

Nutrition policy in the Chilean transition

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Abstract

Objective: This paper examines socioeconomic, demographic, epidemiological and nutrition changes that have occurred in Chile in the last decades using concepts of epidemiological and nutrition transition, and discusses policies related to nutrition.

Design and setting: This is a descriptive, population-based study to analyse changes in the Chilean diet and nutrition situation including some of the main demographic, socioeconomic and epidemiological variables. Data came from the FAO, the National Institute of Statistics, the Ministry of Health and national surveys.

Results and policy implications: In Chile, the epidemiological and nutrition situation shifted from a pretransition stage with high rates of undernutrition to a post-transition stage with increasing rates of obesity in all groups aged less than 20 years. However, changes were not accompanied by modifications in nutrition policy, which had been successful in reducing undernutrition. Despite changes in diet to a 'western' diet and in nutritional status of the population from undernutrition to obesity, food and nutrition programmes have been maintained unaltered. Governmental and university organizations were created in 1994 and 1995 to address the current food and nutrition problems. The accomplishments of these institutions have been the elaboration of dietary guidelines, reformulating the food and nutrition programmes and the promulgation of the Food Sanitary Regulations for Chile.

Conclusions: Education for the prevention of nutrition excess problems should be a main food and nutrition policy in developing countries.

Keywords
Nutrition transition
Nutrition policy
Obesity

Rapid changes have occurred in Latin American countries in the last decades. Demographic transition as well as socioeconomic changes have been extremely important in most of the countries, in particular Chile. In the 1960s, its biomedical indicators were average amongst Latin American countries, with high infant and maternal mortality rates, high prevalence of infectious diseases and undernutrition. In the 1990s, the Chilean situation shifted to a completely different scenario, particularly in relation to biomedical indicators. Public investments since the 1930s in health and nutrition, as well as basic education and potable water and sanitation, have had a significant impact in reducing the incidence of communicable diseases and malnutrition, playing a decisive role in overall health improvements.

The most relevant changes in health conditions in the last decades are the predominance of chronic diseases and injuries, that have increased from 53.7% of all deaths in 1970 to 75.1% in 1995 – with cardiovascular diseases as the main cause of death and one of the main causes of morbidity among adults. Simultaneously, the prevalence of cardiovascular risk factors (lack of exercise, inadequate diet, hyperlipidaemias, smoking and excessive alcohol ingestion) is high and increasing. Malignant tumours are also increasing as a percentage

of causes of death, following the increasing risk factors for cancer¹. A reversal of the nutrition situation, with an important decrease in undernutrition and increase in obesity, have also occurred in the 1990s.

The epidemiological transition describes the shift from a pattern of high prevalence of infectious diseases and malnutrition to a pattern of high prevalence of chronic and degenerative diseases strongly associated with lifestyle². A later pattern of delayed degenerative diseases has been more recently formulated with a progression in life expectancy and a major shift to mortality patterns related to chronic and degenerative diseases³.

Demographic and epidemiological transitions are the framework for the nutrition transition, which is based on changes in human diet and nutritional status of the population. Clearly, the patterns of dietary change over time and space that constitute the nutrition transition have occurred concurrently with demographic, socioeconomic and epidemiological change⁴.

This paper examines socioeconomic, demographic, epidemiological and nutrition changes that have occurred in Chile in the last decades using concepts of epidemiological and nutrition transition, and discusses policies related to nutrition.

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Design and setting

This is a descriptive, population-based study to analyse changes in diet and the nutrition situation over the last 25 years in Chile, including some of the main demographic, socioeconomic and epidemiological variables.

Sources of data

Secondary data were collected from official information sources and specific studies carried out in the country. For demographic, socioeconomic and epidemiological data, annual demographic reports of the National Institute of Statistics⁵ and population data projections from the same institute were used. Information from the Ministry of Health⁶, the Food and Agriculture Organization⁷, the Planning Office at the Ministry of Agriculture and the Central Bank in Chile⁸ and different local studies were also utilized.

