting

In reaching a recommendation, the guideline development group considered that the quality of the evidence from the systematic review was low. There was no strong evidence that supplementary feeding changes the outcomes of interest, and the review showed no impact on stunting over longer durations. At the same time, supplementary food may increase weight gain in stunted children, with long-term consequences.

The group noted that there is broad experience in implementing supplementary feeding schemes in various settings, so it is clearly feasible given adequate resources. However, whether resources would be forthcoming, and whether these would detract from other needs, were major questions raised by the guideline development group, especially noting the numbers of children globally who are stunted. Providing a supplement only for stunted children aged from 6 to 24 months was one option considered. However, there is no evidence to support this specific approach for children who are stunted, nor is there evidence for any differential effects on linear growth according to the type of supplementary food, i.e. high versus low energy, or by micronutrient profile. Another difficulty would be focusing the intervention to reach the most vulnerable, and to avoid accentuating inequalities.

While a generally acceptable intervention, it was noted that some families in different settings would prefer to receive cash. In many places, the provision of a food supplement or cash could be done as a community intervention, and not solely for children attending a primary health-care facility and cared for through IMCI. To this end, improving linkages between health-facility services and community-based programmes may be advantageous.

Given the evidence and balance of other factors, the guideline development group recommended against the provision of supplementary foods for stunted children. Because of the wide variation in acceptability and the low quality of evidence, the recommendation made was conditional.

### *Implementation considerations*

- While counselling may appear to be a straightforward intervention to implement, the benefits that might be obtained are entirely dependent on the content and quality of the counselling. This would, in part, depend on the investments available for human resources and training.
- WHO provides relevant training courses to improve both the content and quality of nutrition-related counselling for this population. National programmes or adapted training courses should be consistent with, and of the same quality as, WHO training courses.
- Maintaining the quality of counselling over time requires continuing support to staff on the ground. The issue of sustainability of quality services should be considered at the time when an intervention is launched.

### Research priorities

#### Nutritional counselling

- What are effective ways of communicating nutrition messages in low-resource settings.
- What are the most effective approaches for the delivery and content of nutrition counselling for caregivers of stunted children?
- What is the most effective approach for dietary counselling and what is the impact on catch-up growth in sick children with moderate acute malnutrition?
- How can reported barriers to counselling be overcome?

#### Supplementary foods

- What is the effect of different types and durations of supplementary foods, including low-energy supplements, on linear growth in children who are stunted, presenting with or without an illness?

#### Interventions

- What is an effective package of interventions to achieve nutritional and functional recovery of children with moderate wasting or stunting?
- What is the effect of providing different types and durations of supplementary foods in food-insecure settings on linear growth in children?
- What is the effect of zinc supplementation on linear growth in children living in food-insecure or low-resource settings?

## 3. Care of children who are overweight or obese presenting to primary health-care facilities

### Programmatic questions

- a. Should primary health-care workers counsel caregivers of children who are overweight or obese regarding nutrition or other dietary measures?
- b. Should primary health-care workers counsel caregivers of children who are overweight or obese regarding physical activity?
- c. Should primary health-care workers refer children who are obese?

### Background

The epidemic of child and adolescent overweight and obesity is affecting all regions of the world and not just those of relative affluence. Lifestyle changes, including shifts towards unhealthy diets and reduced physical activity, are affecting the status of child health as much as adult health. The patterns emerging today in child overweight and obesity will impact on the health of populations for the next 50–60 years and will probably have major economic and human-resource consequences for health systems (4).

Poverty and poor diets are some of the drivers of obesity. Obesity and increased rates of overweight are commonly seen in lower socioeconomic groups, owing to the expense associated with more healthy foods. Urbanization and increased motorized transportation and availability of fast foods

contribute to the social determinants of the epidemic being witnessed in many transitioning economies and countries.

The *Global strategy for infant and young child feeding* (9) aims to improve breastfeeding and infant and young child feeding practices. It highlights the importance of compliance with, and implementation of, the International Code and subsequent relevant World Health Assembly resolutions, in order to protect breastfeeding and infant and young child feeding practices from unethical marketing practices and commercial pressures. It noted, even in 2003, the associations between poor early-infant and child feeding practices and the increasing incidence of child obesity and potential lifelong adverse health consequences. However, it does not specifically address the identification of children at risk of overweight and obesity, nor does it provide guidance on care and management.

IMCI focuses on children presenting to primary health-care facilities with an illness. It serves as an approach for delivering proven effective infant and child interventions. It aims to provide clinical guidance to cover the most serious childhood illnesses typically seen at first-level health facilities. In most countries, the clinical algorithms address diarrhoeal diseases, pneumonia, undernutrition, malaria and fever/meningitis. To date, the generic WHO IMCI has not addressed the challenge of overweight and obesity, though some countries and regions have started their own adaptation.

In response to the changing epidemiology of child health, and to provide guidance on mitigating risk factors for noncommunicable diseases in later life, IMCI needs to adapt and include appropriate guidance related to overweight and obesity.

### Summary of the evidence

A new systematic review of relevant evidence was not commissioned for this area of care, as several systematic reviews had recently been published. Instead, a systematic overview of systematic reviews was conducted, to identify meta-analyses published between 2010 and 2015 that would provide relevant evidence. GRADE profiles were prepared from the relevant reviews.

The search strategy for the reviews, criteria for eligible reviews, Prisma diagram showing the final selection of eligible studies, and GRADE profiles are included in [Annex 3](#).

### Nutrition counselling of caregivers of children who are overweight or obese

One systematic review was identified (48) that provided indirect evidence regarding the question, “Should primary health-care workers counsel caregivers of children who are overweight or obese regarding nutrition or other dietary measures?” This was an update of a previous Cochrane review (49) that summarized interventions for the prevention of obesity in children. Peirson et al. (48) searched five databases up to August 2013 for eligible studies. Randomized trials of behavioural interventions relevant to primary care (diet, exercise and lifestyle) for preventing overweight and obesity in healthy normal or mixed-weight children or youth aged 0–18 years were included, if 12-week post-baseline data were provided for BMI, BMI z-score, or prevalence of overweight or obesity. In total, 90 studies were included, all with mixed-weight populations. Of these, there were 15 RCTs that assessed dietary interventions alone, including but not limited to nutrition counselling.

Overall, among the 90 studies evaluating dietary and/or exercise and/or lifestyle interventions, compared with controls, any combination of dietary/exercise or lifestyle interventions showed a small but significant effect on BMI and BMI z-score (standardized mean difference (SMD) =  $-0.07$ , 95% CI:  $-0.10$  to  $-0.03$ ;  $I^2 = 74\%$ ), a reduction in BMI (mean difference =  $-0.09$  kg/m<sup>2</sup>, 95% CI:  $-0.16$  to  $-0.03$ ;  $I^2 = 76\%$ ) and a reduced prevalence of overweight and obesity (risk ratio [RR],  $RR_{\text{intervention}} - RR_{\text{control}} = 0.94$ , 95% CI:  $0.89$  to  $0.99$ ;  $I^2 = 0\%$ ; number needed to treat 51, 95% CI: 29 to 289). Little

evidence was available on harms. There was variability across efficacious interventions, although many of the interventions were short term (68% were 12 months or less in duration), involved school-aged children and were delivered in educational settings. The authors concluded that, overall, behavioural prevention interventions (dietary and/or exercise and/or lifestyle) are associated with small improvements in weight outcomes in mixed-weight populations of children and adolescents.

Subgroup analyses (15 studies, 11 568 children) show that in children aged 0–18 years who were exposed to dietary interventions (including but not limited to nutrition counselling) alone, the SMD for BMI was  $-0.08 \text{ kg/m}^2$  (95% CI:  $-0.17 \text{ kg/m}^2$  to  $+0.01 \text{ kg/m}^2$ ) than among children who did not receive such interventions.

Among children younger than 5 years (17 studies, 6930 children) who were exposed to dietary and/or exercise and/or lifestyle interventions, the SMD for BMI was  $-0.06 \text{ kg/m}^2$  (95% CI:  $-0.15 \text{ kg/m}^2$  to  $+0.02 \text{ kg/m}^2$ ) than among children who did not receive such interventions.

The authors (47) rated the quality of the evidence for both of these subgroups as very low, owing to risk of bias, indirectness, inconsistency, imprecision or reporting bias among the studies included in the review. Other reviews identified addressed the elements of PICO only indirectly and either did not include RCTs, did not provide relevant subgroup data and/or failed to provide some form of evidence assessment.

#### ***Physical-activity counselling of caregivers of children who are overweight or obese***

One systematic review was identified that provided indirect evidence regarding the question, “Should primary health-care workers counsel caregivers of children who are overweight or obese regarding physical activity?”. Peirson et al. (48), included 18 RCTs (15 902 children) that reported the effect of counselling on physical activity. This systematic review summarized preventive interventions that investigated the effect of dietary, exercise (including but not limited to counselling on physical activity), lifestyle and/or a combination of these interventions on BMI or BMI z-score in children and adolescents (0–18 years of age). Subgroup analyses based on intervention type (diet, exercise, diet plus exercise or lifestyle) showed that the effect was only significant for programmes of diet plus exercise compared with control conditions (mean difference =  $-0.15 \text{ kg/m}^2$ , 95% CI:  $-0.25$  to  $-0.03 \text{ kg/m}^2$ ). Additionally, among children (0–18 years of age) who were exposed to exercise interventions alone, the SMD for BMI was  $-0.08 \text{ kg/m}^2$  (95% CI:  $-0.16$  to  $0.00 \text{ kg/m}^2$ ;  $P < 0.001$ ) compared to children who did not receive such interventions. Among children aged less than 5 years who were exposed to dietary and/or exercise and/or lifestyle interventions, the SMD for BMI was  $-0.06 \text{ kg/m}^2$  (95% CI:  $-0.15$  to  $0.02$ ;  $P = 0.001$ ) compared to children who did not receive such interventions.

Peirson and colleagues (48) assessed that the evidence was of very low quality, owing to risk of bias, indirectness, inconsistency, imprecision or reporting bias. Other systematic reviews by Mura and colleagues (50), Kelley et al. (51) and Cesa et al. (52) included RCTs, but did not provide an assessment of the quality of the evidence and were therefore not considered.

#### ***Referral of infants and children who are obese***

No systematic review was identified that directly addressed the question, “Should primary health care workers refer children who are obese?”. Four systematic reviews indirectly addressed the question (53–56). Both the National Institute for Health and Care Excellence (NICE) (53) and Peirson and colleagues (54) provided a formal assessment of the quality of the evidence, and so both reviews were used to inform the evidence for this question. Black et al. (55) summarized studies of all designs assessing bariatric surgery for obese children and adolescents. Boland and colleagues (56) summarized RCTs and case-studies assessing the pharmacological management of obesity in paediatric patients. However, neither of these two reviews (55, 56) included a formal assessment of the quality of the evidence and they were therefore not further considered.

