Planning for the worst: estimates of obesity and comorbidities in school-age children in 2025

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Summary

Background: Member states of the World Health Organization have adopted resolutions aiming to achieve ‘no increase on obesity levels’ by 2025 (based on 2010 levels) for infants, adolescents and adults.

Objectives: We aimed to assess the scale of the problem facing health planners and service providers.

Methods and Results: Using data prepared by the Global Burden of Disease collaborative for 2000 and 2013, we have estimated that by 2025 some 268 million children aged 5-17 years may be overweight, including 91 million obese, assuming no policy interventions have proven effective at changing current trends. We have also estimated the likely numbers of children in 2025 with obesity-related comorbidities: impaired glucose tolerance (12 million), type 2 diabetes (4 million), hypertension (27 million) and hepatic steatosis (38 million). A supplemental table provides estimates for each of 184 nations.

Conclusion: The 2025 targets are unlikely to be met, and health service providers will need to plan for a significant increase in obesity-linked comorbidities.

Keywords: Childhood, comorbidities, diabetes, global, hypertension, obesity, overweight, prevalence, steatosis.

Introduction

A High Level meeting of the UN General Assembly held in 2011 resolved to tackle non-communicable diseases (1) and among other things called for recommendations on a set of voluntary global targets. In May 2012, the 65th World Health Assembly endorsed the Comprehensive Implementation Plan on Maternal, Infant and Young Child Nutrition (2) which had six global nutrition targets to be achieved by 2025, including Target 4: no increase in childhood overweight, which applied to infants and young children up to age 5 years, and took estimates of 6.7% of pre-school children (43 million under-fives) for the 2010 baseline (3).

The 66th World Health Assembly, held in May 2013, endorsed the WHO Global Action Plan for the Prevention and Control of NCDs 2013-2020 (4) which included a target ‘to halt the rise in diabetes and obesity’ and specified that this should be monitored in both adults and adolescents. Again, 2010 was taken as the baseline for evaluating achievement of a ‘halt’ in the rise in obesity.

Previous estimates of the extent of obesity among school-age children (here defined as age 5 years to 17.9 years) were made by Lobstein, Buay and Uauy in 2004 (5) and by Lobstein and Wang in the first issue of this journal, in 2006 (6). These were the first comprehensive attempts to consider both the prevalence and trends in overweight and obesity across the age range on a global basis, using the standardized International Obesity TaskForce definitions (7,8).

Subsequently, the collaboration of researchers in the Global Burden of Disease (GBD) programme (9) have included adult and child overweight and obesity in their assessments of the causes of deaths and disability-adjusted life years, and published a set of data in 2014 (10) which gave prevalence estimates for 188 countries for 1980, 1990, 2000 and 2013. The data for children covered the age range 2 to 20 years.

In the present paper, we have taken the GBD estimates for 2000 and 2013 to make an estimate for 2010 (to match the World Health Organization baseline year) and to project forward to 2025 on the basis that no effective intervention is
implemented to significantly change the trend. We have also used figures for the prevalence of obesity-related comorbidities for children (12) to make estimates of the prevalence and numbers of children suffering these comorbidities in 2025, as an indication of the severity of the demand on health services that may accrue as this generation of children moves into adulthood.

Methods

Overweight and obesity estimates have been prepared by the Global Burden of Disease collaboration and published by Ng et al. (10), providing figures for each of 17 age groups (2 years through to 80+ years) for males and females, for years 1980, 1990, 2000 and 2013. Methods and sources are described in the paper and in that paper’s online supplementary files (11). The definition of overweight and obesity is based on the International Obesity TaskForce cut-offs for children up to age 18 years. We took the estimates calculated by Ng et al. (10), for the years 2000 and 2013, and interpolated for year 2010 and projected to year 2025 on an unadjusted linear basis, separately for each of 184 countries. Thus for countries such as the USA where there has been little increase in average child obesity prevalence for a decade, this trend was assumed to continue to 2025, while for countries where a rapid rise has been seen, this too was projected to continue to 2025. We also calculated the percentage change in prevalence over the period 2000–2013, based on the calculation 100 * (2013 value -2000 value)/2000 value.

Estimates for the numbers of children in each country for 2000, 2010, 2013 and 2025 were taken from World Bank population estimates and projections (13), which are provided in five-year bands. To calculate the numbers of children aged 5–17.9 years, we added the total of all children aged 5–9 years and 10–14 years, plus three-fifths of those aged 15–19 years. The numbers of children in Taiwan were obtained from official government statistics (14), which are provided in the same format as those from the World Bank.

Results

We summarize the results for projected numbers and prevalence of overweight (including obesity) and obesity in Table 1, which shows global overweight prevalence for children aged 5–17 years rising from 13.9% in 2010 to 15.8% in 2025. On the assumptions of continued population growth given by the World Bank, this translates to a rise from some 219 million children in this age group in 2010 to 268 million children in 2025. Obesity alone rises from 76 million children (4.8%) in 2010 to 91 million (5.4%) by 2025.

