Does Chile’s nutritional situation constitute a double burden?1–4

Eduardo Atalah, Hugo Amigo, and Patricia Bustos

ABSTRACT
Background: Chile has probably experienced Latin America’s fastest nutritional transition, as evidenced by very low rates of stunting, but the country shows a high prevalence of obesity in most population groups.
Objective: The aim was to assess the existence of a double burden of nutritional problems in Chile on the basis of available data.
Design: Secondary analyses were conducted on data collected by the Health Ministry (height and weight for children aged <6 y and for adults aged ≥65 y), the Education Ministry (height and weight in the first year of primary school and the first year of high school), the 2003 and 2009–2010 National Health Surveys [body mass index (BMI) and anemia prevalence], the 2010–2011 National Food Consumption Survey (ENCA; food consumption, height, and weight), and a Food Insecurity Survey of elderly adults (aged 65–74 y) in Santiago (height, weight, and food insecurity).
Results: In 2011 the prevalence of stunting (height-for-age $z$ scores) was 1.9% for children <6 y old and 3.6% among children in the first year of primary school. This situation was in contrast with a high prevalence of obesity in children (22.1% of children in the first year of primary school; BMI ≥2 $z$ scores) and among adults, especially women, increasing with age (44.8% of women 45–64 y old had a BMI ≥30 kg/m²). The prevalence of anemia in women aged 15–64 y was low (5.1%). In the ENCA survey, women showed a high prevalence of below-average intakes of vitamin A, vitamin B-12, vitamin C, calcium, and zinc, irrespective of BMI. Elderly persons who were underweight and those who were obese had a significantly greater perception of food insecurity in relation to those with a normal weight (61%, 50%, and 33%, respectively).
Conclusions: The data showed high rates of obesity with very low frequency of stunting and, although more information is needed, the double burden of malnutrition probably does not exist in Chile, unlike in other countries in the region. Among specific groups there are low intakes of critical nutrients and food insecurity. Surveys that include anthropometric and biochemical measurements at the family level are needed to correctly evaluate the double burden of malnutrition in Chile.

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Keywords Chile, double burden, nutrition, obesity, stunting

INTRODUCTION
In recent decades, the nutritional situation of Latin American countries has undergone significant changes, leading governments to take action to combat nutritional deficits and more recently to tackle the problem of excess body weight. Excess body weight is becoming more prevalent in a majority of countries in the region, although to varying degrees, because they are in different stages of the epidemiologic transition (1). Chile is an intermediate-developed country (2) that has experienced rapid economic growth and a decline in both poverty and extreme poverty since the early 1990s. Although the country’s Human Development Index is 0.819, placing it 40th among all countries and first in Latin America (3), Chile’s level of income inequality remains largely unchanged and is the highest among member countries of the Organization for Economic Co-operation and Development.

In the 1960s, Chile’s health indicators were close to the average for Latin American countries (4). At the time, national programs provided broad health services coverage that ensured an adequate supply of primary care, including family planning and immunization programs, with special attention paid to the nutritional status of the population (5). Since then, food and nutrition policies in Chile have prioritized investment in maternal and child health programs, with comprehensive, stable coverage over time, adequate monitoring systems, and an emphasis on prevention, resulting in success in the rehabilitation of malnourished children (6). Furthermore, investments in health and nutrition as well as education and basic sanitation have reduced communicable diseases, and stunting has been practically eliminated.

Income growth has resulted in better access to food for the overall population, but there have also been increases in negative lifestyle changes, such as sedentarism and excessive intake of high-calorie foods, which could explain the progressive increase in obesity and chronic diseases (7–10). The latter indicates that the current situation is characterized by a rapid change toward a posttransition stage along with social protection policies that ensure an adequate food supply for the most vulnerable sector of the population.

The double burden concept consists of the presence of increased excess weight alongside a high prevalence of either stunting or some micronutrient deficiency. This implies the coexistence of both nutritional conditions in the population, within the same household (e.g., obese mothers and stunted children), or at the individual level (both conditions in the same individual) (11, 12). However, because Chile has reached minimal rates of

1 From the Department of Nutrition, Faculty of Medicine, University of Chile, Santiago, Chile.
2 Presented at the IUNS 20th International Congress of Nutrition held in Granada, Spain, 15 September 2013.
3 The study was based on a secondary analysis of databases and no specific funds were available for this purpose.
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child stunting, what is notable today is the steady increase in overweight and obesity beginning early in life (13, 14).

