

Malnutrition among Adolescents in Low- and Middle-income Countries

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Key messages

- > The double burden of malnutrition has typically been described among adults and children. Its magnitude and distribution among adolescents across low- and middle-income countries (LMICs) is unknown.
- > In the study under discussion, the prevalence of stunting (low height-for-age) and/or thinness (low BMI-for-age) among adolescents was about 3 in 20 adolescents. About one in four adolescents was overweight or obese. A much smaller proportion of adolescents (2%) had concurrent stunting and overweight or obesity.
- > Between 38% and 59% of the variance in adolescent malnutrition was explained by macrolevel contextual factors including internal conflict, lack of democracy, GDP, food insecurity, urbanization and the year of survey.
- > Context-sensitive implementation and scale-up of interventions and policies for the double burden of malnutrition are needed to achieve the Sustainable Development Goal to end malnutrition in all its forms by 2030.

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Background

Adolescence is a period of rapid growth, with higher nutritional demands placing adolescents at greater risk of malnutrition. Nutritional problems are compounded in adolescent girls by menstrual blood loss and possible pregnancies. Adolescent fertility still accounts for 11% of all births globally, with 95% of these births occurring in low- and middle-income countries (LMICs).¹

Stunting (low height-for-age) begins *in utero* and manifests itself across infancy and affects brain and muscle growth.² Among adolescents, stunting is associated with impaired cognitive development and school achievement, and reduced economic productivity.³ It is also associated with poor reproductive health outcomes in females.⁴ Given that resolution of these height deficits may take several generations,⁵ stunted children who are also exposed to obesogenic environments may be at greater risk of becoming overweight or obese. In fact, childhood stunting has also been reported to coexist with overweight or obesity at the individual level.^{6,7} The consequences of concurrent stunting and obesity in adolescents are likely to compound health issues in adolescence and later in adulthood, particularly for females, given the heightened obstetric risk. Thinness (low BMI-for-age) in adolescence is associated with delayed maturation and poor muscle strength leading to constraints in capacity for physical work and reduced bone density later in life.⁸ Obesity in adolescence has been associated with an increased risk of early onset of adult chronic diseases (type 2 diabetes, hypertension) and mortality in adult life.^{9,10}

Adults and young children in countries experiencing the nutrition transition are known to be affected simultaneously by undernutrition and overnutrition.^{2,11} Yet it is unknown to what extent this double burden of malnutrition affects adolescents in LMICs. Likewise unknown are the macrolevel contextual factors associated with the double burden of malnutrition. Globally, the major focus in nutrition has been on children under the age of five years and pregnant women, while adolescents have not received due attention.¹² More recently, there has been a growing interest in adolescent nutrition, particularly girls' nutrition, as a means to improve the health of women and children.^{13,14}



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Urbanization is one of the most important contributors to an obesogenic environment

This article describes the double burden of malnutrition among adolescents and the macrolevel contextual factors shaping the distribution of the double burden across LMICs.

Methods

Individual-participant data from the Global School-based Student Health Survey and Health Behavior in School-aged Children surveys, conducted in 57 LMICs between 2003 and 2013 (129,276 adolescents aged 12–15 years), were used.

Pooled estimates of stunting, thinness, stunting and/or thinness, overweight or obesity, and concurrent stunting and overweight or obesity were calculated with random-effects meta-analysis. Ecological linear regression models were used to examine the association between macrolevel contextual factors (internal conflict, lack of democracy, gross domestic product, food insecurity, urbanization and survey year) and stunting, thinness and overweight and obesity prevalence, respectively.

