

## National Prevalence of Obesity

# Prevalence of overweight in Bolivia: data on women and adolescents

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### Summary

Secondary analysis of Bolivian Demographic and Health Surveys 1994, 1998 and 2003 revealed a steady raising trend in levels of overweight and obesity among women in childbearing age (20–45 years), reaching 30% and 15% respectively in 2003. Adolescents' cross-sectional data suggest that overweight and obesity are mainly found in urban areas. Applying the Bolivian body mass index-for-age reference, obesity reached 5% in adolescents, while overweight affects 14% of adolescents. This overview highlights the importance of including the prevention of weight gain among the public health nutrition policies in Bolivia.

**Keywords:** Adolescents, Bolivia, DHS, overweight, South America, women.

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### Introduction

Bolivia is the geographical heart of South America. This country is divided politically into nine departments, with three main metropolitan centres (the cities of La Paz, Santa Cruz and Cochabamba) where more than 50% of the total country's population is gathered, after the rural–urban internal migrations of the 80s. The main population groups are the Mestizos, the descendants of marriages between natives and Europeans, while large numbers of indigenous groups still remain. Since 2003, Bolivia has been experiencing deep social changes, with consequent social unrest and political instability.

Rich in landscapes, Bolivia has three main geographical regions: highlands, valleys and tropical lowlands. Agricultural production and hence food availability is different in each region: the highlands produce Andean cereals, potatoes and pulses; the valleys produce cattle, milk, fruits, vegetables and cereals; while in the lowlands, the most economically developed region, agricultural production concentrates on cattle, meat and tropical fruits.

Data on nutritional status in Bolivia are scarce, and when existent, scattered over regions and age groups or kept as grey literature. The most comprehensive information is provided by the regular Demographic and Health Surveys (DHS). Their limitation, however, is that they only report on women in childbearing age. Other surveys are local (1,2) or limited to a specific age group (3,4). The goal of this paper is to compile some of the available, but scattered information in order to provide a consolidated overview on the overweight/obesity status in Bolivia. The specific objective is to describe the secular trends of overweight and obesity in women of childbearing age, and to describe the levels of overweight and obesity observed between 2003 and 2007 among school-attending adolescents. This country report could be used as an input for public health nutrition purposes in Bolivia.

### Methodology

The present country report consists of (i) the secondary analysis of the DHS (1994, 1998 and 2003) carried out in

order to describe secular trends of overweight and obesity in Bolivian women of childbearing age and (ii) the secondary analysis of available adolescents' data sets performed in order to estimate overweight and obesity levels applying the recently developed Bolivian body mass index (BMI)-for-age reference values (3).

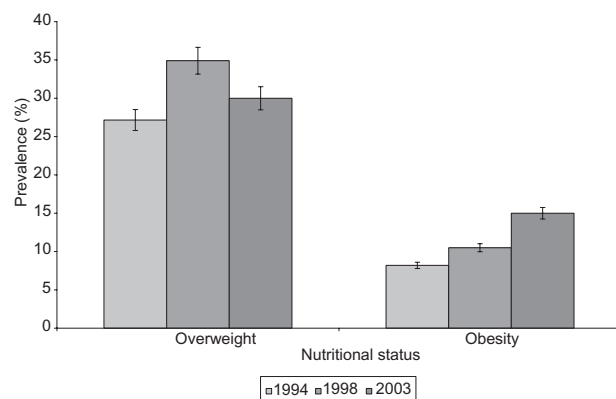
Briefly, DHS were performed on representative stratified samples of the Bolivian population, based on sampling frame of the National Population Census of 1992 and 2001. The instruments of these surveys were (i) a 'household questionnaire' used to assess social and demographic characteristics, income activity, educational level, household equipment and access to public services (water, electricity) and (ii) an 'individual women questionnaire', focusing on reproductive history, contraceptive methods, current pregnancy, breastfeeding practices, marital status and anthropometric measures for all women between the ages of 15 and 49 years if they had delivered a baby in the previous 3–5 years. In 2003, all women in each household were included in the anthropometric measurement. Weights and heights were measured by trained enquirers following standard World Health Organization (WHO) procedures (5). Individual questionnaires were applied to a total of 9114 women in 1994, 11 187 women in 1998 and 17 281 women in 2003. Individual weight and height measurements of 1949 mothers in 1994, 2578 women in 1998 and 12 723 respondents in 2003 were available and retained for analysis. Pregnant women and women of less than 20 years at the time of the survey were not included in the present analysis to avoid overestimation of overweight (if pregnant) or inadequate classification (because neither International Obesity Task Force (IOTF)'s cut-off points nor the Bolivian reference make any provision to account for adolescent mothers). BMI was calculated from measured heights and weights applying the formula:  $BMI = \text{weight (kg)} / (\text{height [m]})^2$ . Respondents were classified according to their nutritional status in the categories of overweight and obese applying WHO's cut-off points of BMI between 25 and  $29.99 \text{ kg m}^{-2}$  for overweight and equal or above  $30 \text{ kg m}^{-2}$  for obesity.

