

# Prevalence And Trends Across The World

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## Introduction

Although there are several different methods and approaches to the measurement of obesity and overweight in children, all the available surveys have one particular feature: they show a substantial and rapid increase in the numbers of children affected, in most regions of the world. In more developed economies child obesity prevalence levels have doubled and in some cases trebled in the period from the late 1970s to the end of the century [1] and is highest among lower income households and some minority ethnic groups. In less developed economies child obesity levels have also risen rapidly, especially since the 1990s, and especially in urban areas and among children in better-off households [2].

## Survey definitions of child overweight and obesity

For young children, it is common practice to use ‘weight-for-height’ rather than BMI to indicate nutritional status. The practice is based on existing definitions used to assess underweight and stunting, where a child’s weight-for-age, height-for-age and weight-for-height are compared with standard growth curves taken from a reference population.

In recent years, BMI has been used as a valid, if indirect, measure of adiposity in adults, and increasingly accepted as measure of adiposity in older children and adolescents for survey purposes [1], [3], and this has led to various approaches to selecting appropriate BMI cut-off values to take account of the fluctuations in BMI during normal growth. Various BMI-for-age reference charts have been developed such as those used by the US National Centre for Health Statistics, or those used by the UK Department of Health, or those developed by other national authorities. Such national reference curves provide a set of cut-offs to define overweight and obesity among children of each gender, at every age.

It should be noted that reference curves for defining overweight and obesity can help to compare different population groups and monitor changes in a population over time, but for the clinical assessment of individual children more careful examination of the child is needed to monitor individual growth trends and ensure that, for example, a high BMI is not due to extra muscle mass or to stunted linear growth.

Difficulties in making comparisons between surveys that used different national reference curves led to the establishment of an expert panel, convened by the International Obesity TaskForce (IOTF), which proposed a set of BMI cut-offs based on pooled data collected from Brazil, Britain, Hong Kong, Singapore, the Netherlands, and the USA. The panel agreed that overweight and obesity would be defined in children according to the BMI centile curves that passed through the cut-off points of BMI 25 and 30 at age 18. The resulting set of age- and gender-specific BMI cut-off points for children was published in 2000 [4]. A more detailed version of this approach, extending the cut-offs to include BMI 35 and 40 at age 18, at monthly intervals from age 2 to 18 years was published in 2012 [5].

Although the World Health Organization (WHO) has previously recommended using a set of cut-offs based on a reference population derived from the USA, it has recently reviewed its recommendations. The US data had included large numbers of formula-fed infants with growth patterns that differed from breast-fed infants, and this was likely to underestimate the true extent of overweight in younger children. WHO