FIGURE 1: Forest plot of stunting prevalence

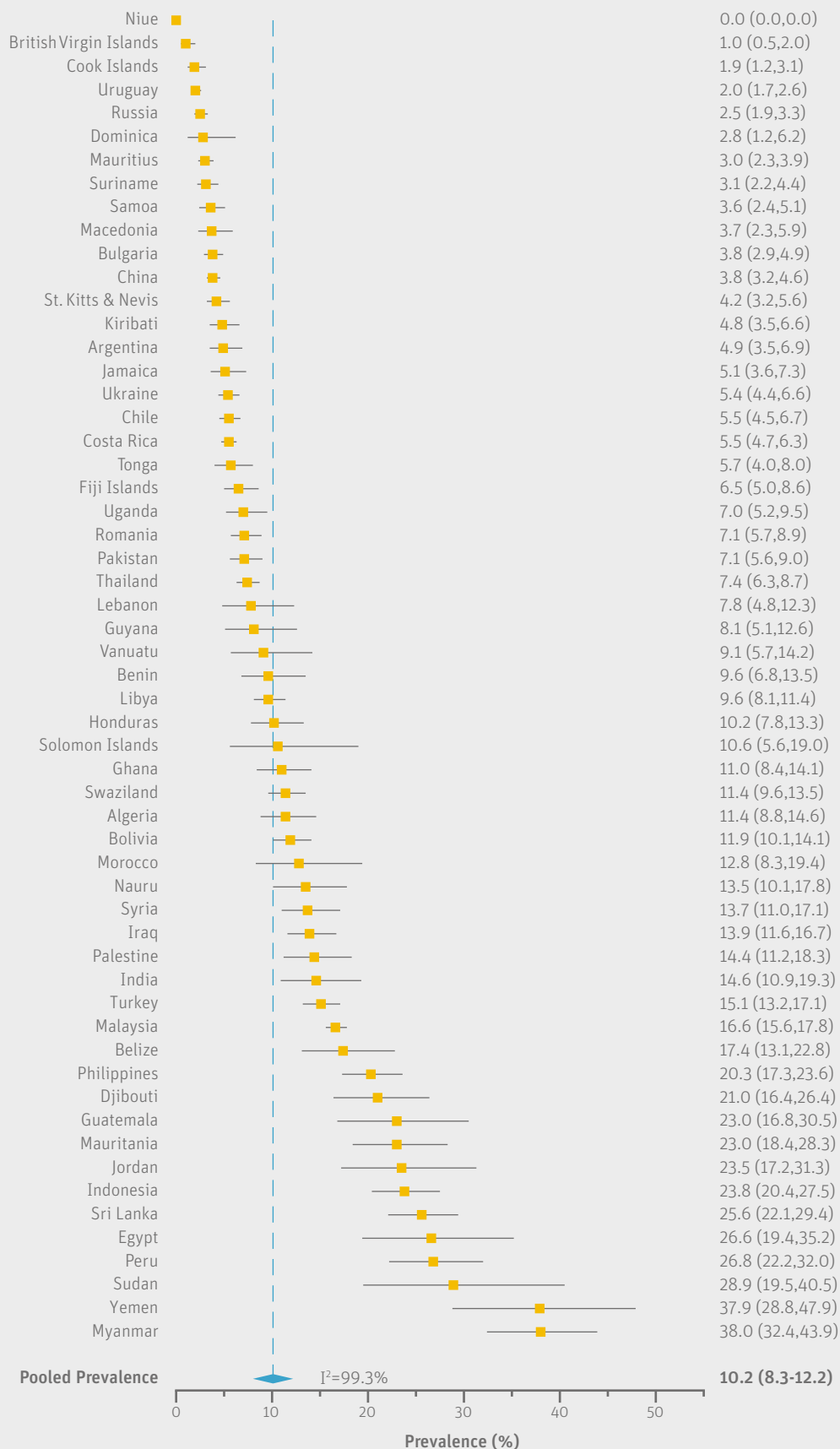


FIGURE 2: Forest