In Table 2, we have extracted from the 184 countries the top 20 countries for (a) absolute numbers of overweight children anticipated for 2025, (b) prevalence levels for 2013 and (c) the fastest rise in prevalence during the years 2000 through to 2013. The first list includes those countries with large populations where there is already a high prevalence of overweight in children (e.g. the USA and the UK) and countries with very large populations and recent increases in overweight, projected to continue to 2025 (e.g. China, India, Brazil and Mexico). The second list (derived from Ng et al. (10)) indicates the highest levels of childhood overweight are found in Pacific islands and the Middle Eastern region. The third list shows how the rapid increase in childhood obesity is affecting a range of developing economies, including those in South Asia, Latin America, Africa, small island states in the Caribbean and several states

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Global childhood overweight and obesity 2000–2025: millions and prevalence levels. Children aged 5.0–17.9 years. Overweight includes obesity, and both are defined using IOTF cut-offs (7,8)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
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<tr>
<td>Overweight</td>
<td>199.9 (12.8%)</td>
</tr>
<tr>
<td>of which obese</td>
<td>71.4 (4.6%)</td>
</tr>
</tbody>
</table>

IOTF, International Obesity Taskforce.
in the former Soviet Union. Based on the Ng et al. (10) estimates, we found very few countries with a reduction in overweight prevalence in the last decade: no countries showed a fall in childhood overweight prevalence of more than three percentage points over the period 2000–2013, while only two countries, Albania and Lesotho, showed a fall in prevalence more than two percentage points over the period (Table S1).

Table 3 gives an indication of the potential demand on health services for countries with the highest likely level of childhood obesity-related comorbidities, for the year 2025. The countries are similar to those listed in Table 2, column a, as these countries have the highest numbers of children anticipated to be obese in 2025. Table 3 also indicates the global figure for all 184 countries combined: namely an anticipated 12.7 million children suffering obesity-related impaired glucose tolerance, and as many as 4 million with Type 2 diabetes, along with 27 million experiencing hypertension and nearly 38 million with hepatic steatosis. Readers should note that comorbidities may cluster in individuals, so the numbers for each comorbidity should not be added together within a given country or globally.
This paper has made estimates of the likely size of the obesity epidemic among school-age children in 2025, the year chosen by the member states of the World Health Assembly to be the target for achieving no increase in child obesity from 2010 levels. On current trends, this target will not be met.

We also estimate the potential numbers of children likely to be affected by obesity-related comorbidities. Hypertension, impaired glucose tolerance and hepatic steatosis are affecting a large number of children as a result of their excess adiposity. The figures in Table 3 do not include cases linked to excess adiposity in overweight, non-obese children, who may be less likely to show these comorbidities but who are a greater proportion of the total population. The figures in Table 3 will include some overlap in the cases, but it would not be unreasonable to assume that around half of the 90 million obese school-age children anticipated for 2025 will have one or more of the comorbidities listed, or raised blood triglyceride or cholesterol levels, or elevated aminotransferase. If there is no screening service in place, these conditions are likely to remain untreated until they become significantly disabling, and potentially expensive, health problems in adulthood.

**Limitations**

The data presented here are projections from estimates which are themselves projections and interpolations from estimates, in turn based on sample surveys using a variety of methods and procedures. The population estimates are based on known census data, with their potential inaccuracies, projected forwards with varying degrees of confidence. The overweight prevalence data are based on occasional, often small-scale sample surveys, some of which collected measured heights and weights while others relied on reported heights and weights, and age ranges were not consistent between all surveys. The GBD methodology undertakes sophisticated procedures to correct for these factors, but cannot realistically validate the corrected data against a known gold standard as the latter does not exist: no country has undertaken measured, annual surveys of every child across the entire age range, throughout the period reported.
The estimates for comorbidity levels are also based on sample data from a range of locations, age-ranges and, more problematically, different definitions of the threshold for determining the presence of that comorbidity, as noted in the original study (12).

We have used linear projections from the last decade, and it may be the case that there is a worldwide deceleration in the rising levels of overweight and obesity. While this appears to be true for some countries, for others, the levels have been rising steeply (Table 2, column c), and there is good reason to assume such trends would continue as additional countries experience similar forms of nutritional transition and enhanced access to markets for processed foods and sugary beverages, increasing sedentary behaviours and continued rising levels of urbanization.

Conclusion

We have made a number of estimates for the scale of child overweight and obesity in 2025, the year that the World Health Organization set for achieving no increase in obesity levels from 2010 for pre-school children, adolescents and adults. For most countries analysed, there appears to be no reason to believe the targets will be met, although we acknowledge a significant lack of good survey data for the last 5 years.

We hope that the estimates shown here are not proved to be correct in 2025. We hope that the assumption of linear trends, which assumes ‘business as usual’ and a lack of significant new interventions to improve children’s prospects, are proved to be wrong and that the real levels of obesity and comorbidities a decade from now are far lower than those indicated.

However, we see no reason to rely on optimism as a strategy for planning for the future, not only for coping with the child obesity problem and its comorbidities, but also the rising levels of ill-health that will become manifest as those children retain or increase their adiposity moving into adulthood. Rather, it is important to plan for the worst: and for this, the managers of health services need to be aware of the potential scale of the problem they may face and should start planning for the resources and staff capacity that they will need for the 2020s and beyond.

Conflict of Interest Statement

No conflict of interest was declared.

References


Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher’s web-site:

Table S1. Additional information may be found in at http://dx.doi.org/ijpo.12185