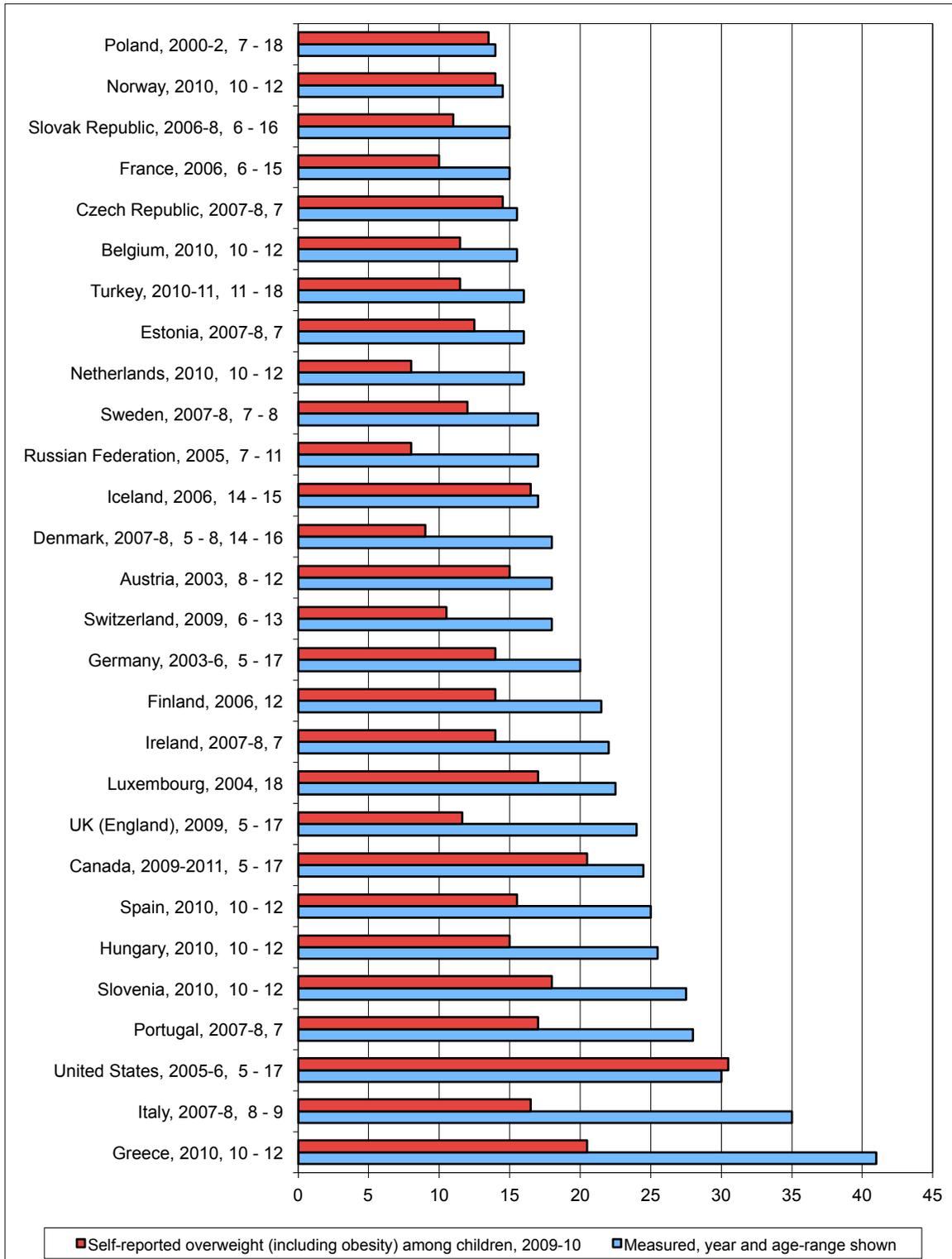
has subsequently published a set of standard growth charts based on data from healthy breast-fed babies and infants aged 0-5 years and has extended these curves statistically to provide a set of reference charts for children aged 5-19 years [6]. These WHO standards and reference charts are discussed in more detail in the chapter in this book by De Onis.

As a result of these different approaches, care should be taken when looking at published prevalence figures for overweight and obesity, and the prevalence levels based on one set of cut-offs or reference curves should not be compared directly with those based on another. Furthermore, the use of the cut-offs may differ, with some reports giving the prevalence value for all 'overweight' children including those that are obese, while others may give the prevalence level for overweight excluding those that are obese. Readers should also note that prevalence levels using reference curves from the USA sometimes refer to 'at risk of overweight' and 'overweight' for the top two tiers of adiposity, and sometimes to 'overweight' and 'obese'.

In addition, the survey methodology needs to be examined carefully. One of the major sources of inaccuracy is the use of self-reported or parent-reported heights and weights, instead of using direct measurements taken by professional health staff. The differences can be quite large: Figure 1 shows estimates of overweight prevalence (using IOTF definitions) based on data collected by self-reported and by directly measured surveys.

**Fig 1: Comparisons of measured and self-reported estimates of overweight and obesity in selected countries**

Overweight defined by IOTF criteria (includes obese).



Source: OECD 2013 [26]

In the present chapter, unless otherwise stated the prevalence levels are based on measured weights and heights, and overweight and obesity are defined by the IOTF international classification scheme

## Worldwide prevalence levels

Estimates for the global prevalence of overweight and obesity among school-age children were first made in 2004, when it was concluded that approximately 10% of school-age children (aged 5-17) were overweight, with around one quarter of these children obese (2% to 3% of children globally) [1]. This global average covers a wide range of prevalence levels in different regions and countries, with the prevalence of overweight in Africa and Asia averaging well below 5% and in the Americas and Europe above 20%. More recent estimates show little change overall, but while the prevalence levels of overweight have seen a plateau or slight decline in higher-income countries, it has risen significantly in emerging middle-income countries (see Table 1).