Chile’s Health and Education Ministries periodically report information on the nutritional status of the population who attend public health centers and students who attend public schools. Although the lack of national information at the family level prevents a within-family evaluation of the nutritional double burden, as several authors have proposed (15–17), this phenomenon can be partially explored by using the data available for different age strata. Thus, the objective of this study was to assess, on the basis of the available data, if there is a double burden of nutritional problems in Chile and if so, if it is being addressed by national nutrition policies.

SUBJECTS AND METHODS

The information presented below is based on national surveys or administrative data that are generated periodically by governmental institutions. These databases do not include measurements of the various members of a family, making it impossible to estimate the nutritional double burden at this level.

Ministry of Health

The Ministry of Health annually collects anthropometric data (height and weight) on the population <6 y old, pregnant women, and persons ≥65 y who attend public health centers, encompassing 65% of the national population (18). The ministry reports annual data from the evaluation of ~1 million children <6 y old with the use of the 2006 WHO growth standards (19) for stunting (height-for-age < −2 SDs) and overweight and obesity (weight-for-height ≥2 SDs). Specific cutoffs are used for the elderly (n = 440,000) based on the following Ministry of Health standards (20): underweight, BMI (in kg/m²) <23.0, and obesity, BMI >32.0.

Ministry of Education

Each year, the ministry evaluates the nutritional status of all children entering first grade (~6 y old) and those entering the first year of high school (~14 y old) in public schools and subsidized private schools (21); this population corresponds to 74% of all Chilean children of those ages. Private school students are not included in this data collection. The 2007 WHO standard is used as a reference (22) to determine stunting (height-for-age < −2 SDs) and obesity (BMI ≥2 SDs).

2009–2010 National Health Survey

This cross-sectional survey with random household sampling (stratified, multistage, conglomerate sample) provides national information that can be broken down by region and urban/rural area. The target population consists of subjects aged ≥15 y (3216 females and 2200 males) in which 42 health problems were studied, including nutritional status based on BMI. The prevalence of anemia was not analyzed in the latest survey, so for that variable the 2003 National Health Study, which had a similar methodology, was used (23).

2010–2011 National Food Consumption Survey

The 2010–2011 National Food Consumption Survey (ENCA) used a probability sample method (stratified and multistaged) and was representative of 5 zones in the country and by urban or rural area of residence. The sample size consisted of 4920 subjects aged ≥2 y. The information collected included socioeconomic, health, lifestyle, food consumption (a quantified food-frequency questionnaire and 24-h recall), and anthropometric (weight, height, and waist circumference) data. Although data on biochemical indicators were not collected, nutrient intake was estimated from 24-h recall. The information was obtained on the basis of the random selection of one person in each household. The data on female subjects were used to determine the prevalence of below-average consumption of requirements of critical nutrients (vitamins A, B-12, and C; iron; calcium; and zinc), on the basis of BMI (24).

Elderly Food Insecurity Survey

This was a cross-sectional study in 344 adults between 65 and 74 y of age in Santiago, Chile. The survey gathered information about socioeconomic situation, food characteristics, nutritional status, and food insecurity at home on the basis of the Household

### TABLE 1
Prevalence of undernutrition and overweight/obesity in children <6 y old and schoolchildren in the first year of primary school and high school: 2011

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Underweight, %</th>
<th>Stunting, %</th>
<th>Acute undernutrition, %</th>
<th>Obesity, %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public health system</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>0–23 mo</td>
<td>356,972</td>
<td>0.6</td>
<td>2.3</td>
<td>0.4</td>
<td>7.6</td>
</tr>
<tr>
<td>24–47 mo</td>
<td>346,367</td>
<td>0.5</td>
<td>1.9</td>
<td>0.3</td>
<td>9.4</td>
</tr>
<tr>
<td>48–71 mo</td>
<td>303,523</td>
<td>0.4</td>
<td>1.4</td>
<td>0.2</td>
<td>12.9</td>
</tr>
<tr>
<td><strong>Schoolchildren</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary school</td>
<td>163,246</td>
<td>—</td>
<td>3.6</td>
<td>—</td>
<td>22.1</td>
</tr>
<tr>
<td>High school</td>
<td>164,508</td>
<td>—</td>
<td>3.2</td>
<td>—</td>
<td>8.2</td>
</tr>
</tbody>
</table>