A systematic review commissioned by NICE to inform guideline development contains two meta-analyses (53). The first meta-analysis of 12 studies, of which two examined referral to specialist centres with staff experienced in assessment and management of obese children, suggests that interventions that involve specialist medical referral to a programme, compared to self-referral, referral by a general doctor or school, or a mixture of referral methods show greater improvements in BMI z-scores at the end of the intervention (SMD = -0.41 (95% CI: -0.64 to -0.17)). The second meta-analysis of 15 studies, three of which examined specialist medical referral, also provides strong evidence that the effect is sustained at 6 months or more post-intervention (SMD = -0.30, 95% CI: -0.49 to -0.11). Although the authors of the systematic review reported the quality of the evidence to be high (strong evidence), it was downgraded by the guideline development group to moderate quality, because of its indirectness.

A review of treatment by Peirson and colleagues (54) included RCTs aimed at behavioural and non-behavioural (pharmacotherapy and surgery) treatment of overweight and obese children aged 0–18 years. Subgroup analyses of combined pharmacological (orlistat) and behavioural (diet, exercise, lifestyle) interventions showed a reduction in BMI and BMI z-score from baseline to the end of the intervention period (2 studies including 562 children; SMD = -0.43, 95% CI: -0.6 to -0.25;  $I^2 = 0\%$ ). The review authors judged the quality of the evidence for this outcome to be moderate.

### Recommendations

With respect to children who are overweight or obese and presenting to primary health-care facilities, three recommendations were agreed.

**Recommendation:** At primary health-care facilities, health workers should provide general nutrition counselling to caregivers of overweight children aged less than 5 years (*strength of recommendation: conditional; very low quality evidence*).

**Recommendation:** At primary health-care facilities, health workers should provide counselling on physical activity to caregivers of overweight children aged less than 5 years (*strength of recommendation: conditional; very low quality evidence*).

**Recommendation:** At primary health-care facilities, children aged less than 5 years who are identified as obese should be assessed and an appropriate management plan should be developed. This can be done by a health worker at primary health-care level, if adequately trained, or at a referral clinic or local hospital (*strength of recommendation: conditional; moderate quality evidence*).

### Justification/remarks

It should be first noted that these recommendations do not represent comprehensive guidance on assessment and management of all children at risk of overweight and obesity. They do, however, start by addressing one population – children presenting to primary health-care facilities – for which there is already a system for training and clinical management (IMCI) that is implemented in many countries.

### Nutrition counselling of caregivers of children who are overweight or obese

All members of the guideline development group agreed with the recommendation and its “conditional” strength. While agreeing that counselling of caregivers of these children would be helpful, it was less clear whether counselling alone would have a significant impact. The evidence base regarding the content of effective counselling is limited and the prevalence of overweight/obesity in different countries is variable; the return, therefore on time and investment may be quite

different according to setting. For these reasons, it was considered that a decision to implement counselling as part of routine services at primary health-care facilities would have to be context specific.

With respect to the systematic reviews and evidence summary, one member of the guideline development group stated that it would have been helpful to know how long follow-up was for the interventions, and whether there had been language restrictions on the search strategy. The Secretariat explained that the strategy was not restricted by language, but noted that the review by Peirson and colleagues (48) only covered publications in English and French.

It was noted that the evidence was constrained by the strategy of the Peirson review (48). Other reviews might consider different interventions that might be more or less effective. It was also noted that the term “counselling” included a wide range of styles and methods, and the content of counselling was not considered.

All members of the guideline development group agreed that the recommendation should be conditional because of the lack of high-quality evidence on the effectiveness of providing training on counselling, uncertainty in terms of equity, and variability in values and preferences.

#### Physical-activity counselling of caregivers of children who are overweight or obese

Members of the guideline development group agreed with the draft recommendation, while noting similar constraints as for counselling on nutrition, i.e. a limited evidence base on the effectiveness of counselling, and uncertainty on the optimal content of counselling, including the frequency and variable prevalence of overweight/obesity in different settings. It was noted that counselling for diet and physical activity should go together (as in the WHO *Global strategy on diet, physical activity and health* and *Global recommendations on physical activity for health* (57, 58)), and not be considered separately. The national adaptation of this strategy should take the context into account for determining specific interventions, and should be seen in the overall context of promoting an agenda for healthy growth and development. It should encourage, enable and facilitate children to engage in physical activity and exploration for cognitive development, at levels appropriate for different ages. This is not specialized “exercise”, but usual and healthy activity. Counselling on physical activity has benefits for all children, including those with nutrition problems.

It was noted in the discussion that some of the studies included in the review involved actual programmes of physical activity, and not just counselling. The studies appeared to be so varied that it was difficult to draw a general conclusion from them.

#### Referral of infants and children who are obese

It was agreed that all obese children and their caregivers should be assessed and a comprehensive care plan should be developed to address underlying risk factors, promote weight reduction and healthy practices, and provide psychosocial support. In order to mitigate possible serious medical complications associated with obesity, such as hypertension and diabetes, assessment should include screening for early indicators of metabolic syndrome, e.g. raised blood pressure for age, or hyperglycaemia/insulin resistance or signs of hyperlipidaemia. However, there was discussion as to where the assessment and development of a care-management plan should be done.

Some members of the guideline development group thought that only obese children with complications such as comorbidities, or from high-risk families, needed referral. However, the group noted the diversity of settings in which recommendations may be implemented and agreed that it could not be assumed that all primary health-care facilities would have sufficient staff to undertake full and satisfactory assessments.

It was also noted that, in some countries, the large number of obese children aged under 5 years would make it impractical for them all to be referred. In some settings, community-based or private

paediatricians may be available to assess and manage children, avoiding the need to refer to a specialist centre.

In settings where there is limited experience in assessing the underlying factors and the ability of a family to implement a comprehensive care plan for an individual child, the guideline development group considered it better to refer the child and family to a facility where such experience would be available. In time, such capacity may become available at primary health-care facilities.

The group agreed, however, that if comorbidities can be excluded and a comprehensive management plan developed, then subsequent follow-up could occur at the primary health-care facilities.

It was considered that national health authorities would make these decisions when adapting and implementing the recommendation.

It was noted that some of the interventions in the systematic reviews included interventions, such as bariatric surgery, that are not recommended for children under 5 years of age. However, the recommendation only refers to referral itself and does not address the subsequent interventions. The guideline development group was also concerned that most of the studies in the systematic reviews were conducted in high-income settings and included only older children.

Finally, it should be noted that WHO is currently developing recommendations for the treatment of obese children and adolescents.

### *Implementation considerations*

- The content of counselling packages for both nutrition and physical activity should reflect local dietary practices and food availability. Packages should be field-tested for acceptability to families and also for ease and feasibility of use by health workers. They should also include positive health messages for the entire family and not be restricted to the child only.
- Staff at primary health-care facilities need to be trained to assess weight and length/height and how to determine weight-for-length/height. When staff identify a child as obese, they also need to recognize that checking the child's blood pressure and blood sugar are important. Depending on the capacity of staff at primary health-care facilities, a management plan for weight management and dealing with medical complications will be needed. This may be undertaken at a primary health-care facility or may require referral to specialist services at another centre. After a management plan is developed, it may be possible to follow up children at primary health-care facilities, depending on local resources and capacity.
- These referral systems for children with obesity should be clarified when the recommendation is being implemented at primary health-care facilities. Low availability, or lack, of services may be a significant constraint. Resources required at primary health-care facilities to provide treatment recommended by a referral centre should be allocated in advance. It was noted this may include paediatric sphygmomanometers and facilities to treat insulin-dependent diabetes.

### *Research priorities*

#### *Dietary counselling for caregivers of infants and children who are overweight or obese*

- How does the context in which recommendations are implemented, e.g. less-resourced settings versus more-resourced settings influence the outcome of dietary counselling?
- What is the quality and type of nutrition counselling currently provided versus what is needed?

- What equity-related issues, in the short and long term, influence the outcome of dietary counselling?
- How can diet-specific counselling at health facilities be linked to multi-sector approaches for improving other health activities including increased physical activity.

*Physical activity among infants and children who are overweight or obese*

- An evaluation of the effect of appropriate physical activity in small children for the prevention of overweight/obesity.
- Evidence on how to implement interventions in younger children and their families including multisectoral approaches for improving diet and physical activity.
- How to frame the language from the health worker to the caregiver, noting the need to differentiate normal physical activity from “exercise”, and to convey the correct message to caregivers.

*Referral of infants and children who are obese*

- What are the long-term effects of combined interventions and the importance of referring obese children aged less than 5 years to a specialist setting?
- What is the optimal management of these children in the long term?
- How to identify which obese children aged less than 5 years require more specific attention.



# Methods

The procedures outlined in the *WHO handbook for guideline development* (59) were followed. The steps in this process included: (i) identification of priority clinical questions and outcomes; (ii) retrieval of the evidence; (iii) assessment of the quality of evidence and synthesis of the findings; (iv) formulation of recommendations, including research priorities; and planning for (v) dissemination; (vi) implementation, equity and ethical considerations; and (vi) impact evaluation and updating of the guideline.

The GRADE methodology (25, 60) was followed to prepare evidence profiles related to preselected topics, based on up-to-date systematic reviews. The guideline development group comprised content experts, methodologists and representatives of potential stakeholder groups. Some of these experts participated in a WHO technical consultation held in Geneva, Switzerland, on 18–19 March 2013, to scope questions for the systematic reviews and guideline update.

The full guideline development group met in Geneva, Switzerland on 17–19 March 2015, to review and discuss the evidence, draft the recommendations and agree on their strength, taking into consideration: (i) the desirable and undesirable effects of this intervention; (ii) the quality (confidence in estimates of effect) of the available evidence; and (iii) the values and preferences related to the intervention, as well as to outcomes and specific contextual factors that pertain to various settings. The cost of the options available to health-care workers in various settings was not formally assessed because of lack of primary data in the literature or elsewhere, but the cost and resource implications were considered as part of a general discussion by the guideline development group.

The guideline development meeting was unable to address all the questions during the March meeting. An additional “virtual” guideline development group meeting was therefore convened by teleconference on Friday 6 June 2015, to review evidence on counselling on diet and physical activity for overweight children and referral for obese children. All members of the guideline development group, including the chair and co-chair, participated in the call. Prior to the teleconference, members of the group were provided with the relevant systematic reviews and draft recommendations. They were also asked to complete relevant sections of the respective evidence-to-decision tables for each recommendation.

An additional group of external experts and stakeholders reviewed the proposed recommendations following their drafting. All members of the guideline development group submitted declarations-of-interest forms before each meeting and also made verbal declarations of interest at the beginning of meetings (see [Annex 7](#)).