**Table 1: Estimated prevalence of excess bodyweight in school-age children in world regions, 2010-2013**

Percentage of children aged 5-17 years inclusive  
Regions defined according to World Health Organization  
Overweight and obesity according to IOTF definitions

Region*	Obese		Overweight (including obese)	
	Male	Female	Male	Female
Americas	9.6	9.3	27.9	26.3
Europe and former USSR	4.6	4.2	20.4	19.4
Middle East and North Africa	6.4	6.7	17.0	18.8
South East Asia (includes India)	2.5	0.5	12.6	7.1
West Pacific (includes China)	2.0	1.2	8.0	6.2
Africa (sub-Saharan)	1.0	1.1	3.8	5.7
Global estimate	3.8	3.0	14.0	12.1

Source: IASO 2013 [9]

## Americas

Comprehensive and comparable national representative data on trends in the prevalence of obesity are available for the USA, where surveys have been undertaken since the 1960s. Data for 2009-2010 show that 34% of children aged 5-17 were overweight (including obese) [7]. In Canada 26% of younger children and 29% of older children were found to be overweight in a 2004 survey, almost exactly double the prevalence levels found among children 25 years earlier [8].

Central and southern American countries show rapidly rising rates of obesity [9]. In Mexico, a survey of children aged 11-14 years in 1998-1999 found 33% of both males and females to be overweight or obese (using US definitions). The levels were higher among better off families and in urban areas. The prevalence of overweight among school-aged children in Brazil was 14% in 1997 (compared with just 4% in 1974). In Chile in 2000 the prevalence of overweight among school children was 26% and in Argentina in 2005 it was 30%.

## Europe

The highest child obesity prevalence levels in this region are found in several southern European countries. The Child Obesity Surveillance Initiative which has introduced a uniform surveillance methodology in several European countries, shows overweight prevalence (including obesity) among children aged 7-8y to range from 15% in Norway to 36% in Italy [10].

**Table 2. Child obesity in selected European countries 2009-2010**

Children aged 7-8y, IOTF criteria

	Obese		Overweight (including obese)	
	Male	Female	Male	Female
Norway	3.0	4.0	13.5	17.4
Belgium	3.9	4.9	14.5	18.4
Latvia	4.5	3.1	15.3	15.1
Czech republic	3.8	4.0	15.8	14.7
Sweden	2.5	3.5	16.0	17.8
Lithuania	5.1	5.1	16.1	16.2
Bulgaria	6.6	9.0	20.1	24.2
Ireland	6.3	5.6	21.1	22.8
Slovenia	7.8	6.7	24.7	23.8
Portugal	7.9	9.3	26.8	28.5
Italy	13.6	11.8	37.2	34.7

Source: Wijnhoven et al 2012 [10]

A marked North-South gradient in Europe has been found in this and other surveys, and the reasons for this are unclear. Although genetic factors may play a role, all countries in the region have shown a marked increase in prevalence in recent decades indicating that all children are exposed to risk to some degree. The child's household or family income may be a relevant variable, possibly mediated through income-related dietary factors such as maternal nutrition during pregnancy, or breast- or bottle-feeding in infancy, as well as the quality of the diet during childhood. The degree of social inequality may also play a role (see below).

## North Africa, Eastern Mediterranean and Middle East

Several countries in this region appear to be showing high levels of childhood obesity. The table below (Table 3) is derived from self-reported heights and weights in the Global School-based Student Health Survey, for children aged 13-15 years [11].