1 Underweight: weight-for-age index < −2 SDs; stunting: height-for-age < −2 SDs; acute undernutrition: weight-for-height < −2 SDs; obesity: weight-for-height ≥2 SDs.
2 Percentages are given as BMI ≥2 z scores for primary and high school children.
3 Source: Ministry of Health, 2011 (18).
5 First year only.
Food Insecurity Access Scale (HFIAS) (25). The survey included information about the perception of concern about food, not eating preferred foods, eating undesirable foods, reducing the frequency of eating and quantity of foods, going to bed hungry, and other variables. The relation between food insecurity and nutritional status among elderly adults was evaluated on the basis of BMI (26).

RESULTS

The prevalence of underweight and stunting was low among children <6 y of age in 2011 and was slightly higher among school-aged children (Table 1). An analysis by region or health services showed that the extreme values of stunting fluctuated between 1.4% and 2.7% among children <6 y old, regardless of the degree of rurality or level of development of the region (data not shown). Obesity, on the other hand, increased with age, reaching its highest value in primary school (22.1%) and decreasing during adolescence (8.2%).

The nutritional status of the adult population showed a high prevalence of obesity among women, with the highest figure (~45%) for those between 45 and 64 y of age, but a low prevalence of anemia among adult women (5.1%). On the other hand, obesity declined among elderly adults as age increased and the opposite occurred with the prevalence of underweight (Table 2).

The ENCA showed that, except for iron, >50% of women had insufficient intakes of several essential nutrients such as vitamins A, B-12, and C and calcium and zinc, regardless of their BMI (Table 3). Finally, the study in low-income elderly adults showed a high prevalence of food insecurity, which was significantly higher among people with underweight and obesity (Table 4).

DISCUSSION

Chile’s current situation shows that the postnutritional transition stage is fully underway and, although more information is needed, the double burden of malnutrition probably does not exist. The evidence for this is that there are very low rates of childhood undernutrition and stunting and overweight constitutes a significant problem that affects almost all age groups and socioeconomic levels.

Chile’s situation has evolved differently from that of other intermediate-developed countries. The practical elimination of stunting in Chile is related to the success of early interventions that involved the progressive expansion of coverage with a focus mainly on the most disadvantaged groups, both socially and biologically (27). Therefore, during cycles of social and political crisis, the most vulnerable sectors have been protected by public policies but also by the ability of these groups to defend their rights, as well as by the favorable evolution of the socioeconomic

<table>
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<th>TABLE 2</th>
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<tr>
<td>Prevalence of underweight and obesity in female adolescents and adults and elderly women, by age</td>
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<table>
<thead>
<tr>
<th>Female adolescents and adults</th>
<th>Elderly women</th>
<th>Hemoglobin &lt;12 g/dL, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (in kg/m²), %</td>
<td>n</td>
<td>&lt;18.5</td>
</tr>
<tr>
<td>National Health Survey²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15–24 y</td>
<td>404</td>
<td>8.0</td>
</tr>
<tr>
<td>25–44 y</td>
<td>985</td>
<td>0.3</td>
</tr>
<tr>
<td>45–64 y</td>
<td>975</td>
<td>0.8</td>
</tr>
<tr>
<td>Public health system³</td>
<td></td>
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<tr>
<td>65–69 y</td>
<td>118,000</td>
<td>—</td>
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<tr>
<td>70–79 y</td>
<td>204,000</td>
<td>—</td>
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<tr>
<td>≥80 y</td>
<td>119,000</td>
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³Source: Ministry of Health, 2011 (18).