## **Evidence retrieval, assessment and synthesis**

The evidence-retrieval process for the priority questions followed the standard outlined in the *WHO handbook for guideline development* (59). A protocol for each systematic review was developed and included the search terms and strategy and the populations, interventions, comparators

and outcomes (PICO) definitions used to define the inclusion and exclusion criteria. The detailed search strategy for each priority question was agreed on after a series of discussions with the WHO steering committee and lead investigators of each review. Each review includes a flow diagram showing the numbers of studies excluded and included. Medline and EMBASE databases and The Cochrane Library were used to identify peer-reviewed publications. The Cochrane Central Register of Controlled Trials, the International Standard Randomised Controlled Trial Number Registry and ClinicalTrials.gov were searched for ongoing studies. The quality of the evidence for each priority question was assessed using the GRADE method (25, 60). The quality of the evidence for treatment interventions was graded as high, moderate, low or very low, based on the definitions in the *WHO handbook for guideline development* (59). The GRADE tables were prepared using the GRADE profiler software (GRADEPro), when appropriate. The reviews and meta-analyses are available through online annexes (URLs provided) and will be published. Based on these data and reviews, the WHO steering committee proposed an initial set of draft recommendations.

### WHO steering committee

A steering committee, with members from the Department of Maternal, Newborn, Child and Adolescent Health and the Department of Nutrition for Health and Development, has overseen the guideline review process. [Annex 6](#) lists the WHO staff members on the committee.

### Guideline development group

WHO convened a 17-member guideline development group consisting of internationally recognized experts in terms of content, methods and regional representation. [Annex 6](#) lists the members. The guideline development group was made up of external experts who assist in the development of evidence-informed recommendations. The group also helped to finalize the scope and key questions of the guideline in PICO format. This group was established early in the guideline development process, once the steering group had defined the guideline's general scope and started to draft the key questions. Members of the guideline development group were identified by the steering group and were selected to encompass the technical skills, diverse perspectives and geographic representation needed.

### External peer-review group

Members of the external peer-review group were asked to review the recommendations developed by the guideline development group, to ensure that there were no important omissions, contradictions or inconsistencies with scientific evidence or programmatic feasibility and to assist in clarifying the language, especially in relation to implementation and how policy-makers and programme staff might read them.

No additional recommendations were invited from the external peer-review group. The WHO steering committee collated the queries raised by the external peer-review group and discussed them with the chairs to resolve any inconsistencies or contradictions raised.

[Annex 6](#) lists the external peer-review group, from various countries and disciplines, with their affiliations.

## Declarations of interest and management of conflicts of interest

All members of the guideline development group, systematic review teams and the external peer-review group were required to sign and submit a declaration of interests and a confidentiality form prior to their participation in the meetings. The WHO steering committee reviewed the declarations before the meeting of the guideline development group, to determine whether any of the proposed members had a conflict of interest that might have precluded or limited his or her participation. One potential conflict of interest was noted.

- Professor Linda Adair indicated that the institution to which she is affiliated had received funding from Wyeth in 2012 and also from 2012 to 2014. Wyeth was, in turn, taken over by Nestlé in 2013. Dr Adair had not personally received any funds either for herself or for research. The WHO steering committee discussed the interest with the WHO Department of Compliance, Risk Management and Ethics. It was agreed that Professor Adair could attend the meeting, present data and contribute to discussions. However, in the event of a vote being required, she would not be eligible to vote in favour of or against a recommendation. These details were disclosed to all participants at the beginning of the meeting and the approach was agreed.

No other potential conflicts of interest were declared by the members of the guideline development group.

## Grading the quality of the evidence

The guideline development group used the GRADE method (25, 60) to evaluate the quality of the evidence. GRADE tables summarize details about the studies included in the systematic review, including study outcomes, limitations (risk of bias), possible inconsistency, indirectness, imprecision and other factors that might affect judgements of the quality of the evidence.

**Table 6** lists the definitions of the levels of quality of evidence using the GRADE method.

**Table 6. Definitions of the quality of the evidence using the GRADE method**

QUALITY	DEFINITION	IMPLICATION
High	The guideline development group is very confident that the true effect lies close to that of the estimate of the effect.	Further research is very unlikely to change confidence in the estimate of the effect.
Moderate	The guideline development group is moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.	Further research is likely to have an important impact on confidence in the estimate of the effect and may change the estimate.
Low	Confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the true effect.	Further research is very likely to have an important impact on confidence in the estimate of the effect and is unlikely to change the estimate.
Very low	The guideline development group has very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of the effect.	Any estimate of effect is very uncertain.

Evidence based on RCTs is initially given a high-quality rating, and evidence from observational studies is given a low-quality rating. These initial ratings may be downgraded by the following factors:

- study limitations or considerations on the risk of bias, such as concealment, blinding, attrition and detection bias in RCTs; and issues of selection bias and confounding in observational studies;
- consistency: whether the results from the studies are similar and in the same direction of effect;
- directness: whether the population, intervention or comparator are the same as for the clinical question the guideline is considering;
- precision: whether data arise from a large sample with high event rates as represented in the breadth of confidence intervals;
- reporting or publication bias: whether the underlying beneficial or harmful effect is systematically underestimated or overestimated because of the selective publication of studies or selective reporting of outcomes.

In non-randomized studies, additional adjustment factors, including dose–response gradients, the directional effect of plausible bias and the magnitude of effect, may result in upgrading of the quality of the evidence.

### Decision-making process

For each draft recommendation, the WHO steering committee presented a synthesis of the evidence, the GRADE tables and the draft null recommendation language. The decision-making tables were drafted, including the benefits and risks of the interventions from a public health perspective; the values, preferences and acceptability to mothers and their communities, as well as programme managers, policy-makers and health-care providers; and the feasibility of implementing any recommendations (including the resources needed, focusing on national programmes in resource-limited or other settings; see [Annex 4](#)).

The cost of options available to health-care workers in various settings was not formally assessed because of a lack of primary data in the literature or elsewhere. However, the guideline development group considered the cost implications as part of the general discussion. Comments were therefore restricted to personal experiences and extrapolations from general cost considerations of programmes.

Each guideline development group member was asked to review the material and independently comment on and suggest revisions to the proposed guidance and decision-making tables. They were requested to rank the overall quality of the evidence using the GRADE method, the balance of benefits versus harm, the values that should be considered in making a recommendation, and the applicability of any proposed recommendations to the populations for whom they are intended. Finally, they were asked to assess what strength each recommendation should be given, based on the criteria provided in [Table 7](#).

**Table 7. Criteria for assessing the strength of recommendations**

STRENGTH OF THE RECOMMENDATION	RATIONALE
Strong	The guideline development group is confident that the desirable effects of adherence to the recommendation outweigh the undesirable effects. With strong recommendations, the guideline communicates the message that the desirable effects of adherence to the recommendation outweigh the undesirable effects. This means that, in most situations, the recommendation can be adopted as policy.
Conditional	The guideline development group concludes that the desirable effects of adherence to a recommendation probably outweigh the undesirable effects. However, the recommendation is only applicable to a specific group, population or setting or where new evidence may result in changing the balance of risk to benefit or where the benefits may not warrant the cost or resource requirements in all settings. Conditional recommendations are made when there is greater uncertainty about the benefits versus risks, values and preferences, feasibility and acceptability, and cost, or if local adaptation has to account for a greater variety in values and preferences or when resource use makes the intervention suitable for some locations but not for others. This means that substantial debate and involvement of stakeholders are needed before this recommendation can be adopted as policy.
No recommendation	Further research is required before any recommendation can be made.

The guideline development group used a consensus-building process to finalize the recommendations. Once participants expressed their opinions and suggestions on a recommendation, the chairs and the WHO steering committee summarized this information. This summary was presented to the members of the guideline development group to gauge the degree of consensus and where differences existed. The chairs of the guideline development group facilitated discussions among group members until there was consensus on the language of each recommendation, the quality of the evidence and the strength. The guideline development group had agreed at the beginning of the meeting that if consensus could not be reached, a simple majority vote would determine a contested decision.

WHO staff members did not express personal opinions on the data, in the discussions or in the decisions on language, the strength of the recommendations or the quality of the evidence. Throughout the meeting, WHO staff members articulated the principles and guidelines of the WHO decision-making process.

The guideline development group reached agreement on all the recommendations and best practice statements following revisions of the text. It was not required to subject any decisions to a final vote.

The guideline development group declined to make a recommendation for some of the programmatic questions identified in advance but instead formulated best practice statements through a consensus process.

# Dissemination, adaptation and implementation

## Dissemination

The current guideline will be posted on the WHO website, including the [Child health](#) (61) and [Nutrition](#) (62) websites, the WHO e-Library of Evidence for Nutrition Actions ([eLENA](#)) (63) and social media.

The recommendations in this guideline will be disseminated through a broad network of international partners, including WHO country and regional offices, health ministries, WHO collaborating centres, other United Nations agencies and nongovernmental organizations. They will also be published on the WHO website, as well as the websites of partner agencies. As needed, assistance will be provided to adapt the guideline to national contexts.

## Adaptation and implementation

WHO publications, including training materials that deal with the populations of infants and children for whom there may be implications, will be revised. These include WHO training and reference materials such as: *Integrated Management of Childhood Illness* (12); *Infant and young child feeding counselling: an integrated course* (13); *Combined course on growth assessment and infant and young child feeding* (64); *Essential newborn care course* (14); and *Caring for newborns and children in the community: training courses for community health workers*, which includes courses on *Caring for the newborn at home*, *Caring for the sick child* and *Caring for the child's healthy growth and development* (15–17).

Individual countries are expected to adapt the recommendations to suit the local social, cultural and economic contexts. Countries will be encouraged to hold key stakeholder discussions to inform the decision-making on using and introducing the recommendations into national programmes. Frameworks for assisting policy-makers, such as DECIDE (Developing and Evaluating Communication Strategies to Support Informed Decisions and Practice based on Evidence) (65), will be shared.

An enabling environment should be created for the use of these recommendations, including relevant national policies and changes in the behaviour of health-care practitioners to enable the use of evidence-informed practices. Local professional societies may play important roles in this process, and an all-inclusive and participatory process should be encouraged. WHO's Department of Maternal, Newborn, Child and Adolescent Health and Department of Nutrition for Health and Development have substantial experience with introducing WHO guidelines and tools into national programmes.

## Monitoring and evaluating the implementation of the guideline

Monitoring and evaluation should be built into the implementation process, to provide important lessons for uptake and further implementation.

The implementation of this guideline should involve national child health programmes collecting and reporting data on child health. Putting this into practice may require review of existing patient-monitoring systems, including reporting tools, to ensure that the conditions are adequately addressed.

Key areas that require monitoring include, but are not limited to:

- the prevalence of wasting and stunting;
- the prevalence of overweight and obesity in children;
- patterns of growth among the infants and children with a history of low birth weight.

## Implications for future research

Several specific clinical and programmatic research questions were identified as part of the discussions on individual recommendations; these are included in the information provided for each individual recommendation. In addition, implementation research will inform and assist the adoption of policy and implementation.

## Plans for updating the guideline

The WHO Secretariat will continue to follow the research development in this important area of work, particularly for questions where the quality of evidence was low or very low. If the guideline merits an update, or if there are concerns about the validity of the guideline, the Department of Maternal, Newborn, Child and Adolescent Health and the Department of Nutrition for Health and Development will coordinate the guideline update, following the formal procedures of the *WHO handbook for guideline development* (59).