Variables

Demographic and socioeconomic changes were analysed with the following variables: population growth rate, total fertility rate (TFR), general mortality rate, infant mortality rate (IMR), life expectancy at birth and age structure of the population. Socioeconomic data variables were urban and rural distribution, gross domestic product (GDP) per capita, water and sanitation, literacy and income distribution.

The nutritional status of children under 6 years old, pregnant mothers and adults were analysed with the Sempe reference⁹ and the National Center for Health Statistics (NCHS) reference¹⁰ and the Chilean reference for pregnant mothers¹¹. Obesity was based on the NCHS 85th percentile in 20–29-year-olds from the 1976–80 survey¹² using a BMI cut-off point of 27.3 kg m^{-2} for women and 27.8 kg m^{-2} for men¹².

Dietary data was analysed from the pattern of food consumption in kilograms per person per year; in food availability at the household level in average calories per person per day; the median of nutrients per day; and in percentage of calories from each nutrient (proteins, fat and carbohydrates).

Description and setting

Chile is located in the southwestern part of South America, bordering the Pacific Ocean with more than 4000 km of coastline and a mainland area of 756.626 km^2 . Its territory is a ribbon of land lying between the Andes and the Pacific, 4329 km long and, on average, no more than 180 km wide. Of this width, the Andes and a coastal range of highland take up from a third to a half. Chile is a republic with an elected centralized government located in the capital, Santiago, and a political administrative structure that divides the country into 13 regions, 51 provinces and 336 districts⁶.

The country has experienced a progressive urbanization process since the 1930s, with a high percentage of urban population (75.1%) in 1970 which increased to 85.8% of the population living in urban areas in 1995, concentrated mainly in the metropolitan region (39.8%). In education, the total students registered in 1995 in the different educational levels numbered 3 399 086. The schooling rate is 70%, reaching 95% in basic education and 80% in secondary education. The literacy rate is 94.5%. According to the Human Development Index, Chile is an intermediate developed country, having a leading position in the Latin American countries. United Nations information shows that the country overcame the 38th place in 1994 to the 33rd place in 1995, from a total of 174 nations⁶.

Chile has had continuous economic growth in the last 12 years with GDP growth at an average rate of 6.4% per annum during the 1990s, and having a positive increase in the GDP per capita income from US\$3000 in 1990 to US\$4550 in 1995. However, income distribution is skewed: the share in total income is 57.8% for the highest 20% of the population, and only 5.4% for the lowest 20% of the population¹³.

The total population of Chile for 1995 was estimated to be 14 210 429 inhabitants of whom 50.6% are male. The population growth has remained stable in the last 10 years, fluctuating around 1.7% annually. The TFR has been maintained at low rates (TFR=2.6) and the general mortality rate has decreased, in particular the IMR. The life expectancy at birth has been prolonged by 9 years from 1970–75 to 1990–95. As a consequence, the population structure by groups of age and the proportion of deaths by groups of age has changed drastically. In the period 1970–95, the proportion of the population in the age group 0–14 years has decreased by 25% and in the group aged over 64 years has increased by 32% (Table 1). In the year 2000 the proportion of the population aged over 65 years will be 7%. On the other hand, the proportion of deaths in the group of 0–14 year olds has decreased by 75.5% and the proportion of deaths in the group aged over 64 years has increased by 73.4%⁵.

IMR declined in Chile from 82.2 per 1000 in 1970 to 11.1 in 1995 (–86.5%). This decrease has been double that seen in the same period of time for all Latin American and Caribbean countries (–46.3%).

In the pattern of mortality for all ages, between 1970 and 1995 infectious and parasitic diseases have decreased from 10.9% of all deaths to 2.7%. Cardiovascular disease, now the leading cause of death, accounted for 26.8% of all deaths in 1995 up from 22.3% in 1970. Malignant tumours, now the second leading cause of death, have increased from 12.0% to 20.9% of all deaths in the same period⁵ (Table 1). The most important increase is in gall bladder cancer, which has increased more than 115% in the last 20 years, as