**Table 3. Self-reported child overweight and obesity in selected countries in North Africa, Eastern Mediterranean and Middle East, 2007-2012**

Children aged 13-15y, WHO criteria

	Obese	Overweight including obese
Pakistan 2009	1	6.5
Yemen 2008	4.4	11.8
Sudan 2012	3.6	11.4
Morocco 2010	2.5	14.1
Djibouti 2007	4.6	16.3
Jordan 2007	5	21.2
Syria 2010	5.8	21.7
Palestine 2010	6.1	22.4
Lebanon 2011	6.7	24.1
Iraq 2012	7.9	25.3
Libya 2007	8.2	26
Egypt 2011	7	32.5
UAE 2010	14.4	38.4
Kuwait 2011	22.7	51.4

Source: Global School-based Student Health Survey [11]

The problem is not restricted to adolescents. A survey of nearly 20,000 children in Saudi Arabia in 2005 found 12% of five-year-old children to be overweight, rising to over 27% by age 10 years, and continuing at this level through adolescence. In the Birjand province of Iran, 18% of kindergarten children aged 2.0-4.9 years were overweight or obese [12]. By age 10 years, 39% of Kuwaiti boys were overweight or obese [13] although in Morocco the figure is below 9% [14].

## Asia and Pacific

In more economically developed countries the prevalence figures for pre-school and school-age children are considerably higher. Among Australian children and adolescents aged 7-15 years, the prevalence of

overweight (including obesity) doubled from 11% to 21% between 1985 and 1995, and reached 27% in 2007-2008 [15].

**Table 4. Child overweight prevalence in selected countries in Asia and Australasia, 2007-2012**

Overweight by IOTF criteria

	Year of survey	Age range	Male	Female
Sri Lanka	2003	10 - 15	1.7	2.7
China	2009	6 - 12	15.5	14.5
Mauritius	2006	9 - 10	15.8	18.9
India	2007/8	2 - 17	20.6	18.3
Singapore	1993	10	25.5	17.6
Taiwan	2001	6 - 18	26.8	16.6
Australia	2007	2 - 16	22	24
New Zealand	2007	5 - 14	28.2	28.8

Source: IASO [9]

In mainland China, whose population accounts for one-fifth of the global population, the prevalence of obesity has been rising quickly in both adults and children during the past two decades. Using a pooled method for estimating overweight, one meta-analysis estimated overweight to affect 2% of Chinese children in the early 1980s, rising to 21% by 2006-2010. Prevalence tended to be higher among boys, and was highest among children living in urban areas [16].

### **Sub-Saharan Africa**

There are very few surveys from African countries that can provide prevalence figures for childhood obesity, as most public health nutrition programs have been focused on under-nutrition and food safety problems. The prevalence of childhood obesity remains very low in this region, although it appears to be rising on several countries. In South Africa, childhood obesity is rising: the prevalence of overweight (including obesity) among young people aged 13-19 years was under 20% in 2002 but rose to nearly 26% by 2008, with females significantly more commonly overweight (36%) than boys (14%) [17].

### **Secular trends and demographic differences**

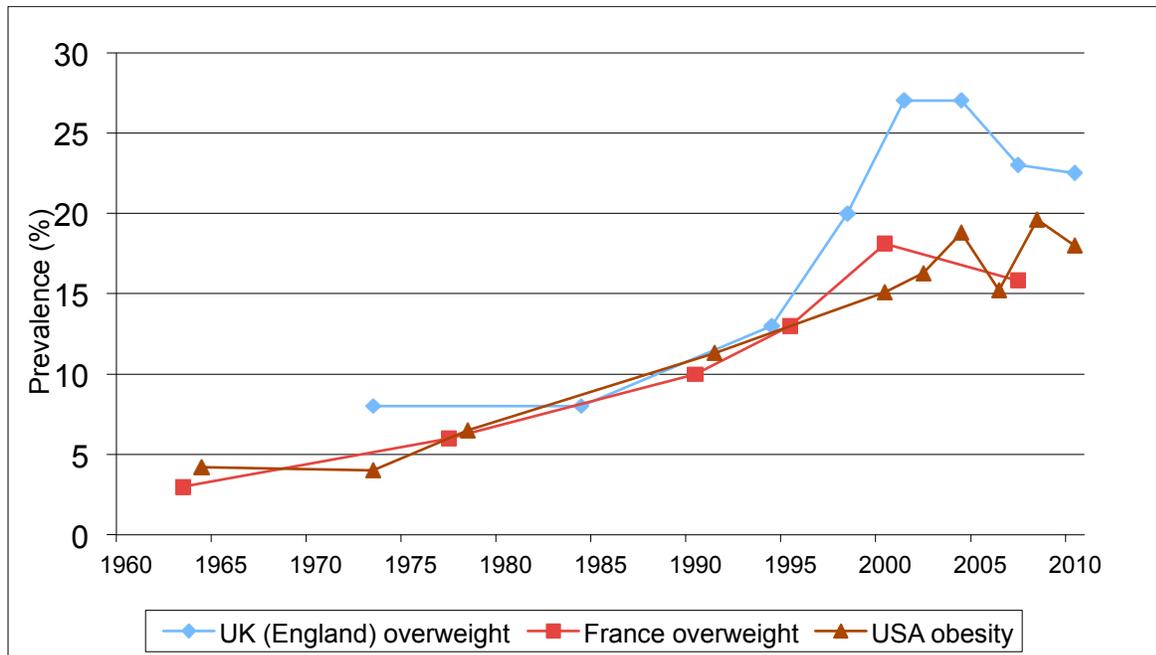
As noted already, the last three decades have seen unprecedented increases in the prevalence of child obesity. North America and some countries in Europe have shown consistent year-on-year increases in prevalence, although recent surveys indicate that the rising trends are easing, with a plateau in prevalence levels shown since around 2005 [9].