As the guideline nears the 5-year review period agreed by the guideline development group, the Department of Maternal, Newborn, Child and Adolescent Health and the Department of Nutrition for Health and Development at the WHO headquarters in Geneva, Switzerland, along with its internal partners, will be responsible for conducting a search for new evidence.

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# Annex 1.

## Analysis of demographic and health survey and multiple indicator cluster survey datasets

Barros A, Victora C. The prevalence of child underweight, wasting and stunting by region: a meta-analysis of epidemiological data from 63 LMIC countries (1993–2012). Geneva: World Health Organization; 2015

([http://who.int/maternal\\_child\\_adolescent/documents/barros-victora-child-  
undernutrition-1993-2012.pdf](http://who.int/maternal_child_adolescent/documents/barros-victora-child-<br/>undernutrition-1993-2012.pdf)) (23).

## Annex 2. Systematic reviews

- a. Anthropometric measures during infancy and childhood and the risk of developing obesity, cardiovascular disease or diabetes mellitus type 2 in later life: a systematic review  
Singh M, Thumburu KK, Jaiswal N, Agarwal A. Geneva: World Health Organization; 2015 ([http://who.int/maternal\\_child\\_adolescent/documents/singh-anthropometry-ncd-infants-children-2015.pdf](http://who.int/maternal_child_adolescent/documents/singh-anthropometry-ncd-infants-children-2015.pdf)) (24).
- b. Nutritional assessment and growth monitoring in IMCI countries: a survey of IMCI chart booklets and clinical algorithms used in different countries, reporting current uptake and adaptations of IMCI at national level  
Flandez KL. Geneva: World Health Organization; 2015 ([http://who.int/maternal\\_child\\_adolescent/documents/flandez-nutrition-growth-monitoring-imci-2015.pdf](http://who.int/maternal_child_adolescent/documents/flandez-nutrition-growth-monitoring-imci-2015.pdf)) (26).
- c. Benefits and harms of supplementary foods in moderately and severely undernourished infants and children (6–59 months)  
Grobler L, Visser M, Siegfried N. Geneva: World Health Organization; 2015 ([http://who.int/maternal\\_child\\_adolescent/documents/grobler-supplementary-foods-undernutrition-children-2015.pdf](http://who.int/maternal_child_adolescent/documents/grobler-supplementary-foods-undernutrition-children-2015.pdf)) (35).

# Annex 3.

## Systematic reviews of interventions to prevent or treat obesity in children

The process outlined below was used.

- Search strategy to identify systematic reviews addressing questions in population, intervention, comparison, outcome (PICO) format
- Algorithm used to determine which systematic reviews most appropriately address the PICO questions
- Flow diagram showing screening and final selection of eligible studies
- Grading of Recommendations Assessment, Development and Evaluation (GRADE) tables:
  - Should health workers provide counselling on nutrition (diet) versus standard care without nutrition counselling to (carers of) overweight children aged less than 59 months?
  - Should health workers provide counselling on physical activity or a physical-activity programme versus standard care without physical-activity counselling or a physical-activity programme to (carers of) overweight or obese children aged less than 59 months?
  - Should health workers refer obese children aged less than 59 months to a specialist setting for treatment?

### *Search strategy to identify systematic reviews addressing the PICO questions*

SEARCH	QUERY	ITEMS FOUND
#5	Search (((#1 AND #2 AND #3))) AND (“2010/01/01”[Date – Publication] : “2015/04/20”[Date – Publication])	<b>1282</b>
#4	Search (#1 AND #2 AND #3)	<b>2097</b>
#3	Search (Systematic[sb] OR systematic reviews[ti])	<b>247 306</b>
#2	Search (infant[mh] OR infant[tiab] OR infants[tiab] OR infancy[tiab] OR toddler*[tiab] OR preterm*[tiab] OR prematur*[tiab] OR postmatur*[-tiab] OR baby[tiab] OR babies[tiab] OR neonat*[tiab] OR newborn*[tiab] OR newly born*[tiab] OR preschool*[tiab] OR pre-school*[tiab] OR child[mh] OR child*[tiab] OR kindergar*[tiab] OR minors[mh] OR minors[tiab] OR paediatric*[tiab] OR pediatric*[tiab] OR peadiatric*[tiab] OR kid[tiab] OR kids[tiab] OR boy*[tiab] OR girl*[tiab] OR creche*[tiab] OR under ag*[tiab] OR underag*[tiab] OR perinatal[tiab] OR peri natal[-tiab] OR postnatal[tiab] OR post natal[tiab] OR postpartum*[tiab] OR peripartum*[tiab])	<b>2 736 279</b>
#1	Search (Overweight[mh] OR overweight[tiab] OR over weight[tiab] OR weight change*[tiab] OR weight gain[tiab] OR obesity[mh] OR obes*[-tiab] OR body mass index[mh] OR body mass index[tiab] OR bmi[tiab])	<b>376 784</b>



*Algorithm used to determine which systematic reviews most appropriately address the PICO questions*

1. Does a Cochrane review published from 2010 to 2015 **specifically** address the PICO questions?

YES	Select the most up-to-date Cochrane review and extract the relevant data for the evidence profile
-----	---------------------------------------------------------------------------------------------------

NO



2. Does a systematic review published from 2010 to 2015 **specifically** address the PICO questions?

YES	Select the most up-to-date systematic review and extract the relevant data for the evidence profile If there are a number of eligible systematic reviews then limit to those systematic reviews that include randomized controlled trials (RCTs) <b>AND</b> provide a form of evidence assessment
-----	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

NO



3. Does a recent systematic review published from 2014 to 2015 **indirectly** address the PICO questions?

YES	Systematic review addresses the target <b>population</b> but not the target intervention OR Systematic review addresses the target <b>intervention</b> but not the target population	Select the most up-to-date systematic review and extract the relevant data for the evidence profile If there are a number of eligible systematic reviews then limit to those systematic reviews that include RCTs <b>AND</b> provide a form of evidence assessment
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NO



4. Does a systematic review published from 2010 to 2013 **indirectly** address the PICO questions?

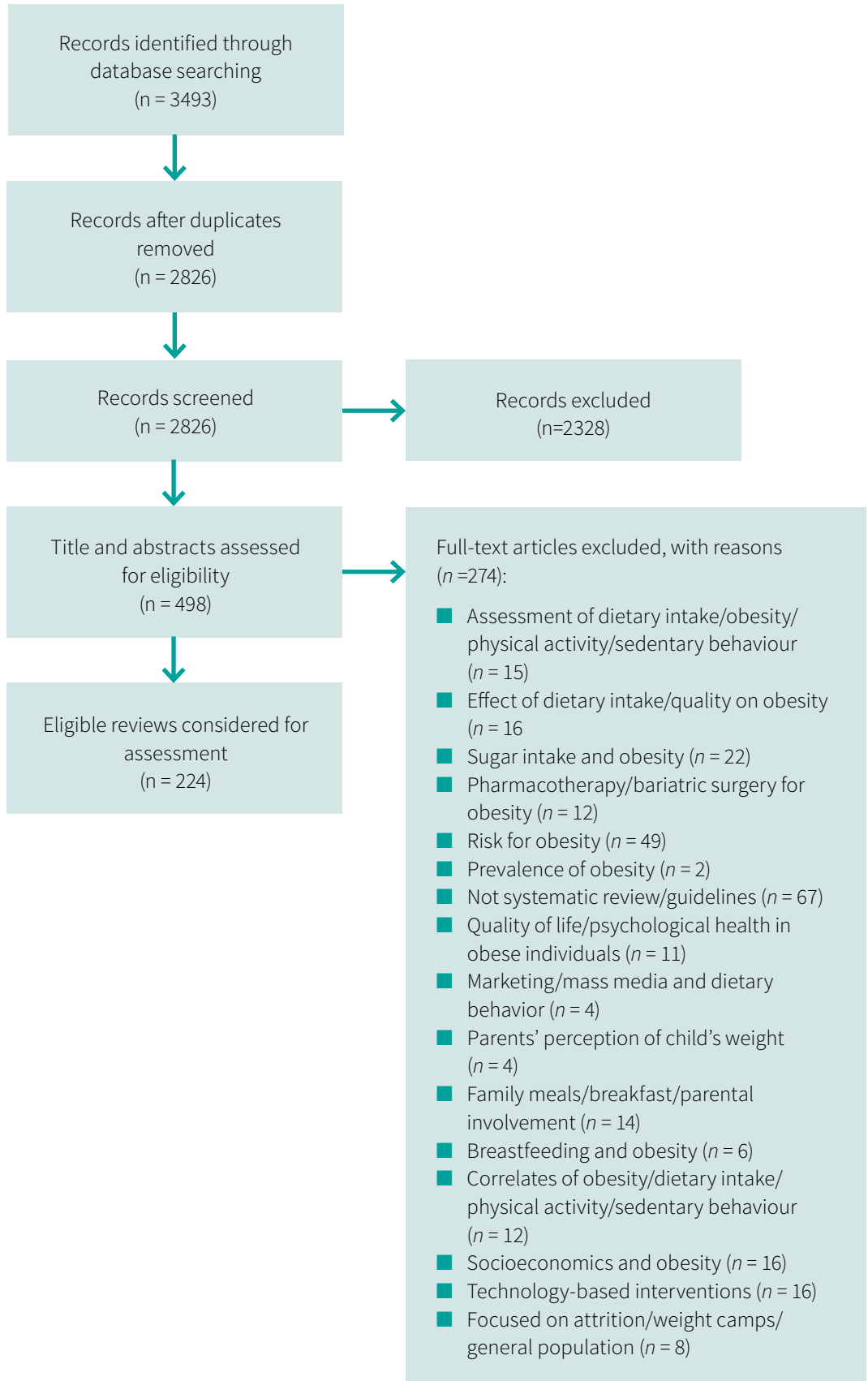
YES	Systematic review addresses the target <b>population</b> but not the target intervention OR Systematic review addresses the target <b>intervention</b> but not the target population	Select the most up-to-date systematic review and extract the relevant data for the evidence profile If there are a number of eligible systematic reviews then limit to those systematic reviews that include RCTs <b>AND</b> provide a form of evidence assessment
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NO



There is no evidence from systematic reviews published from 2010 to 2015 that address this PICO question.

**Flow diagram showing screening and final selection of eligible studies**



# GRADE tables

## Evidence profile 1

**Question:** Should health-care workers provide counselling on nutrition (diet) versus standard care without nutrition counselling to (carers of) overweight children aged less than 59 months?