Table 1 Chile: main demographic and health changes from 1970 to 1995⁵

	1970	1995	% change 1970–95
% population aged 0–14 years	39.2	29.4	–25
% population aged 65+ years	5.0	6.6	+32
General mortality rate	8.7	5.5	–36.8
Infant mortality rate	82.2	11.1	–86.5
Maternal mortality rate	1.72	0.25	–85.5
% deaths from cardiovascular diseases (390–459)* (A80–88)†	22.3	26.8	+20.2
% deaths from malignant tumours (140–208)* (A45–59)†	12.0	20.9	+74.2
% deaths from infectious and parasitic diseases (1–139)* (A80–88)†	10.9	2.7	–75.2

* PAHO/WHO International Classification of Diseases, 9th revision, 1975.

† PAHO/WHO International Statistical Classification of Diseases and Related Health Problems, 10th revision, 1995.

described in a previous paper¹. Breast cancer has also increased, following the trend of the increasing risk factors, such as oestrogen replacement, fewer children, first children at older ages, decrease of breast-feeding, and increase in alcohol and fat consumption and obesity in women. Regarding age-related cancers, such as prostate cancer, their increase is probably not only due to an increase in the risk factors (high fat consumption and smoking habits) but also because of the increase in life expectancy in Chile. The increase in cancer of respiratory organs may be explained by high rates of smoking in the population. In addition, the study of mortality differentials across the country shows a great and consistent excess mortality from cancer of respiratory organs in the Second Region; the most likely explanation is arsenic environmental contamination, present in high levels of drinking water in Antofagasta, the largest city in that region¹⁴.

Today, the most prevalent illnesses are chronic diseases conditioned by a series of risk factors, with food and nutrition among the most important.

Results

Dietary changes

Dietary factors are associated with the main causes of death in Chile – cardiovascular diseases and cancer. Although problems of economic accessibility to food can be found in some subgroups of the population¹⁵, in the last 10 years most of the low income population have not faced dietary deficit. Moreover, the Chilean economic improvement has also resulted in the poor beginning to face the problems of dietary excess.

The pattern of food consumption has changed to a new pattern closer to the ‘western’ diet¹⁶, rich in saturated fats. Saturated and polyunsaturated fat consumption has increased in the country¹⁷. In 1975, fat consumption was 13.9 kg person^{–1} year^{–1}, and in 1995 it increased to 16.7 kg person^{–1} year^{–1}. Regarding sugar consumption, there was also an increase from 30.2 to 39.2 kg person^{–1} year^{–1} in the same period of time⁷. National food supply data⁸ has shown an important increase in meat (mainly chicken) and dairy product consumption, and a stabilization or decrease in cereal and legume consumption (Table 2). Other studies done in Santiago in different groups of population demonstrate the same tendency. A study of seven poor subgroups of the population in the periurban metropolitan area of Santiago in the last decade¹⁸, which assessed food availability at the household level using a measure of weekly expenditure on food, has shown an important increase in the overall calorie intake (Table 3).

A survey to assess food intake was carried out on a non-randomly selected group of 859 adults (410 men) 20–55 years old who attended 120 public health centres in the metropolitan area of Santiago. Food intake was assessed using a 1-day (24-hour) dietary recall administered on 31 October 1995, by well-trained standardized nutritionists. Results demonstrated that the median of energy consumption for men was 2324 calories day^{–1} and for women 1668 calories day^{–1}, with an important variability. There was a very low

Table 2 Pattern of food consumption in Chile, 1980–95⁸

Food	1980 (kg person ^{–1} year ^{–1})	1995 (kg person ^{–1} year ^{–1})	% variation
Total meats	32.6	56.9	+74.5
Beef	15	21.6	+43.3
Lamb	1.1	0.6	–45.5
Pork	5.0	12.0	+140.0
Poultry	10.3	20.0	+94.2
Fish	4.9	4.8	–2.0
Sausage	3.5	9.9	+182.8
Eggs (units)	116	135	+19.6
Bread	97	91	–6.1
Potatoes	50–54	50–54	0
Milk (l person ^{–1} year ^{–1})	115	140	+21.7
Beans	4.5	2.0	–55.5