The sampling frame, methodology and main results of the adolescent studies have been reported elsewhere (2–4,6). Briefly, primary sampling units (secondary schools) were randomly selected from the Bolivian Ministry of Education's list using computer-generated random numbers. In each school, classrooms were again randomly selected, and every student present on the interview day was surveyed. Each student gave written consent to participate in the study and the Bolivian Ministry of Education provided the ethical non-objection. Questionnaires were used to compile socio-demographic information and in all cases weight and height were measured by trained enquirers following standard WHO procedures (5). Table 1 shows recently

**Table 1** Gender-specific body mass index-for-age cut-off points for overweight and obesity in Bolivian adolescents

Age (years)	Girls		Boys	
	Overweight >85th percentile	Obesity >95th percentile	Overweight >85th percentile	Obesity >95th percentile
12	22.8	25.4	22.7	25.9
13	23.8	26.3	22.9	25.8
14	24.5	27.1	23.1	25.7
15	25.1	27.7	23.3	25.6
16	25.5	28.2	23.6	25.8
17	25.9	28.8	23.9	26.1
18	26.4	29.4	24.2	26.4

Adapted from Baya Botti *et al.* (3).



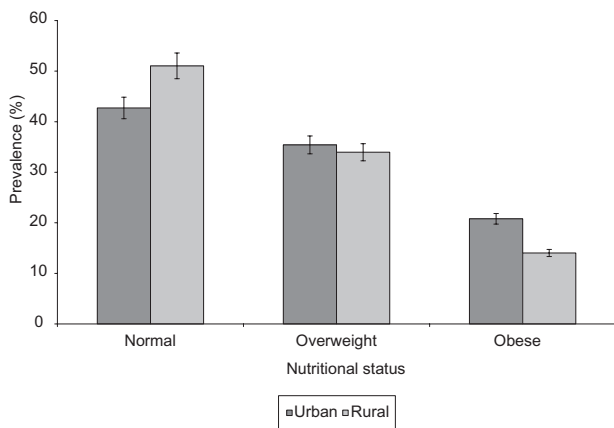
**Figure 1** Secular trends of overweight and obesity in Bolivian women of childbearing age (1998–2003). Source: Demographic and Health Surveys.

developed gender-specific BMI-for-age cut-off points for overweight and obesity in Bolivian adolescents (3).