**Fig 2: Trends in USA, England and France showing apparent plateau of overweight/obesity from around 2005**

England: children 5-17y, overweight (including obese) defined by IOTF criteria

France: children 5-17, overweight (>85<sup>th</sup> centile) defined by French national criteria

USA: children 6-11y, obesity (>95<sup>th</sup> centile) defined by CDC criteria

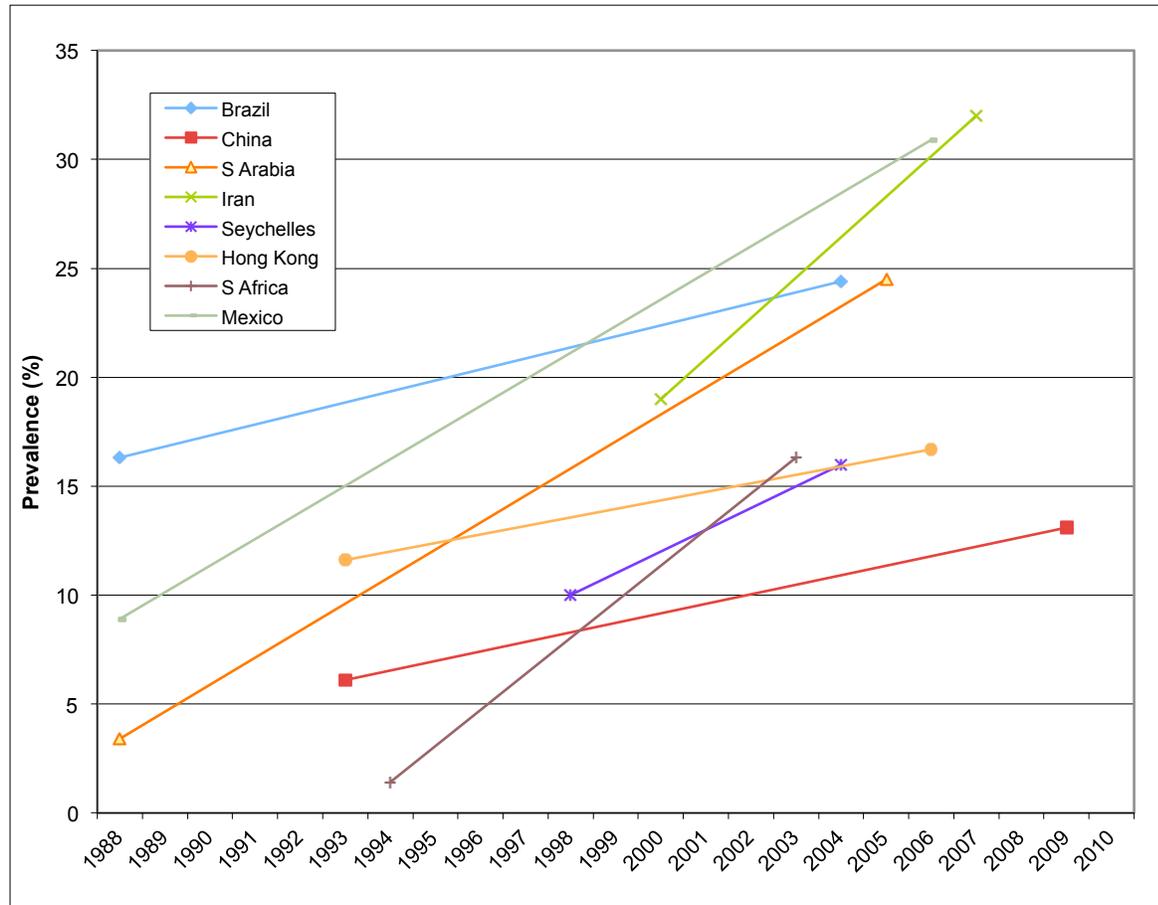


Source: IASO [9]

Data from other regions, for example Latin America, indicate that these countries are showing more rapid rates of increase than experienced in Western Europe and North America [9].

**Fig 3: Overweight prevalence trends eight emerging low- and middle-income countries**

Overweight defined by IOTF criteria (includes obese).



Source: IASO [9]

In contrast, several countries are showing only modest increases. As noted above, China has shown a small rise in the prevalence of overweight among rural children, but it has shown a more marked increase among urban children. Interestingly, a decline in the prevalence of overweight children was found in Russia during the 1990s, a period when the country was affected by a major economic downturn [2].

### **Ethnic and racial factors**

In the US, obesity prevalence levels for children show consistent difference between ethnic groups in surveys across the last three decades. Hispanic and Afro-Caribbean youth are more likely to be overweight than white youth: in 2008, some 17% of white males aged 12-19 years were obese (defined by US cut-offs) while the figure was 20% among Afro-Caribbean children and 27% among Mexican Americans. For females, the pattern was different, with 15%, 29% and 17% obese, respectively [18].

In the UK, Afro-Caribbean girls are more likely to be overweight than girls in the general population.

Indian and Pakistani boys were more likely to be overweight. A survey of over 2,000 adolescents aged 11-14 in London reported high levels of overweight and obesity among all ethnic groups examined, with the highest levels among Indian males (36% overweight) and black African females (40% overweight) [19]. This was unlikely to be due to economic differences as no association between BMI and measures of socioeconomic status were found although the group as a whole was relatively deprived compared with the UK population generally.