**Settings:** Primary health-care facilities

Number of reviews	Design	Quality assessment						Number of studies	Effect		Quality	Importance
		Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Relative (95% CI)		Absolute SMD			
BMI (kg/m <sup>2</sup> )/BMI z-score <sup>1</sup> – subgroup analyses: dietary interventions only in children aged 0–18 years (follow-up >3 months); lower values indicate better outcomes												
1 <sup>2,3</sup>	Systematic review	none	no serious inconsistency <sup>4</sup>	serious <sup>5</sup>	no serious imprecision	none	15 RCTs <sup>6</sup>	—	SMD 0.08 lower (0.17 lower to 0.01 higher)	⊕○○○ VERY LOW <sup>7</sup>	CRITICAL	
BMI (kg/m <sup>2</sup> )/BMI z-score <sup>1</sup> – subgroup analyses: dietary and/or physical-activity interventions in children aged 0–5 years (follow-up > 3 months); lower values indicate better outcomes												
1 <sup>2</sup>	Systematic review	none	no serious inconsistency <sup>8</sup>	serious <sup>5</sup>	no serious imprecision	none	17 <sup>9</sup>	—	SMD 0.06 lower (0.15 lower to 0.02 higher)	⊕○○○ VERY LOW <sup>7</sup>	CRITICAL	
% Body fat (follow-up >3 months; lower values indicate better outcomes)												
		none	no serious inconsistency	no serious indirectness	no serious imprecision	none	—	—	No data on this outcome		IMPORTANT	
Skinfold thickness (mm); lower values indicate better outcomes												
		serious <sup>1</sup>	no serious inconsistency	no serious indirectness	no serious imprecision	none	—	—	No data on this outcome		IMPORTANT	
Fat-free mass (kg); lower values indicate better outcomes												
		none	no serious inconsistency	no serious indirectness	no serious imprecision	none	—	—	No data on this outcome		IMPORTANT	

BMI: body mass index; CI: confidence interval; RCT: randomized controlled trial; SMD: standardized mean difference.

1. Compared to the median of the *WHO child growth standards* (2).
2. Peirson et al., 2015 (48): most up-to-date systematic review that indirectly addresses the PICO. The systematic review included RCTs (only), conducted in children aged 0–18 years that investigated the effect of behavioural (diet, exercise, diet and exercise and lifestyle) interventions on prevention of weight gain (BMI), aimed at the primary care setting. Ninety RCTs were included in this review.
3. Other recently published (2014/2015) systematic reviews also provided some indirect evidence for this PICO.

- Gayes and Steele, 2014 (66) examined the effect of motivational interviewing (a patient-centred, focused, goal-directed, counselling approach) interventions for paediatric health-behaviour change. Compared to a passive control group or different methods of counselling, motivational interviewing had a greater positive effect (Hedge's g effect size: 0.15; 95% CI: 0.146 to 0.154; 12 studies) on obesity-related outcomes in children (aged 5–16 years).
  - Wang et al., 2015 (67) assessed all obesity-prevention programmes targeted at children aged 2–18 years. The review included RCTs and non-RCTs conducted in high-income countries only and with a follow-up greater than 1 year (or >6 months if school based). The review does provide an overall assessment of the quality of the evidence (strength of evidence) per subgroup. The authors reported moderate-quality evidence for school-based diet only interventions (3 studies).
  - Redsell et al., 2015 (68) examined all RCTs aimed at reducing the risk of overweight and obesity in infancy and early childhood. The systematic review did not provide any overall assessment of the quality of the evidence and a meta-analysis of the data was not conducted. Twelve of the 27 trials included in the review assessed diet, nutrition and/or responsive feeding-behaviour interventions. Seven of these trials focused on parent education about diet and responsive feeding.
  - Laws et al., 2014 (69) assessed the impact of interventions to prevent obesity or improve obesity-related behaviours in children (aged 0–5 years) from socioeconomically disadvantaged and/or indigenous families. This systematic review included RCTs, non-RCTs and other quasi-experimental studies. The review does not provide any overall assessment of the quality of the evidence and a meta-analysis of the data was not conducted. Although the data pertains to children aged 0–5 years, the information is subgrouped by study setting (home based, preschool, primary health care) and not by intervention type, which makes it very difficult to tease out useful information on the studies assessing dietary interventions incorporating nutrition counselling or education.
- 4 Peirson et al., 2015 (48) reported substantial statistical heterogeneity for the meta-analysis of this subgroup ( $I^2 = 81\%$ ). The heterogeneity may be due to the differences in the types of intervention included in the subgroup, the setting in which the RCT took place, baseline differences in the proportion of overweight/obese participants, or differences in the ages of the participants. Therefore, the evidence need not be downgraded for inconsistency, as the heterogeneity can be explained.
  - 5 The quality of the evidence has been downgraded for indirectness, as the data from this subgroup included dietary interventions that do not necessarily incorporate nutrition counselling or education. Nutrition education may involve the use of board games, leaflets/fliers and web-based information. Dietary interventions often include the provision of healthy food or water instead of fruit juice or sugary drinks. Furthermore, not all of the studies were conducted in children aged 0–5 years.
  - 6 This reflects the effect of dietary interventions on change in BMI and BMI z-score by subgroup. Twelve of the 15 RCTs that examined the effect of diet-related interventions on the BMI of children aged 0–18 years involved some form of nutrition counselling or nutrition education.
  - 7 Peirson et al., 2015 (48) reported the quality of the evidence for each subgroup as very low.
  - 8 Peirson et al., 2015 (48) reported moderate statistical heterogeneity for the meta-analysis of this subgroup ( $I^2 = 62\%$ ). The heterogeneity may be due to the differences in the types of intervention included in the subgroup, the setting in which the RCT took place, or baseline differences in the proportion of overweight/obese participants. Therefore, the evidence need not be downgraded for inconsistency as the heterogeneity can be explained.
  - 9 This reflects the effect of dietary and/or exercise and lifestyle interventions on change in BMI and BMI z-score by subgroup (age <5 years). Four of the 17 RCTs that examined the effect of dietary and/or exercise and lifestyle interventions on change in BMI and BMI z-score of children aged 0–5 years involved some form of nutrition counselling or nutrition education.

## Evidence profile 2

**Question:** Should health-care workers provide counselling on physical activity or a physical-activity programme versus standard care without physical-activity counselling or a physical-activity programme to (carers of) overweight or obese children aged less than 59 months?

**Settings:** Primary health-care facilities

Number of reviews	Design	Quality assessment						Number of studies	Effect		Quality	Importance
		Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Relative (95% CI)		Absolute SMD			
BMI (kg/m <sup>2</sup> )/BMI z-score <sup>1</sup> – physical-activity interventions only in children aged 0–18 years (follow-up >3 months); lower values indicate better outcomes												
2,2,3	Systematic review	none	no serious inconsistency <sup>4</sup>	serious <sup>5</sup>	no serious imprecision	none	18 RCTs	—	SMD 0.08 lower (0.16 lower to 0 higher) <sup>6</sup>	⊕○○○ VERY LOW <sup>7</sup>	CRITICAL	
BMI (kg/m <sup>2</sup> )/BMI z-score – physical-activity interventions in children aged 0–5 years (follow-up >3 months); lower values indicate better outcomes												
1 <sup>8</sup>	Systematic review	none	no serious inconsistency <sup>9</sup>	serious <sup>5</sup>	no serious imprecision	none	17	—	SMD 0.06 lower (0.15 lower to 0.02 higher) <sup>10</sup>	⊕○○○ VERY LOW <sup>7</sup>	CRITICAL	
% Body fat (follow-up >3 months); lower values indicate better outcomes												
		none	no serious inconsistency	no serious indirectness	no serious imprecision	None	—	—	No data on this outcome		IMPORTANT	
Skinfold thickness (mm); lower values indicate better outcomes												
		serious <sup>2</sup>	no serious inconsistency	no serious indirectness	no serious imprecision	none	—	—	No data on this outcome		IMPORTANT	
Fat-free mass (kg); lower values indicate better outcomes												
		none	no serious inconsistency	no serious indirectness	no serious imprecision	none	—	—	No data on this outcome		IMPORTANT	

BMI: body mass index; CI: confidence interval; RCT: randomized controlled trial; SMD: standardized mean difference.

1. Compared to the median of the *WHO child growth standards* (2).
2. Peirson et al., 2015 (48): most up-to-date systematic review that indirectly addresses the PICO. The systematic review included RCTs (only), conducted in children 0–18 years that investigated the effect of behavioural (diet, exercise, diet and exercise and lifestyle) interventions on prevention of weight gain (BMI), aimed at the primary care setting. Ninety RCTs were included in this review. Dobbins et al., 2013 (70): Cochrane review, included RCTs (only), assessing school-based physical-activity programmes for promoting physical activity and fitness in children and adolescents aged 6–18 years. Twenty-six RCTs included in the review.
3. Other recent systematic reviews published in 2015/2014 report on the effect of physical-activity interventions on BMI in children aged 0–18 years:
  - Mura et al., 2015 (50): a systematic review of RCTs assessing school-based physical-activity interventions in children aged 3–18 years. The review focused on interventions conducted in Europe. An overall assessment of the evidence was not provided and a meta-analysis was not conducted.
  - Kelley et al., 2014 (51): a systematic review of RCTs assessing exercise-only interventions to treat overweight and obese children aged 2–18 years. An overall assessment of the evidence was not provided. A meta-analysis was conducted. The review authors reported reduction in BMI z-score equivalent to a relative exercise-minus-control group improvement of 3% (10 RCTs; mean effect size: -0.06; 95% CI: -0.09 to -0.03;  $I^2 = 59%$ ). Body weight (6 RCTs; mean effect size: -0.74 kg; 95% CI: -1.18 to -0.30;  $I^2 = 0%$ ), BMI (8 RCTs; mean effect size: -0.47 kg/m<sup>2</sup>; 95% CI: -0.86 to -0.08;  $I^2 = 71%$ ), % body fat (9 RCTs; mean effect size: -0.96%; 95% CI: -1.43 to -0.50;  $I^2 = 52%$ ), fat mass (5 RCTs; mean effect size: -0.65 kg; 95% CI: -1.15 to -0.16;  $I^2 = 15%$ ).

- Cesa et al., 2014 (52): a systematic review of RCTs assessing the effect of physical-activity interventions longer than 6 months' duration on cardiovascular risk factors in children aged 6–12 years. An overall assessment of the evidence was not provided. A meta-analysis was conducted. Overall, physical-activity interventions reduced BMI (11 RCTs;  $-0.03$  kg/m<sup>2</sup>; 95%CI:  $-0.16$  to  $0.13$ ;  $I^2 = 0\%$ ).
- 4 Peirson et al., 2015 (48) reported substantial statistical heterogeneity for the meta-analysis of this subgroup ( $I^2 = 79\%$ ). The heterogeneity may be due to the differences in the types of intervention included in the subgroup, the setting in which the RCT took place, baseline differences in proportion of overweight/obese participants, or differences in the ages of the participants. Therefore, the evidence need not be downgraded for inconsistency, as the heterogeneity can be explained.
- 5 The quality of the evidence has been downgraded for indirectness as these two reviews assessed physical-activity interventions in children aged 0–18 years, which includes, but is not specific to, the target population of the PICO.
- 6 This reflects the effect of physical-activity interventions on change in BMI and BMI z-score by subgroup: intervention – exercise (48).
- 7 Peirson et al., 2015 (48) reported the quality of the evidence for each subgroup as very low. Dobbins et al., 2013 (67): there was low-quality evidence to support the effect of educational, health-promotion, counselling and management strategies to promote physical activity and fitness on BMI (kg/m<sup>2</sup>) in children aged 6–18 years, compared to standard, currently existing physical-education programmes in school. The evidence was downgraded for substantial heterogeneity between trials regarding type of intervention and measured outcomes, as well as a wide and overlapping range of effects.
- 8 Peirson et al., 2015 (48): most up-to-date systematic review that indirectly addresses the PICO. The systematic review included RCTs (only) conducted in children aged 0–18 years that investigated the effect of behavioural (diet, exercise, diet and exercise and lifestyle) interventions on prevention of weight gain (BMI), aimed at the primary care setting. Ninety RCTs were included in this review.
- 9 Peirson et al., 2015 (48) reported moderate statistical heterogeneity for the meta-analysis of this subgroup ( $I^2 = 62\%$ ). The heterogeneity may be due to the differences in the types of intervention included in the subgroup, the setting in which the RCT took place, or baseline differences in the proportion of overweight/obese participants. Therefore, the evidence need not be downgraded for inconsistency, as the heterogeneity can be explained.
- 10 This reflects the effect of dietary and/or exercise and lifestyle interventions on change in BMI and BMI z-score by subgroup: age <5 years). In Peirson et al., 2015 (48), 3 of the 20 RCTs conducted in children aged 0–5 years investigated physical activity alone.