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<tr>
<th>TABLE 3</th>
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<tr>
<td>Prevalence (95% CI) of intake of vitamins and minerals below the Estimated Average Requirement in women by BMI¹</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>18.5–24.9</th>
<th>25.0–29.9</th>
<th>≥30.0</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin A</td>
<td>57.3 (52.7, 61.9)</td>
<td>62.0 (58.2, 65.8)</td>
<td>60.3 (56.6, 64.0)</td>
<td>0.306</td>
</tr>
<tr>
<td>Vitamin B-12</td>
<td>61.5 (57.0, 66.1)</td>
<td>64.0 (60.2, 67.8)</td>
<td>63.2 (59.6, 66.9)</td>
<td>0.704</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>71.8 (67.6, 75.9)</td>
<td>73.4 (69.9, 76.8)</td>
<td>70.1 (66.6, 73.6)</td>
<td>0.423</td>
</tr>
<tr>
<td>Iron</td>
<td>38.2 (33.7, 42.7)</td>
<td>35.3 (31.6, 39.1)</td>
<td>31.1 (27.7, 34.7)</td>
<td>0.053</td>
</tr>
<tr>
<td>Calcium</td>
<td>84.9 (81.6, 88.2)</td>
<td>88.9 (86.4, 91.4)</td>
<td>88.3 (85.9, 90.7)</td>
<td>0.111</td>
</tr>
<tr>
<td>Zinc</td>
<td>58.0 (53.0, 62.5)</td>
<td>52.6 (48.7, 56.5)</td>
<td>53.0 (49.3, 56.8)</td>
<td>0.164</td>
</tr>
</tbody>
</table>

situation as reflected by reduced poverty and increased economic growth. As a result of these changes in nutritional status, government policies are now directed at preventing overweight, because almost 70% of the adult population is overweight and among schoolchildren the obesity figure is \( \sim 25\% \).

Chile’s unique situation and how it compares with other countries may have multiple explanations, but it is undoubtedly related to the well-controlled effect of intervention policies focused on certain social groups. Today, this focus should be shifted toward preventing overweight, because globalization has brought unbalanced hypercaloric diets, and modern lifestyles and increased purchasing power have directly contributed to the rise in sedentarism (28).

From the point of view of the high prevalence of overweight, 2 elements stand out: 1) women have the highest rates of overweight and 2) the increase in abandonment and food insecurity, as well as an increase in undernutrition, among elderly adults. The latter element constitutes a significant challenge because the size of this population is expected to increase substantially in the coming years. This is a situation that has been observed in some developed countries and should be taken into account in future interventions.

All of this indicates that the reduction in nutritional deficiency in the maternal-child population is attributable to effective and large-scale interventions; for instance, Chile’s supplementary nutrition programs continue their long-term focus on children and pregnant and lactating mothers. However, it now appears necessary to take a different approach to control overweight. This implies changing the goals, strategies, and focus of interventions; redefining target groups; and establishing partnerships for joint actions implemented by the state, civil society, and community groups. Such partnerships should include consumer groups and the substantial academic community studying this issue (29). The results presented with regard to children also indicate that actions to prevent overweight should start from a very early age.

From the point of view of nutrition, there is information that indicates that, nationally, food consumption is sufficient but not adequately varied, especially with regard to the intake of vegetables, fruit, fish, and milk, for which population nutrition guidelines are not being met (24). The more favorable situation with iron may be in part attributable to wheat flour fortification programs that have existed for >50 y. However, periodic national surveys of different age and population groups are needed to assess the biochemical indicators of critical nutrients.

Among the limitations of this study are the lack of information at the household level as well as only partial information about certain nutrients. In addition, the information is not sufficiently disaggregated, preventing the identification of those geographical areas where characteristics such as high prevalence of overweight are worse. For Chile and other countries, a breakdown by ethnic group, level of poverty, and other characteristics is essential, but unfortunately, the national data do not permit such disaggregation. Recently, the ENCA was carried out to assess intake and nutritional status, but only partial results have been released. An additional obstacle to comparing the nutritional situation of adults and elderly adults is that the studies use different cutoffs to classify excess weight for these 2 groups. A higher cutoff is used for elderly adults to take into account the loss of height that has occurred with age.

As for the strengths of this study, it should be noted that the information presented represents the country as a whole and is supported by long-term application of information collection standards by trained health professionals.

Chile’s rapid transition should serve as an alert with regard to the need to formulate policies to protect vulnerable groups and focus in an ongoing manner on at-risk groups. The experience with eradicating undernutrition should now be directed toward preventing overweight.

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