## **Socio-economic factors**

Examination of differences in the distribution of overweight and obesity among children coming from different social classes (defined by family income levels or educational levels of the main income earner, or local indices of deprivation) shows a complex pattern.

In countries which are not economically developed, or are undergoing economic development, overweight and obesity levels tend to be higher among families with larger incomes or higher educational attainment. In Brazil, in 2005, 38% of 11-year-old children in higher-income families were overweight or obese (WHO definition), compared with 26% of children in middle-income families and 20% of children in lower income families [20]. In China there is a similar association between child overweight and family income level and educational level [21]. In a review across many developing countries, the determinants of risk of obesity were found to be: “high socioeconomic status, residence in metropolitan cities, female gender, unawareness and false beliefs about nutrition, marketing by transnational food companies, increasing academic stress, and poor facilities for physical activity” [22].

In contrast, in many economically developed, industrialised countries, children in lower socio-economic groups tend to show higher prevalence levels of overweight and obesity. In the USA, obesity prevalence among children in families where the head of household did not gain a high school diploma are two- to three-times the prevalence among families where the head of household has a university degree [23]. Secular trends show that in several countries these social class differences in obesity levels appear to be widening [24].

The relationship between child overweight and socio-economic status has a further nuance in developed economies. Countries with a higher level of social inequality (measured by size of the difference between the lowest and highest households in terms of income or deprivation) also show a higher level of child obesity, independent of the level of average wealth measured by GDP [25]. The greater the inequity in a country, the greater the prevalence of obesity. For policy-makers, a failure to deal with relative social deprivation across society as a whole may reduce the effectiveness of policies to tackle obesity and promote healthy child growth.

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