**Evidence profile 3**

**Question:** Should health-care workers refer obese children aged less than 59 months to a specialist setting for treatment?

**Settings:** Primary health-care facilities

Number of reviews	Design	Quality assessment					Number of studies	Effect		Quality	Importance
		Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		Relative (95% CI)	Absolute SMD		
BMI (kg/m <sup>2</sup> ); lower values indicate better outcomes											
1 <sup>1,4</sup>	Systematic review	none	no serious inconsistency <sup>2</sup>	very serious <sup>3</sup>	no serious imprecision	none	—	—	SMD -0.41 lower (-0.64 to -0.17 lower)	⊕⊕⊕⊕ LOW	CRITICAL
% body fat; lower values indicate better outcomes											
		none	no serious inconsistency	no serious indirectness	no serious imprecision	none	—	—	No data on this outcome		CRITICAL
Skinfold thickness (mm); lower values indicate better outcomes											
		none	no serious inconsistency	no serious indirectness	no serious imprecision	none	—	—	No data on this outcome		IMPORTANT
Fat-free mass (kg); lower values indicate better outcomes											
		none	no serious inconsistency	no serious indirectness	no serious imprecision	none	—	—	No data on this outcome		IMPORTANT

BMI: body mass index; CI: confidence interval; RCT: randomized controlled trial; SMD: standard mean difference.

- 1 National Institute for Health and Care Excellence (NICE) guidance (53) title: Weight management: lifestyle services for overweight or obese children and young people. Review 1: Effectiveness and cost effectiveness of lifestyle weight management services for children and young people. The review authors stated that there was strong evidence from a meta-analysis of 12 studies, of which two studies examined specialist referral, to suggest that interventions that involve specialist medical referral to a programme compared to self-referral, referral by a general practitioner or school or a mixture of referral methods show greater improvements in BMI z-scores at the end of intervention. A meta-analysis of 15 studies, of which three examined specialist medical referral, also provides strong evidence that the effect is sustained at 6 months or more post-intervention (SMD = -0.30; 95% CI: -0.49 to -0.11). Referral methods: specialist medical referral, from medical records, from patients referred into an obesity clinic, from university paediatric obesity clinic; mixed referral, paediatricians from a children's hospital or responded to a community advertisement; local professional networks in primary and secondary care, from schools and local media; media, schools, health professionals, and community organizations; via local newspaper advertisements; referral from local paediatricians; via media publicity and school newsletters. Across all studies there was no difference between mean BMI z-score at baseline by referral method.
- 2 There was moderate heterogeneity between the studies included in the meta-analysis ( $I^2 = 37\%$ ).
- 3 This evidence has been downgraded twice for indirectness. Only two of the RCTs included in this meta-analysis included referral as an intervention and only a small percentage of the participants were aged under 5 years. Furthermore, the programmes described in the studies were conducted in high-income countries, so the findings may or may not be applicable to settings in low- and middle-income countries.
- 4 There are other systematic reviews that indirectly address this PICO.

**Evidence for the effectiveness of pharmacotherapy for the management of overweight and obesity in children**

- Peirson et al., 2015 (54): systematic review of RCTs assessing behavioural and pharmacological interventions for treating overweight and obesity in children aged 0–18 years. Subgroup analyses of combined pharmacological and behavioural interventions showed a reduction in BMI and BMI z-score from baseline to the end of the intervention period (2 studies; SMD: -0.43; 95% CI: -0.6 to -0.25;  $I^2 = 0$ ). The review authors judged the quality of the evidence for this outcome as moderate.

- Boland et al., 2015 (56): assessed RCTs and case-studies investigating the effect of orlistat, metformin, glucagon-like peptide-1 agonists, topiramate, and zonisamide in human subjects. Orlistat is the only Food and Drug Administration (FDA)-approved medication for paediatric obesity, and reduced BMI by 0.5–4 kg/m<sup>2</sup>. Gastrointestinal adverse effects are frequently reported with its use. Metformin showed BMI reductions of 0.17–1.8 kg/m<sup>2</sup>. Mild gastrointestinal adverse effects are usually managed with dose titration. Exenatide reduced BMI by 1.1–1.7 kg/m<sup>2</sup> and was well tolerated with mostly transient or mild gastrointestinal adverse effects. Most of the studies were conducted in adolescents.

**Evidence for the effectiveness of bariatric surgery for the management of overweight and obesity in children**

- Black et al., 2013 (65): a systematic review including all study designs (1 controlled and 22 uncontrolled before–after studies) assessing the effectiveness of bariatric surgery in children (aged 6–18 years). Bariatric surgery reduced BMI of obese adolescents at 1 year post surgery (23 studies; weighted mean difference: –13.54 kg/m<sup>2</sup>; 95% CI: –15.14 to –11.93; I<sup>2</sup> = 76%). Surgical complications were inconsistently reported.

**Evidence for the effectiveness of both bariatric surgery and pharmacotherapy for the management of overweight and obesity in children**

- Hearnshaw and Matyka, 2010 (71): 21 pharmacotherapy papers and 22 papers on surgery were reviewed in detail. All studies involved adolescents. Pharmacotherapy: most studies were small and of short duration, the notable exceptions being two large RCTs of sibutramine and orlistat. Sibutramine led to a mean estimated change in BMI from baseline of –3.1 kg/m<sup>2</sup> versus –0.3 kg/m<sup>2</sup> for placebo over 12 months. Orlistat was also beneficial, with a mean change in BMI of –0.55 kg/m<sup>2</sup> versus a change of +0.31 kg/m<sup>2</sup> in the placebo group at 12 months. Bariatric surgery: most papers presented clinical observations and there were no RCTs. Robust selection criteria were not used and ideal candidate selection remains unclear. Most papers showed a significant benefit of surgery in severely obese adolescents in the short term, but long-term data were sparse. There were a surprisingly large number of papers examining the benefits of intensive weight management in obese adolescents. The study design of many was inadequate and the role of pharmacotherapy or surgery in childhood obesity remains unclear.

**Evidence for the effectiveness of specialist counselling for the management of overweight and obesity in children**

- Gayes and Steele, 2014 (66) examined the effect of motivational interviewing (a patient-centred, focused, goal-directed counselling approach) interventions for paediatric health-behaviour change. Compared to a passive control group or different methods of counselling, motivational interviewing had a greater positive effect (Hedge's g effect size: 0.15; 95% CI: 0.146 to 0.154; 12 studies) on obesity-related outcomes in children (aged 5–16 years).



# Annex 4.

## Evidence-to-decision for recommendations tables

### 1. Anthropometric assessment of infants and children presenting to primary health-care facilities

*Considerations when developing recommendations related to the anthropometric assessment of infants and children presenting to a primary health-care facility*

		SUPPORTING EVIDENCE AND ADDITIONAL CONSIDERATIONS
	<b>Questions</b>	<p>a. Should primary health-care workers assess infants and children in order to identify stunting (chronic malnutrition) in addition to wasting (acute malnutrition)?</p> <p>b. Should primary health-care workers assess infants and children in order to identify overweight and obesity?</p> <p>c. Which anthropometric measures should primary health-care workers use to assess nutritional status?</p>
BENEFITS AND HARM	<b>Do the desirable effects (of assessing children for stunting, overweight or obesity) outweigh the undesirable effects?</b>	<p>Identifying wasting, stunting and overweight/obesity in infants and children presenting with another illness would enable earlier interventions that may reduce other morbidity and mortality. Assessing children using only weight-for-age precludes health workers from accurately identifying children with wasting, stunting or overweight/obesity. Measuring length/height and mid-upper arm circumference would enable health workers to differentiate children with only “very low weight” from those who are wasted. Children with wasting without stunting could then receive relevant counselling or other interventions. Determining counselling content and other interventions based on weight-for-age only may result in children receiving interventions that may not have short-term benefits and yet may place them at long-term risk. Including mid-upper arm circumference as part of standard assessment would identify more children with severe acute malnutrition than using weight-for-length/height by itself. However, there are no criteria as yet for mid-upper arm circumference for overweight/obesity, so it could not be used for this purpose as well.</p>
	<table border="1"> <tr> <td><b>Expected benefits and harms</b> Assessing nutritional status of infants and children</td> <td><b>Decision</b>  Benefits outweigh harm</td> </tr> </table>	
<b>Expected benefits and harms</b> Assessing nutritional status of infants and children	<b>Decision</b>  Benefits outweigh harm	
VALUES, PREFERENCES AND ACCEPTABILITY	<b>Is there important uncertainty or variability about how much people value the options?</b>	<p>In settings where stunting is highly prevalent, classifying a child as stunted may appear strange to parents and caregivers and seem inconsistent with local perceptions of what is normal growth.</p> <p>In contrast, health workers are likely to appreciate the value of early identification of children with wasting, as this will provide opportunity to initiate appropriate care.</p> <p>The relative merit of identifying children who are overweight/obese may be viewed considerably differently according to setting. There is little experience at this time of how to manage children aged less than 5 years who are either overweight or obese.</p>
	<table border="1"> <tr> <td><b>Likely value given by mothers and families</b> Assessing nutritional status of infants and children</td> <td><b>Variability</b>  Major</td> </tr> </table>	
<b>Likely value given by mothers and families</b> Assessing nutritional status of infants and children	<b>Variability</b>  Major	