plot of thinness prevalence

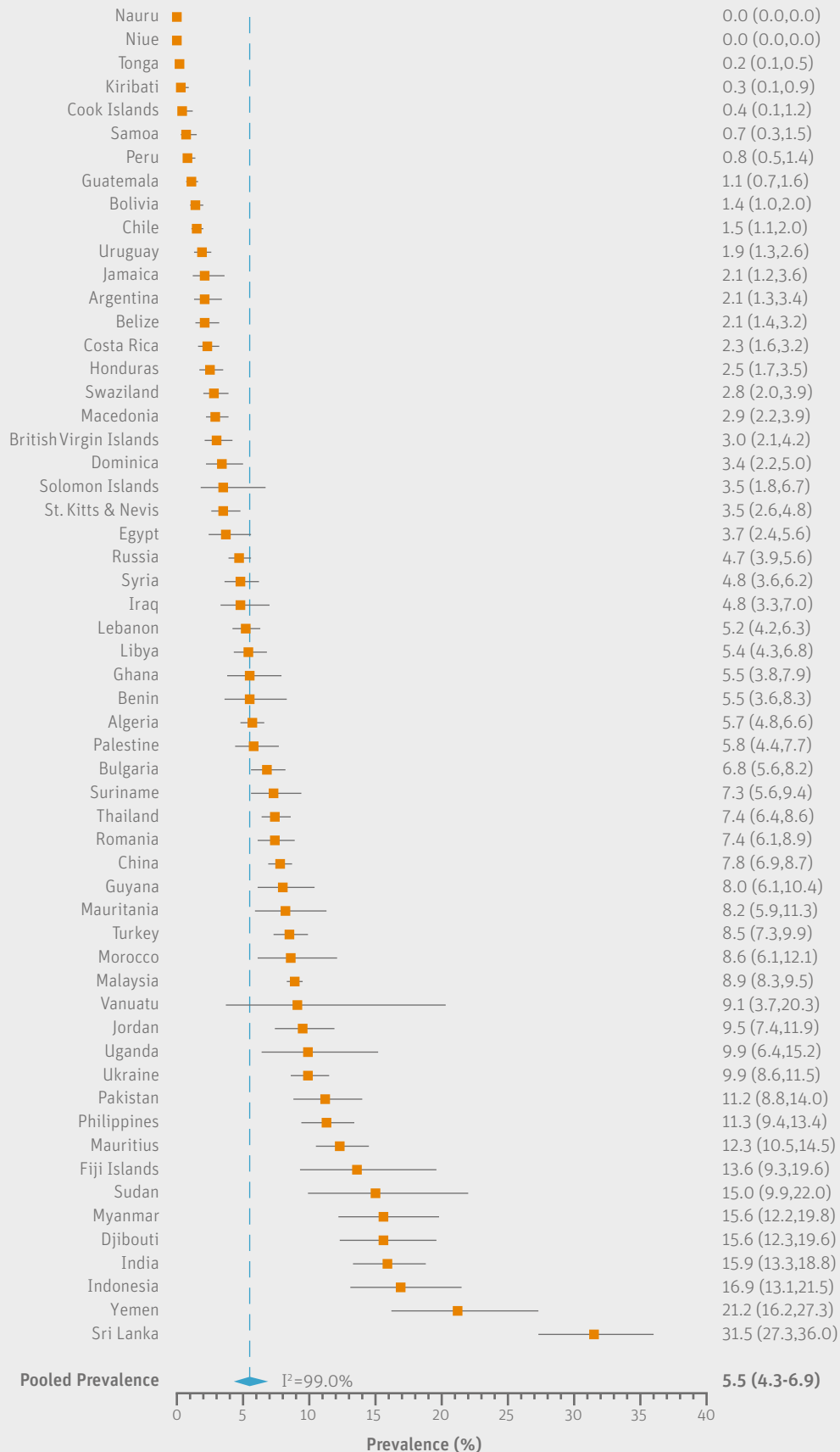


FIGURE 3: Forest plot of overweight or