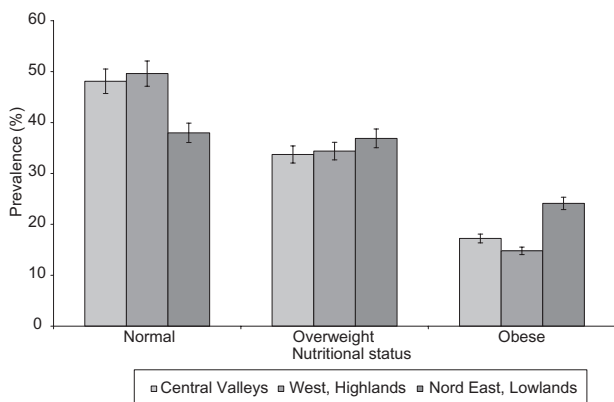
## Results

### Secular trends of overweight and obesity in Bolivian women

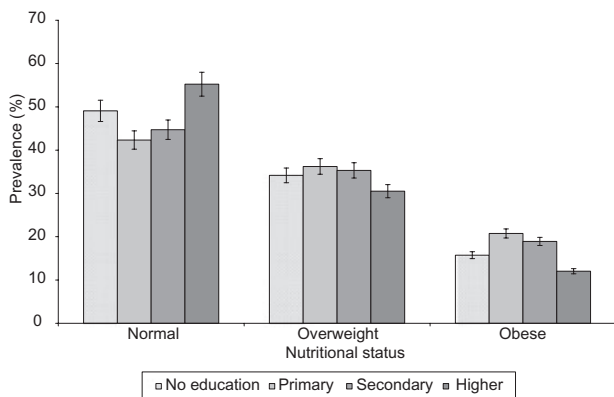
Figure 1 shows secular trends of overweight and obesity in Bolivian women of childbearing age. In 2003, 46% of the female population was either overweight (31%) or obese (15%). The important increase of 9% in levels of overweight observed between 1994 and 1998 has been attenuated by the increase in prevalence of obesity by 2003. The data suggest that women who were overweight in 1998 steadily gained weight and could be classified as obese in 2003. Figures 2 and 3 present the prevalence of overweight and obesity according to locality and region of residence in 2003. Overweight and obesity were more prevalent in the urban agglomerations and in the more prosperous low-



**Figure 2** Prevalence of overweight and obesity in Bolivian women by locality of residence (2003).



**Figure 3** Nutritional status of Bolivian women by region of residence (2003).



**Figure 4** Nutritional status of Bolivian women by educational level (2003).

lands of Bolivia. Figure 4 shows the levels of obesity and overweight according to educational achievement of the respondents. The prevalence of obesity was significantly higher among women with elementary or secondary education and those of older age groups (more than 35 years).

### Adolescent overweight

Table 2 shows overweight and obesity levels from two Bolivian adolescents' studies, one in urban areas and the other is nationally representative. In order to allow for comparisons with other studies, Table 2 displays also the prevalence values according to the IOTF's recommended cut-off points (7). Based on the Bolivian reference, overweight reached the level of 14% in urban adolescents, while obesity reached the 5% level. Rural adolescents in general have lower overweight and obesity levels when compared with their urban counterparts. Independently of residence, gender differences were observed in overweight and obesity prevalence. According to this study, overweight levels above 16% were observed in rural Bolivian girls, while obesity levels above 6% were found among urban boys.

### Discussion

#### Secular trends of overweight and obesity in Bolivian women

The main advantage of using the DHS data for the present study is that these data sets are per definition representative of the country. Furthermore, the common methodology applied in all three surveys allows comparison of weight gain trends in the female population. Reported overweight and obesity levels are lower than developed countries (8,9), but suggest that Bolivian women are gaining weight steadily, confirming the previously observed trend (10). Furthermore, this study adds the information of 2003, which includes all women, not just those who gave birth in the past 3 years, highlighting that obesity and obesity-related comorbidities are already a concern for Bolivia's public health sector.

The specific limitation of this comparison is the fact that the 2003 data set, although richer than the previous two, cannot be directly compared with 1994 and 1998 as it provides the information of all women in the household even if they did not have any child in the past 3 years. This feature is, however, an advantage, as it allows to determine the nutritional status of women who were previously set aside from the anthropometric survey. Regional differences in obesity levels reported previously for 1994 and 1998 (10) have been further confirmed: in 2003, the odds of being obese (using as reference the central valleys) was 1.3 times higher in the lowland, and 30% less in the high-mountain region. The lowlands region has experienced a dramatic improvement in living conditions of the population in the last 25 years, particularly as a result of large agricultural exploitations and revenues of petrol. All these changes lead to the consequent reduction in physical activity, the adoption of new eating patterns, particularly more energy-dense food items (mainly fast food and sugary

