Mid-upper arm circumference as a screening tool for identifying adolescents with thinness

Research snapshot

Adolescence is a unique period of rapid growth and, when combined with household food insecurity, is also a period of an increased risk of undernutrition. Failure to achieve optimal nutrition during adolescence may lead to delayed physical growth and sexual maturation and, for adolescent girls, increases the risk of giving birth to undernourished infants. There is a need for a simple, reliable and accurate screening tool to identify undernutrition in this age group to underpin effective interventions. This cross-sectional study aimed to evaluate the performance of mid-upper arm circumference (MUAC) as an alternative to the World Health Organization-recommended body mass index (BMI) z-score to identify thinness in the late adolescence period.

In a sample of 851 adolescents aged 15 to 19 years from 15 schools in Addis Ababa, Ethiopia, the study found that MUAC had a significant strong positive correlation with BMI z-score, r = 0.81 (95% CI 0.79, 0.84) but was poorly correlated with age, r = 0.15 (95% CI 0.08, 0.21). MUAC could identify thinness among adolescents with excellent discriminatory performance (area under the curve (AUC) 0.91). The optimum MUAC cut-off point to identify thinness was ≤23.3 cm for males (sensitivity: 87.9%; specificity: 75.9%), whereas the optimum MUAC cut-off point for females was ≤22.6 cm (sensitivity: 100%; specificity: 88.2%). Based on the proposed cut-off point for the total sample (≤23.3 cm), MUAC had a high negative predictive value (NPV) – among those adolescents who identified as non-thin by MUAC, 98.0% were non-thin by BMI Z-score – and lower positive predictive value (PPV) – among those adolescents identified as thin by MUAC, only 32.4% were thin by BMI Z-score.

This indicates that MUAC is a good indicator for ruling in and ruling out thinness among adolescents but that, due to the low PPV, a large number of adolescents would be incorrectly considered to be thin leading to unnecessary nutritional support, poor use of resources and an overburdened healthcare system. When used in a relatively well-nourished population, it would be necessary to choose a cut-off with a greater positive predictive value.

Reviews of evidence are included regarding how to improve food supply chains (Nordhagen, 2020), food environments (Downs & Demmler, 2020) and food behaviours (Tatlow-Golden & Pelto, 2020) – the key determinants of food systems outlined in the Innocenti Framework. Recognising the changing landscape of malnutrition, a review of evidence is included regarding the marketing of unhealthy, ultra-processed foods to children and adolescents, especially on digital platforms (Tatlow-Golden & Garde, 2020). A concluding paper presents the key implications for public policies and programmes with specific country-level illustrations (Morris et al., 2020). This special issue will be useful for food system reorientations in support of improved diet quality among children and adolescents, as well as protecting the diets of children and adolescents has never been more urgent and relevant than now.

References


Fox, E. L., & Timmer, A. (2020). Children’s and adolescents’ dietary intakes are sub-optimal compared to dietary recommendations. A further paper builds on this evidence to create a conceptual framework of food systems for the diets of children and adolescents – the ‘Innocenti Framework’ – that depicts drivers, determinants, influencers and interactions (Raza et al., 2020) and another paper details specific actions to reorient food systems for improved diets in this age group (Hawkes et al., 2020). These tools address important conceptual and practice gaps and create common analytical reference points for different stakeholders working on food systems and nutrition.

Food systems for children and adolescents

Research snapshot

Well-nourished children and adolescents are the foundation for thriving communities and nations. Undernutrition, in the form of stunting, wasting and micronutrient deficiencies, remains widespread among young children while overweight, obesity and diet-related non-communicable diseases are increasing rapidly among children and adolescents including in countries and regions where undernutrition is still prevalent. Recognising that food systems are essential to supporting diet quality among children and adolescents but that their nutritional needs are rarely prioritised in efforts to reorient food systems, the United Nations Children’s Fund (UNICEF) and the Global Alliance for Improved Nutrition (GAIN) convened a ‘Global consultation on food systems for children and adolescents’ in November 2018 to identify priority actions for food systems and diet quality among children and adolescents. A special issue of ‘Global Food Security’ contains a series of 10 papers that were commissioned based on the priorities identified before and during the consultation.

Three papers describe the distinctive way that children and adolescents engage with the food system and how this influences their diets (Fox & Timmer, 2020), nutrition recommendations for the dietary intakes of children and adolescents (Hollis et al., 2020) and what data is available on diet quality in low- and middle-income settings (Kupka et al., 2020). These three papers indicate that children and adolescents require special attention in food system reorientations for improved diets and that, despite existing data gaps, there is evidence that children’s and adolescents’ dietary intakes are sub-optimal compared to dietary recommendations. A further paper builds on this evidence to create a conceptual framework of food systems for the diets of children and adolescents – the ‘Innocenti Framework’ – that depicts drivers, determinants, influencers and interactions (Raza et al., 2020) and another paper details specific actions to reorient food systems for improved diets in this age group (Hawkes et al., 2020). These tools address important conceptual and practice gaps and create common analytical reference points for different stakeholders working on food systems and nutrition.

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