

Worldwide trends in childhood obesity

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The prevalence of childhood obesity is raising rapidly worldwide [1]. While paediatric obesity has long been associated with western countries, accumulating evidence shows that the epidemic extends to developing countries as well, in addition to an ongoing problem of under-nutrition in the latter [1]. In children as in adults, obesity is associated with chronic conditions such as type 2 diabetes or hypertension. In addition, obese children are at high risk of becoming obese adults. It has been suggested that failing to address the epidemic of overweight would expose current children generations to shorter life expectancy than their parents due to increased obesity-related disease burden [2].

We compared trends in the prevalence of obesity in school children aged 6–12 years from Switzerland and the USA – as examples of industrialised high-income countries – and in children from Seychelles – as an example of a middle-income developing country experiencing rapid health transition [3]. We chose the 6–12 age range because one recent national survey available in Switzerland was limited to this range [4]. We used published aggregated data for Switzerland [4–6] and the USA [7–9], and raw data for Seychelles [3].

In Switzerland, data are available from regional surveys in the city of Zurich in 1960/65 (n = 232) [4, 5] and 1980/90 (n = 205) [4, 6] and from a nationally representative sample of children aged 6–12 years in 2002 (n = 2431) [4]. For the United States of America, we report the prevalence of obesity among children aged 6–11 years from six national surveys in 1963/65 (n = 7119), 1971/74 (n = 2062), 1976/80 (n = 1725), 1988/94 (n = 1064), 1999/2002 (n = 1049) and 2003/04 (n = 981) [7–9]. For the Seychelles, we report the prevalence of obesity from seven national surveys conducted yearly between 1998 and 2004 in all students of all schools in four selected school grades (day-care, 4th, 7th and 10th years of mandatory school), from which we calculated the estimates for students aged 6–12 (n = 16996) [3].

For all three countries, obesity was defined according to the criteria of the American Centres for Disease Control and Prevention (CDC), ie a body-mass index (BMI) at or above the age- and sex-specific 95th percentile from the “2000 CDC Growth Charts: United

States” (notice that these 2002 CDC data are based on anthropometric measurements made in the 1970–80s, before the obesity epidemic) [10].

In Switzerland, the prevalence of obesity among school children aged 6–12 years was very low until the 1980s (figure 1). In 2002, the prevalence was 6.5% [4]. If the prevalence reported in the city of Zurich in the 80s was considered to be representative for the general population of Switzerland, this would correspond to an absolute increase of approximately 0.3 percentage point per year over the 20 past years. In the USA, the prevalence was 4.2% in the 1960s [7, 8] and it progressively rose to 18.8% in 2003/04 [9]: the increase of obesity was of 0.2 percentage point per year between 1964 and 1978, 0.4 between 1978 and 1991, and 0.6 between 1991 and 2003/04. In the Seychelles, the prevalence of obesity was 4.6% in 1998 and rose to 9.4% in 2004 [3], an increase of 0.8 percentage point per year over that period. The steepest increase over time was therefore observed in the Seychelles, where the prevalence of obesity has more than doubled in seven years and could now exceed the prevalence in Switzerland (figure 1). The trends shown in the figure were similar when examined separately in boys and girls.

Other surveys have assessed the prevalence of obesity in Switzerland. However, other definitions for obesity were used [11–13] and/or children of other age categories were considered [13, 14]. In Lausanne, in a cohort of school children (n = 1203), the prevalence of obesity at age of 5–12 was 1.7% in boys and 2.7% in girls in 1985/91 [12]. In this survey, obesity was defined with the criteria of the International Obesity Task Force (IOTF) which tend to give lower estimates for obesity compared to the CDC criteria. In a nationally representative survey performed in 1999 (n = 595), the prevalence of obesity at

age 6–12 was 9.7% in 1999 [11]. In this survey, obesity was based on the former US definition of obesity, which tends to give higher estimates than the CDC criteria [15]. We recently reported a prevalence of obesity of 3.6% among 5207 children of the 6th grade of the canton of Vaud (mean age: 12.3 years (SD: 0.5); range: 10–14) (open circle on the figure) [14]. Prevalence of obesity was reported to be lower in young adolescents compared to younger children [1, 13] and may differ between regions of the country or between cities and countryside, depending on ethnicity and socio-economic characteristics of the population.