**Table 2** Overweight and obesity levels in samples of Bolivian adolescents

Setting	Year of study	Sample size (n)	Total Overweight (%)	Total Obesity (%)	Number of boys	Boys Overweight (%)	Boys Obesity (%)	Number of girls	Girls Overweight (%)	Girls Obesity (%)
Urban schools of La Paz city (4)	2003	525	13.7	4.9	238	14.0	7.2	287	13.4	2.9
Bolivian reference (3)			19.8	2.3		12.2	3.4		26.1	1.4
IOTF (7)										
National representative survey rural (3)	2005–2007	1167	12.9	4.9	537	9.1	2.8	630	16.2	6.7
Bolivian reference (3)			12.9	1.5		6.3	4.1		18.6	2.9
IOTF (7)										
National representative survey urban (3)	2005–2007	2344	14.5	5.2	1031	15.1	6.2	1313	13.9	4.3
Bolivian reference (3)			13.4	2.3		9.6	2.5		16.4	2.1
IOTF (7)										
National representative survey combined (3)	2005–2007	3511	14.1	5.0	1568	13.1	5.0	1943	14.7	5.1
Bolivian reference (3)			13.2	2.5		8.5	2.2		17.1	2.8
IOTF (7)										

IOTF, International Obesity Task Force (7).

beverages), and represent thus a more advanced stage of nutritional transition. Another plausible explanation is that food availability and eating traditions are different in each of the regions (11). Traditional foods in the lowlands of Bolivia, although rich in fruits and starchy roots like cassava and vegetables, are also very rich in added lipids, as many of the traditional dishes are fried. However, this diet is less monotonous than that in the highlands, where potatoes and pulses are the main staple.

Obesity levels are higher in urban areas, among people with low educational level, and in the lowlands. According to a previous report, these differences could be explained by the maintenance – mainly in rural areas – of the traditional diets, based on foods of plant origin, low meat and moderate milk consumption, while large cities have adopted energy-denser foods (11).

### Adolescent overweight

Socioeconomic differences in the levels of overweight and obesity in Bolivian adolescents have been observed. As reported previously (4), overweight was associated to wealth and female gender in the capital city of La Paz (which accounts for 22% of the total Bolivian population). The nationally representative study added to the existing knowledge the regional disparities in prevalence levels of overweight and obesity. Lower overweight and obesity levels have been observed in rural areas, suggesting protective environment against effects of nutritional transition (1–3), and documenting dietary patterns of isolated communities (2). The most important message to take into consideration is that stunting together with overweight constitutes actual concerns for Bolivian adolescents' health, independently of their locality of residence, and hence should be addressed by nutritional policies and programmes. Although sample sizes, locality and socioeconomic status could affect results' comparability, the studies performed in smaller samples in a rural setting (2) and an upper-middle-class school (6) allowed ecological observations of actual disparities within Bolivia, and served as baseline for the nationally representative study (3).

For the purposes of this report, the levels of overweight and obesity were recalculated applying the recently developed Bolivian BMI-for-age reference (3). Although IOTF cut-off points (7) have been suggested to be used in this kind of reports, previous analyses suggested that in the particular case of Bolivia (A. Bayá Botti, unpubl. data), IOTF significantly overestimates overweight and underestimates obesity (12). Nevertheless, the overweight levels found with this more conservative instrument suggest that weight gain is already of concern in Bolivian adolescents independently of their socioeconomic status and locality of residence.

## Conclusion

Weight overload is increasing in Bolivia. Almost 46% of all women in childbearing age are overweight or obese. Adolescent obesity reached 5% at national level, while overweight is above 14%. The present overview highlights the importance of including weight gain prevention among the Bolivian public health nutrition policies.

## Acknowledgements and disclaimer

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## Conflict of Interest Statement

No conflict of interest was declared.

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