		SUPPORTING EVIDENCE AND ADDITIONAL CONSIDERATIONS
VALUES, PREFERENCES AND ACCEPTABILITY	<p><b>Is the option acceptable to key stakeholders?</b></p> <p><b>Likely acceptability to health workers</b> Assessing nutritional status of infants and children</p>	<p><b>Variability</b></p> <p>Uncertain</p>
	<p><b>How large are the resource requirements?</b></p> <p><b>Resource implications</b> Assessing nutritional status of infants and children</p> <p><b>Is the option feasible to implement?</b></p> <p><b>Feasibility</b> Assessing nutritional status of infants and children</p>	<p><b>Variability</b></p> <p>Major</p> <p><b>Variability</b></p> <p>Minor</p> <p>Including length/height as part of routine assessment would have significant implications in terms of daily work routine, plotting of charts and purchase of equipment. There would also be significant training costs associated. Staff are generally available in health facilities to measure infants/children as proposed. There would also be significant training needs and subsequent supervision required to ensure that the anthropometric assessments are being properly conducted. In particular, understanding the differences between weight-for-age and weight-for-length/height and what they mean in terms of clinical care would require input and training. However, measuring length/height and calculating weight-for-length/height or body mass index (BMI) should be very feasible.</p>
EQUITY	<p><b>Would the option improve equity in health?</b></p> <p><b>Equity</b> Assessing nutritional status of infants and children</p>	<p><b>Variability</b></p> <p>Minor</p> <p>In poor communities, gaining estimates of stunting may result in health interventions and strategies to prevent stunting in the future. Collection of such data on a regular basis would assist health managers in planning of programme interventions to benefit the most at-risk communities. Identifying children who are overweight or obese would not disadvantage such children and should improve access to care.</p>

## 2. Care of infants and children with acute or chronic malnutrition presenting to primary health-care facilities

*Considerations when developing recommendations related to counselling of caregivers and other interventions among infants and children who are moderately wasted or stunted*

		SUPPORTING EVIDENCE AND ADDITIONAL CONSIDERATIONS
<b>Questions</b>		<p>a. Should primary health-care workers counsel caregivers of, or otherwise intervene among, infants and children who are moderately wasted?</p> <p>b. Should primary health-care workers counsel caregivers of, or otherwise intervene among, infants and children who are stunted?</p>
BENEFITS AND HARM	<b>Do the desirable effects (of counselling or otherwise intervening) outweigh the undesirable effects?</b>	<p><b>Counselling of caregivers of children with moderate wasting with or without stunting</b></p> <p>There was little evidence regarding the effectiveness of counselling alone to improve wasting in children; however, the guideline development group considered that specific messaging is likely to be helpful. Less concern was expressed regarding any potential long-term harmful effects of counselling to increase dietary intake in moderately malnourished children.</p> <p>Counselling would be of value to caregivers of children aged less than 5 years who would not otherwise be likely to receive it.</p> <p>For caregivers of children who are stunted, the guideline development group considered there was no evidence to inform the content of such counselling and considered that, based on current evidence, counselling would not be specifically different from that for non-stunted children. Conversely, concerns were expressed about potential harms related to inappropriate or misdirected counselling leading to excess weight gain in stunted children who are not wasted. However, it was unlikely to be harmful for caregivers of these children to receive the same general nutritional counselling as for caregivers of all other children.</p> <p><b>Supplementary foods for children with moderate wasting</b></p> <p>While some evidence of short-term benefits with regard to weight-for-length/height were reported, the magnitude was small and there was no evidence that this was sustained. However, the guideline development group noted the mortality risks associated with moderate wasting and that many nongovernmental organizations involved in humanitarian care were already engaged with providing supplementary food products. No data were available on potential long-term harms. Participants considered that the intervention may help to prevent children from progressing from moderate acute malnutrition to severe acute malnutrition, but there was no evidence to show that this may occur.</p> <p><b>Supplementary foods for children with stunting</b></p> <p>The guideline development group was uncertain as to whether the potential benefits of supplementary foods outweighed the potential harms that were considered quite possible. There was concern related to excess weight gain and long-term consequences in stunted children who are not wasted, without any significant short-term benefits.</p>
	<p><b>Expected benefits and harms</b></p> <p>Counselling for moderate wasting</p> <p>Counselling for stunting</p> <p>Supplementary foods for moderate wasting</p> <p>Supplementary foods for stunting</p>	

		SUPPORTING EVIDENCE AND ADDITIONAL CONSIDERATIONS	
VALUES, PREFERENCES AND ACCEPTABILITY	<b>Is there important uncertainty or variability about how much people value the options?</b>	<p><b>Counselling of caregivers of children with moderate wasting with or without stunting</b></p> <p>The guideline development group agreed that the majority of mothers/families in most settings would positively value relevant nutrition counselling. Most health workers would be likely to agree with providing counselling.</p> <p>Most health workers are unfamiliar with this specific area of counselling (stunting). In most settings, there is a higher prevalence of stunting than wasting; however, health workers are more familiar with counselling for the latter problem.</p> <p><b>Supplementary foods for children with moderate wasting</b></p> <p>Mothers and caregivers are likely to value receiving supplementary foods, as wasting may be an indicator of family food insecurity. However, in such settings, there is no certainty that the index child would receive the supplementary feeding; it may be distributed among the family. Families may value high-quality foods, but would be concerned about receiving what they perceive as low-quality supplementary food. The intervention may be complex for health workers to manage, including issues around storage of the product. Concern with regard to sustainability was expressed.</p> <p><b>Supplementary foods for children with stunting</b></p> <p>There appeared to be major variability, and acceptability would vary depending on the product, owing to factors such as taste, texture, etc.</p> <p>It may be complex for health workers to manage and sustain supplementary feeding programmes, including storage. These concerns may be greater for programmes providing supplementary foods for stunting rather than for wasting alone, because of the higher prevalence of stunting. Acceptability will vary depending on the product (owing to taste, texture, etc.) and storage needs.</p>	
	<b>Likely value given by mothers and families</b>		<b>Variability</b>
	Counselling for moderate wasting		Minor
	Counselling for stunting		Minor
	Supplementary foods for moderate wasting		Major
	Supplementary foods for stunting		Major
	<b>Likely acceptability to health workers</b>		<b>Variability</b>
	Counselling for moderate wasting		Minor
	Counselling for stunting		Major
	Supplementary foods for moderate wasting		Major
Supplementary foods for stunting	Major		

		SUPPORTING EVIDENCE AND ADDITIONAL CONSIDERATIONS																				
FEASIBILITY AND RESOURCE USE	<p><b>How large are the resource requirements?</b></p> <table border="1"> <thead> <tr> <th>Resource implications</th> <th>Variability</th> </tr> </thead> <tbody> <tr> <td>Counselling for moderate wasting</td> <td>Minor</td> </tr> <tr> <td>Counselling for stunting</td> <td>Minor</td> </tr> <tr> <td>Supplementary foods for moderate wasting</td> <td>Minor</td> </tr> <tr> <td>Supplementary foods for stunting</td> <td>Minor</td> </tr> </tbody> </table> <p><b>Feasibility</b></p> <table border="1"> <thead> <tr> <th>Feasibility</th> <th>Variability</th> </tr> </thead> <tbody> <tr> <td>Counselling for moderate wasting</td> <td>Feasible</td> </tr> <tr> <td>Counselling for stunting</td> <td>Feasible</td> </tr> <tr> <td>Supplementary foods for moderate wasting</td> <td>Uncertain</td> </tr> <tr> <td>Supplementary foods for stunting</td> <td>Uncertain</td> </tr> </tbody> </table>	Resource implications	Variability	Counselling for moderate wasting	Minor	Counselling for stunting	Minor	Supplementary foods for moderate wasting	Minor	Supplementary foods for stunting	Minor	Feasibility	Variability	Counselling for moderate wasting	Feasible	Counselling for stunting	Feasible	Supplementary foods for moderate wasting	Uncertain	Supplementary foods for stunting	Uncertain	<p><b>Counselling of caregivers of children with moderate wasting with or without stunting</b></p> <p>In countries where Integrated Management of Childhood Illness (IMCI) (11) is already in place, then modest additional training and resources would be required to provide counselling.</p> <p>Counselling is feasible but major resources would be required for implementation. Counselling requires personnel, training and finances.</p> <p><b>Supplementary foods for children with moderate wasting</b></p> <p>The group all considered that major resources would be required to provide supplementary feeding.</p> <p><b>Supplementary foods for children with stunting (chronic malnutrition)</b></p> <p>The members of the guideline development group considered the provision of supplementary foods feasible, but that there would be major variability in implementation requirements in different settings. The ease of implementation would depend on the context.</p>
	Resource implications	Variability																				
Counselling for moderate wasting	Minor																					
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Equity	Variability																					
Counselling for moderate wasting	Uncertain																					
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### 3. Care of children who are overweight or obese presenting to primary health-care facilities

*Considerations when developing recommendations related to the assessment and care of children who are overweight or obese*

		SUPPORTING EVIDENCE AND ADDITIONAL CONSIDERATIONS							
BENEFITS AND HARM	<b>Questions</b>	a. Should primary health-care workers counsel caregivers of children who are overweight or obese regarding nutrition or other dietary measures? b. Should primary health-care workers counsel caregivers of children who are overweight or obese regarding physical activity? c. Should primary health-care workers refer children who are obese?							
	<b>Do the desirable effects (of counselling or otherwise intervening) outweigh the undesirable effects?</b>	<b>Nutrition counselling of caregivers of children who are overweight or obese</b> Members of the guideline development group agreed that the benefits of the recommendation (to counsel caregivers) outweighed the disadvantages. Some members emphasized that there was a need to recognize the specific context where this recommendation would be implemented, as the opportunity cost of providing this type of counselling would be greater in some settings. The type and strength of the health systems and the consequences for providing services to other children should be considered.							
	<table border="1"> <thead> <tr> <th>Expected benefits and harms</th> <th>Decision</th> </tr> </thead> <tbody> <tr> <td>Nutrition counselling: children who are overweight or obese</td> <td>Benefits outweigh harms</td> </tr> <tr> <td>Physical-activity counselling: children who are overweight or obese</td> <td>Benefits outweigh harms</td> </tr> <tr> <td>Referral of children who are obese</td> <td>Benefits outweigh harms</td> </tr> </tbody> </table>	Expected benefits and harms	Decision	Nutrition counselling: children who are overweight or obese	Benefits outweigh harms	Physical-activity counselling: children who are overweight or obese	Benefits outweigh harms	Referral of children who are obese	Benefits outweigh harms
Expected benefits and harms	Decision								
Nutrition counselling: children who are overweight or obese	Benefits outweigh harms								
Physical-activity counselling: children who are overweight or obese	Benefits outweigh harms								
Referral of children who are obese	Benefits outweigh harms								
		<b>Referral of children who are obese</b> Most guideline development group members thought that the benefits of the proposed recommendation (to refer obese children) outweighed potential harms. However, concerns were that the recommendation would only apply where the option of referral was realistically available, and whether the quality of the assessment would be adequate.							