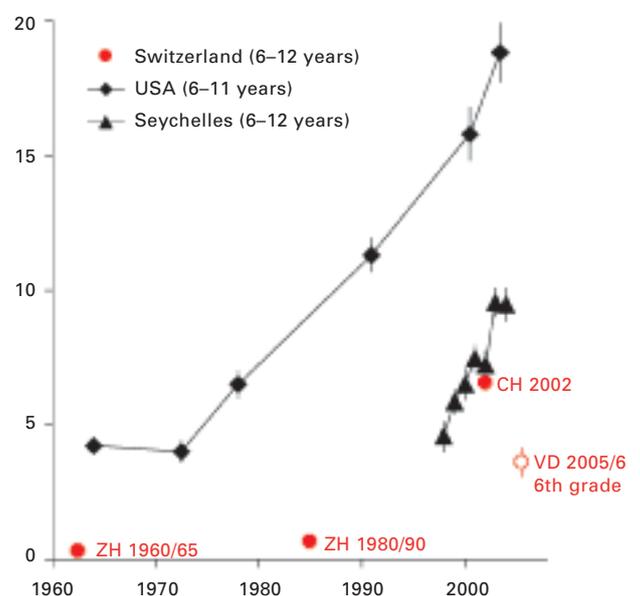
The trends that we report for Switzerland are consistent with findings in other European countries: the annual increase in the prevalence of childhood obesity (IOTF criteria) rose from below 0.1% per year in the 1980s to 0.3% per year in the late 1990s [16]. By 2010, it is expected that one of ten school children will be obese in Europe [16]. In Switzerland, as in many other western countries, paediatric obesity is associated inversely with socio-economic status [1, 14].

The rapidly increasing prevalence of paediatric obesity in the Seychelles is consistent with rapid socio-economic development, as observed in other developing populations like Brazil or Chile [1]. Our results in the Seychelles (gross domestic product of US\$ 8000/year per capita) are also consistent with the finding that the prevalence of obesity increases rapidly when a country's gross domestic product reaches about 5000 international dollars [17].

Decreasing physical activity and increasing sedentary behaviours are likely to be main forces driving the obesity epidemic [18]. In Switzerland, a decrease in sports practice was reported in adolescents during the last decade [19]. In the Seychelles, walking time and leisure physical activity decreased between

Figure 1

Prevalence of obesity in children aged 6–12 years in the Seychelles [3] and in Switzerland [4–6] (CH: Switzerland; ZH: Zurich), and in children aged 6–11 years in the United States [7–9], between 1963 and 2004. Obesity is defined as a body mass index (BMI) at or above the age- and sex-specific 95th BMI percentile from the 2000 CDC Growth Charts [10]. The open circle indicates prevalence of obesity among schoolchildren of 6th grade (mean age: 12.3 years (SD: 0.5); range: 10–14) of the canton of Vaud in 2005/06 [14].



1998 and 2004, and these factors were associated with overweight [3]. Unfavourable changes in the diet might also be involved, but few reliable data are available on trends in children. In Switzerland, changes in socio-economic and ethnic characteristics of children – which both relate strongly to obesity – can also account for upward trends in the prevalence of obesity in the population.

While the prevalence of obesity is increasing worldwide, there is yet no indication, in any country, that trends were successfully reversed or even curbed in youths or in adults [1, 8]. The rapid prevalence increase of paediatric obesity stresses the need for accelerating the development and evaluation of programs and policies aimed at promoting physical activity and healthy nutrition, as well as programs to provide appropriate health care to obese children.

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