obesity prevalence

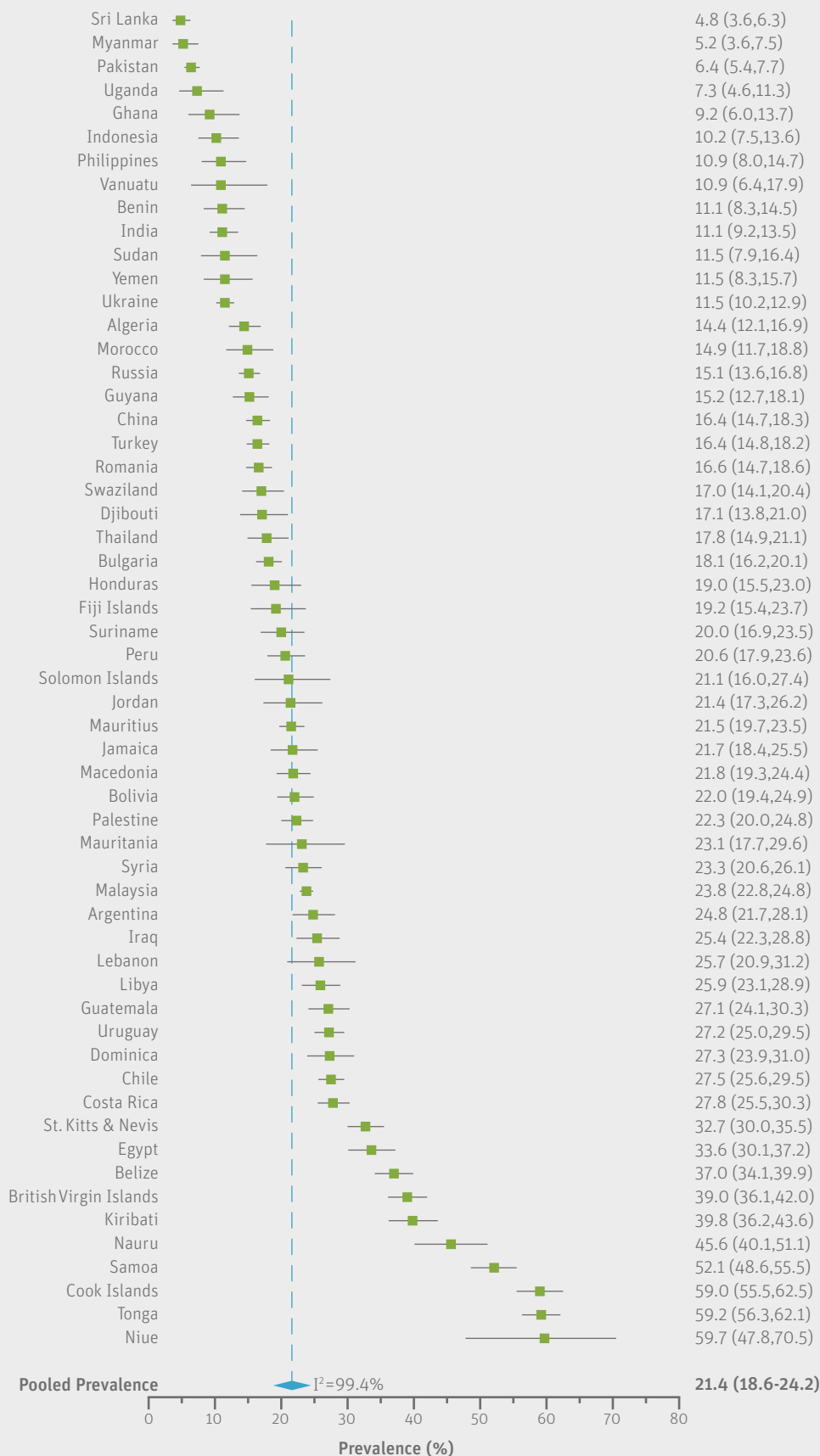


FIGURE 4: Forest plot of concurrent stunting