		SUPPORTING EVIDENCE AND ADDITIONAL CONSIDERATIONS	
VALUES, PREFERENCES AND ACCEPTABILITY	<b>Is there important uncertainty or variability about how much people value the options?</b>	<p><b>Nutrition counselling of caregivers of children who are overweight or obese</b></p> <p>Most guideline development group members thought there would be major variability as to whether nutrition counselling for preventing overweight/obesity would be valued by families. This was largely based on different expectations and perspectives, based on geographical and social settings. Acceptability also depends on the context, e.g. in many low-income countries a health worker may not immediately see the need for overweight counselling because it may detract from the more immediate problems of undernutrition and child survival. The opposite might be true in higher-income countries.</p> <p>Some guideline development group members commented that there was insufficient information available to comment.</p> <p><b>Physical-activity counselling of caregivers of children who are overweight or obese</b></p> <p>Most guideline development group members thought that there was minor variability by region, namely that families would be very accepting of such counselling. Similar comments were made regarding the acceptability of physical-activity counselling to health workers as were made for nutrition counselling.</p> <p><b>Referral of children who are obese</b></p> <p>In general, the recommendation would be acceptable for health workers and families, but the level of acceptability depends on the context. There was likely to be variability in values and preferences by region.</p>	
	<b>Likely value given by mothers and families</b>		<b>Variability</b>
	Nutrition counselling: children who are overweight or obese		Major
	Physical-activity counselling: children who are overweight or obese		Minor
	Referral of children who are obese		Minor
	<b>Likely acceptability to health workers</b>		<b>Variability</b>
Nutrition counselling: children who are overweight or obese	Minor		
Physical-activity counselling: children who are overweight or obese	Uncertain		
Referral of children who are obese	Minor		

		SUPPORTING EVIDENCE AND ADDITIONAL CONSIDERATIONS								
FEASIBILITY AND RESOURCE USE	<b>How large are the resource requirements?</b>	<p><b>Nutrition counselling of caregivers of children who are overweight or obese</b></p> <p>The feasibility of implementing the recommendation would depend on the workload at primary health-care facilities. Members of the guideline development group thought that moderate to major additional resources would be required. One major concern was how much training would be needed to ensure a minimal quality of counselling to make it effective. There was little information on what effort and quality is needed, which depends on the context.</p> <p><b>Physical-activity counselling of caregivers of children who are overweight or obese</b></p> <p>The feasibility of implementation is uncertain, and depends on the workload at primary health-care facilities. There was concern about the content of the counselling directed to infants and toddlers. Most guideline development group members stated that moderate or major additional resources would be required to implement this recommendation. There was a need to be clear about what should be done in different contexts, and how to operationalize it. A new set of skills may be required for health workers, and there will be a process of learning how to carry this out.</p> <p><b>Referral of children who are obese</b></p> <p>The feasibility of the proposed recommendation would depend upon the content of the counselling and who provides it. Major additional resources would probably be required for implementation but may relate more to the care being offered at a referral centre than what is required at primary health-care facilities.</p>								
	<table border="1"> <thead> <tr> <th>Resource implications</th> <th>Variability</th> </tr> </thead> <tbody> <tr> <td>Nutrition counselling: children who are overweight or obese</td> <td>Uncertain</td> </tr> <tr> <td>Physical-activity counselling: children who are overweight or obese</td> <td>Uncertain</td> </tr> <tr> <td>Referral of obese children</td> <td>Uncertain</td> </tr> </tbody> </table>		Resource implications	Variability	Nutrition counselling: children who are overweight or obese	Uncertain	Physical-activity counselling: children who are overweight or obese	Uncertain	Referral of obese children	Uncertain
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<b>Is the option feasible to implement?</b>	<table border="1"> <thead> <tr> <th>Feasibility</th> <th>Variability</th> </tr> </thead> <tbody> <tr> <td>Nutrition counselling: children who are overweight or obese</td> <td>Uncertain</td> </tr> <tr> <td>Physical-activity counselling: children who are overweight or obese</td> <td>Uncertain</td> </tr> <tr> <td>Referral of children who are obese</td> <td>Uncertain</td> </tr> </tbody> </table>	Feasibility	Variability	Nutrition counselling: children who are overweight or obese	Uncertain	Physical-activity counselling: children who are overweight or obese	Uncertain	Referral of children who are obese	Uncertain	
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EQUITY	<b>Would the option improve equity in health?</b>	<p><b>Nutrition counselling of caregivers of children who are overweight or obese</b></p> <p>The guideline development group was unsure whether implementing this recommendation might increase or decrease equity. The view was expressed that overweight children in low- and middle-income countries were likely to be from better-off families. This could increase inequity if more resources went to them, and underweight children received less support. However, it may also depend on the availability of low-cost nutrient-rich foods. It was felt to be a complex and context-specific issue.</p> <p><b>Physical-activity counselling of caregivers of children who are overweight or obese</b></p> <p>Whether implementing the recommendation would increase or decrease equity was also felt to depend on the context. Some guideline development group members said that it could potentially decrease inequality, at least in the long term. It was noted that the challenges of implementing such a recommendation should not be underestimated.</p> <p><b>Referral of children who are obese</b></p> <p>Most guideline development group members thought that evidence on the impact of referral on equity was lacking, and were unable to draw a conclusion.</p>								
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## Annex 5.

Questions in population, intervention, comparison, outcome (PICO) format, when relevant, used for preparing systematic reviews

<b>1</b>	<b>Question</b>	<b>Anthropometric assessment of infants and children presenting to primary health-care facilities</b>	<b>Importance</b>
		<ul style="list-style-type: none"> <li>a. Should primary health-care workers assess infants and children in order to identify stunting (chronic malnutrition) in addition to wasting (acute malnutrition)?</li> <li>b. Should primary health-care workers assess infants and children in order to identify overweight and obesity?</li> <li>c. Which anthropometric measures should primary health-care workers use to assess nutritional status?</li> </ul>	

<b>2</b>	<b>Question</b>	<b>Care of infants and children with acute or chronic malnutrition presenting to primary health-care facilities</b>	<b>Importance</b>
		<ul style="list-style-type: none"> <li>a. Should primary health-care workers counsel caregivers of, or otherwise intervene among, infants and children who are moderately wasted)?</li> <li>b. Should primary health-care workers counsel caregivers of, or otherwise intervene among, infants and children who are stunted?</li> </ul>	

<b>Population</b>	Infants and children classified by the Integrated Management of Childhood Illness (IMCI) (11) as “very low weight”, namely weight-for-age more than 3 SD below the median of the <i>WHO child growth standards</i> (2), or with moderate wasting, namely weight-for-length/height between 2 standard deviations (SD) and 3 SD below the median of the <i>WHO child growth standards</i>
<b>Intervention</b>	Supplementary foods or nutrition counselling
<b>Comparison</b>	No intervention
<b>Outcome</b>	<ul style="list-style-type: none"> <li>1. Linear growth measured by length/height-for-age and rate of change of length/height-for-age</li> <li>2. Overweight/obesity as measured by weight-for-length/height or body mass index-for-age</li> <li>3. Cardiovascular events or diabetes mellitus</li> <li>4. Risk factors for cardiovascular disease or diabetes</li> </ul>

<b>Population</b>	Infants and children classified by IMCI (11) as stunted, i.e. length/height-for-age more than 2 SD below the median of the <i>WHO child growth standards</i> (2)
<b>Intervention</b>	Supplementary foods or nutrition counselling
<b>Comparison</b>	No intervention
<b>Outcome</b>	<ol style="list-style-type: none"> <li>1. Linear growth measured by length/height-for-age and rate of change of length/height-for-age</li> <li>2. Overweight/obesity as measured by weight-for-length/height or body mass index-for-age</li> <li>3. Cardiovascular events or diabetes mellitus</li> <li>4. Risk factors for cardiovascular disease or diabetes</li> </ol>

3	Question	Care of children who are overweight or obese presenting to primary health-care facilities	Importance
		<ol style="list-style-type: none"> <li>a. Should primary health-care workers counsel caregivers of children who are overweight or obese regarding nutrition or other dietary measures?</li> <li>b. Should primary health-care workers counsel caregivers of children who are overweight or obese regarding physical activity?</li> <li>c. Should primary health-care workers refer children who are obese?</li> </ol>	
3a.	<b>Population</b>	Children aged less than 5 years who are overweight or obese who attend primary health-care facilities	
	<b>Intervention</b>	Nutrition counselling (diet) and/or dietary measures	
	<b>Comparison</b>	Standard of care with no nutritional counselling	
	<b>Outcome</b>	Body mass index (BMI), BMI z-score compared to the median of the <i>WHO child growth standards</i> (2); measures of adiposity (e.g. % body fat; skinfolds, fat-free mass)	
3b.	<b>Population</b>	Children aged less than 5 years who are overweight or obese who attend primary health-care facilities	
	<b>Intervention</b>	Counselling on physical activity, or actual physical-activity programmes	
	<b>Comparison</b>	Standard of care with no counselling on physical activity or no activity programme	
	<b>Outcome</b>	BMI, BMI z-score compared to the median of the <i>WHO child growth standards</i> (2); measures of adiposity (e.g. % body fat; skinfolds, fat-free mass)	
3c.	<b>Population</b>	Children aged less than 5 years who are obese who attend primary health-care facilities	
	<b>Intervention</b>	Management of paediatric obesity	
	<b>Comparison</b>	Standard of care	
	<b>Outcome</b>	BMI, BMI z-score compared to the median of the <i>WHO child growth standards</i> (2), measures of adiposity (e.g. % body fat; skinfolds, fat-free mass); blood pressure; glucose; lipid profile	

# Annex 6.

## Guideline development group and advisory groups

### **Guideline development group**

---

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**Technical experts who participated in the guideline scoping meeting, 18–19 March 2013**

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**Additional technical input**

WHO gratefully acknowledges the following for their technical input in preparing the systematic reviews and analyses of datasets:

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**Taryn Young – Team lead**

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Emergency Nutrition Network, London, United Kingdom of Great Britain and Northern Ireland

**Rebecca Norton**

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## Annex 7.

# Declarations of interest, approved by the World Health Organization (WHO) steering committee October 2014

LAST NAME	FIRST NAME	INSTITUTION	DECLARED INTEREST
Adair	Linda	University of North Carolina at Chapel Hill (United States of America)	Yes. The institution to which Dr Adair is affiliated had received funding from Wyeth in 2012 and also from 2012 to 2014. Wyeth was, in turn, taken over by Nestlé in 2013. Dr Adair had not personally received any funds either for herself or for research.
Briend	André	Retired (formerly, University of Tampere, Finland)	None declared
Farhoud	Suzanne	Former Regional Adviser for Child and Adolescent Health, WHO/Regional Office for the Eastern Mediterranean	None declared
Haider	Rukhsana	World Alliance for Breastfeeding Action and Training and Assistance for Health and Nutrition (THAN) Foundation	None declared
Jackson	Alan	University of Southampton (United Kingdom of Great Britain and Northern Ireland [UK])	None declared
Karrar	Zein	University of Khartoum (Sudan)	None declared
Martinez-Costa	Cecilia	University of Valencia (Spain)	None declared
Reilly	John	University of Strathclyde (UK)	Yes. Funds from WHO in the past to conduct systematic review
Sachdev	Harshipal	Sitaram Bhartia Institute of Science and Research (India)	None declared
Sall	Mohamadou Guelaye	BP 6251 Dakar (Sénégal)	None declared
Siegfried	Nandi	Independent consultant (South Africa)	None declared
Singh	Meenu	Institute and Medical Education and Research (India)	None declared

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