and obesity prevalence

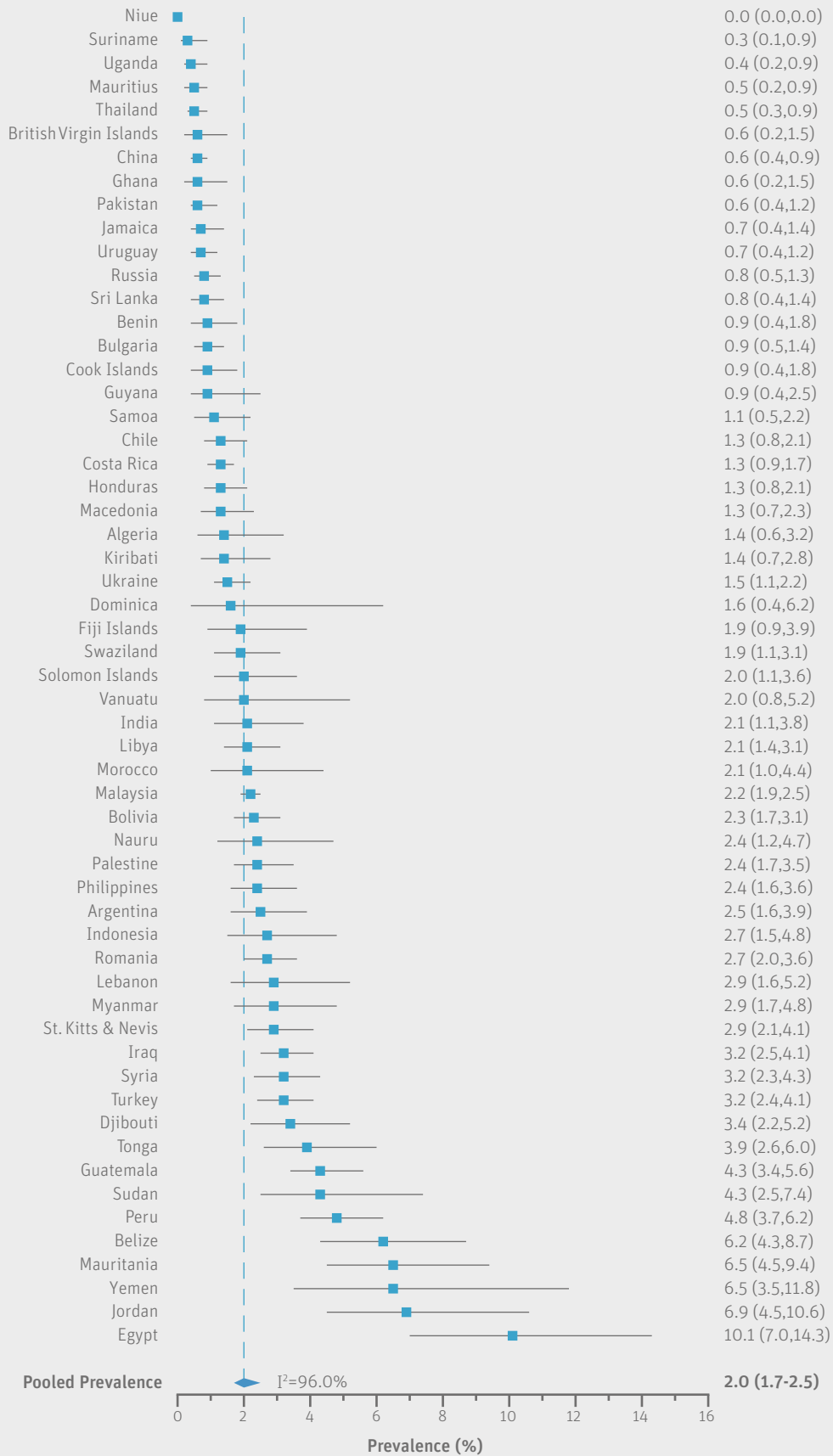
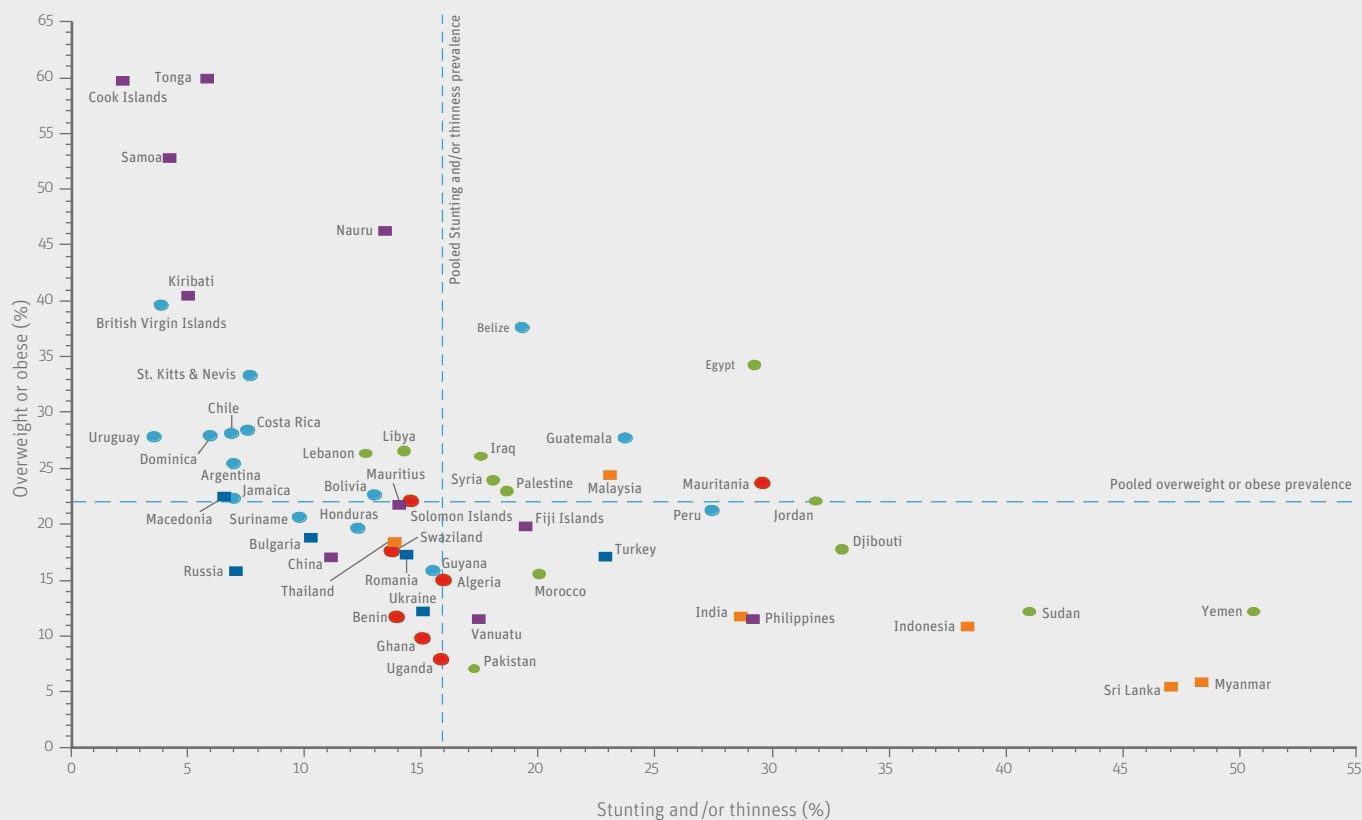


FIGURE 5: Adolescent overweight or obesity prevalence by stunting and/or thinness prevalence

Results

Stunting prevalence was 10.2% (95% CI: 8.3, 12.2) (Figure 1) and thinness prevalence was 5.5% (95% CI: 4.3, 6.9) (Figure 2). Overweight or obesity prevalence was 21.4% (95% CI: 18.6, 24.2) (Figure 3). Up to 43.4% of the variance in stunting prevalence was accounted for by recent internal conflict, lack of democracy, GDP per capita and food insecurity; 38.4% of the variance in thinness prevalence was accounted for by recent internal conflict, lack of democracy, food insecurity and survey year; and 58.7% of the variance in overweight or obesity prevalence was accounted for by recent internal conflict, GDP per capita, food insecurity, urbanization and survey year. The prevalence of concurrent stunting and overweight or obesity was 2.0% (95% CI: 1.7, 2.5) (Figure 4). Figure 5 shows adolescent overweight or obesity prevalence by stunting and/or thinness prevalence. Sixteen percent had overweight or obesity prevalence and stunting and/or thinness prevalence greater than the overall pooled prevalence estimates for overweight or obesity and stunting and/or thinness prevalence, respectively. By WHO region, per total number of LMICs, 14% in Africa, 7% in the Americas, 17% in the Eastern Mediterranean region, 33% in Europe, 0% in South-East Asia and 9% in the Western Pacific had overweight or obesity and stunting and/or thinness prevalences

greater than their regional prevalence estimates for overweight or obesity and stunting and/or thinness.

Key data

Stunting prevalence was 10.2% (95% CI: 8.3, 12.2)

Thinness prevalence was 5.5% (95% CI: 4.3, 6.9).

Overweight or obesity prevalence was 21.4% (95% CI: 18.6, 24.2).

Between 38.4% and 58.7% of the variance in adolescent malnutrition was explained by macrolevel contextual factors.

The prevalence of concurrent stunting and overweight or obesity was 2.0% (1.7, 2.5).

Discussion

The prevalence of stunting and/or thinness among adolescents was 15.6%, or about three in twenty adolescents, while 21.4%,

or about one in four adolescents, was overweight or obese. A much smaller proportion of adolescents also had concurrent stunting and overweight or obesity. There were significant differences in adolescent malnutrition prevalence estimates across LMICs; 38%–59% of the variance at the population level could be explained by macrolevel contextual factors including internal conflict, lack of democracy, GDP, food insecurity, urbanization and the year of survey.

These results are not directly comparable with those of Abarca-Gómez et al.¹⁵ because the two studies covered different age ranges (5–19 years in the Abarca-Gómez et al. study compared with 12–15 years in our study). However, both studies found thinness prevalence was highest in the South-East Asian region and overweight or obesity prevalence was highest in the Western Pacific region.

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“Thinness prevalence was highest in the South-East Asian region and overweight or obesity prevalence was highest in the Western Pacific region. Concurrent stunting and overweight or obesity among adolescents in LMICs was highest in the Eastern Mediterranean region.”

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Concurrent stunting and overweight or obesity among adolescents in LMICs was highest in the Eastern Mediterranean region. Inadequate nutrition in the period between conception and two years can lead to reduced linear growth.² Given that resolution of these height deficits may take several generations,⁵ stunted children also exposed to obesogenic environments may be at greater risk of becoming overweight or obese. Stunting has been reported to alter body composition and fat distribution (e.g., via greater insulin sensitivity and/or lower fat oxidation), predisposing adolescents to excess adiposity.¹⁶

Addressing the double burden of adolescent malnutrition in LMICs would require countries to adopt an integrated agenda (based on national or regional data) that addresses the root causes of malnutrition using a life-course approach (i.e., prior to conception and continuing up to and including adolescence).¹⁷ At a national level, few LMICs have nutrition policies that could address both burdens at the same time, with lower-income countries tending to have policies that only address undernutrition.¹⁸ Irrespective of what evidence-based policies and programs are offered to address both burdens of undernutrition and



Improved food and nutrition security stems directly from government policies that integrate the food economy with a development agenda that seeks to boost economic growth while achieving a more equitable distribution of income

overnutrition among adolescents, scant attention to the macrolevel contexts can result in poor policy decisions. This issue is highlighted in a mixed method study of the South Sudan Nutrition Health and Empowerment (SSHINE) Program.¹⁹

The SSHINE program was a multiyear assistance program funded by the U.S. Agency for International Development Office of Food for Peace, and it included a supplementary ration provision following the ‘Prevention of Malnutrition in Children Under 2 Approach.’ Since independence in July 2011, the country has suffered ongoing internal conflict. While the program was initiated at a time of relative stability, political instability in the region affected households in a number of ways. Ultimately, this led to substantial obstacles to the distribution of supplementary household rations and the prevention of child malnutrition. Monthly household rations delivered via a non-emergency food assistance program were received by communities; however, the majority of households had used up these rations less than 30 days after receipt. More than one-half of children aged 12–17 months and one-third of children aged 18–23 months consumed diets consisting of fewer than four food groups in the final week of each month.¹⁹ Notably, the strategy at the time was the most current one for preventing child malnutrition and had proved beneficial in its original evaluation in Haiti.²⁰

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“Addressing the double burden of adolescent malnutrition in LMICs would require countries to adopt an integrated agenda that addresses the root causes of malnutrition using a life-course approach”

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Conclusion

While there is substantial variation across low- and middle-income countries in the prevalence of under- and overnutrition among adolescents, the double burden of malnutrition particularly at the population level is common in LMICs. A large proportion of the variance in adolescent malnutrition was explained by macrolevel contextual factors. Without attending to context, interventions and programs for adolescent malnutrition in LMICs may fail or underperform.

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