Table 3 Changes in food availability at the household level in six poor communities in Santiago, Chile in 1986, 1991 and 1993¹⁸

Community	1986 (cal person ⁻¹ day ⁻¹)	1991 (cal person ⁻¹ day ⁻¹)	1993 (cal person ⁻¹ day ⁻¹)	% change (1986–93)
JM Caro-F	1766	2213	3142	+77.9
JM Caro-E	1647	2242		+36.1*
Lo Sierra	1673	2174	2730	+63.2
Lo Hermida	1790	2103	2412	+34.7
Santo Tomas		2132	2610	+22.4†
Las Turbinas		2064	2724	+32.0†

*% change 1986–91.

†% change 1991–93.

Table 4 Median of macronutrients and percentage calories per day by sex, in Santiago, Chile in 1995¹⁹

Daily consumption	Men		Women	
	Median per day	% calories	Median per day	% calories
Proteins (g)	84	14.4	58	13.9
Fat (g)	70	27.1	53	28.6
Carbohydrates (g)	340	58.5	240	57.5
Energy (cal)	2324	100.0	1668	100.0

consumption of fish and legumes, low consumption of fruits, milk and cereals and a relatively high consumption of fats and oils, bread, vegetables, sugar and meat. Fat calorie percentage consumption was over the highest recommended limit of 25%¹⁹ (Table 4).

Although the current level of per cent energy from fat is low compared with developed countries²⁰, the relatively rapid rise in fat intake over such a short period of time is a potential hazard for the health of the population. In 1984, obese poor people had different characteristics to wealthy obese groups. In the poor, cholesterol levels were normal but in the rich were high²¹. At that point of time, 43.9% of the poor obese women presented hyperglycaemia with a high calorie intake from carbohydrate²². High fat intake is an important component of obesity, but high calorie intake from other sources and low energy expenditure may also be important as causes of obesity in women of low socioeconomic level. This is a hypothesis that is currently being investigated through measuring energy expenditure by the doubly labelled water method. In the last decade there has been an increase in fat consumption in the poor as a consequence of a relatively better income and the rapid change in food habits to a western style.

A survey to assess 58 food items related to natural antioxidants was conducted in 1594 adults in Santiago, with a food frequency questionnaire. Results showed a low intake of 41 of the food items with high levels of carotene, retinol, vitamin C and vitamin E. Based on National Research Council (USA) recommendations, approximately 10% of the subjects had a low intake of vitamins A, C and E. This figure is important considering the effect of antioxidants in the diet in preventing chronic diseases²³. In general, a significant part of the adult population had inadequate patterns of food intake.

Nutrition situation

The nutrition situation in Chile has changed rapidly. From a high prevalence of undernutrition (15.5% in 1975) – measured with a nutritional surveillance system in 1.2 million preschool-age children attending public health centres, with the weight/age indicator, Sempe reference⁹ and a cut-off point of –1 SD – an important decrease was produced in 20 years²⁴, reaching very low levels of undernutrition (5.0%). The prevalence of low birth weight has also decreased, from 11% to 4.9% in the period 1975–95⁶.

The same situation has been observed in pregnant women, with a decrease in undernourished mothers and an increase in overweight and obese mothers²⁵ measured with the same reference since 1987¹¹ (Table 5).

Obesity, measured with the weight-for-height indicator, NCHS reference¹⁰ and a cut-off point of +2 SD has also been increasing in preschool and school-age children²⁵ (Table 6).

In a 1988 survey on risk factors for chronic diseases carried out in a representative sample of the metropolitan area of Santiago²⁶, 20% of men and 30% of women were obese using a BMI cut-off point of

Table 5 Changes in measures of nutritional status in pregnant women, Chile 1987–95²⁵

Nutritional status*	1987 (%)	1995 (%)	% change
Underweight	25.7	16.6	–35
Normal	42.6	34.5	–19
Overweight	18.8	21.9	+16
Obese	12.9	27.0	+109

*Measured with the Rosso-Mardones-S reference, Ministry of Health, Chile¹¹.

Table 6 Prevalence of obesity in children under 5 years old, Chile 1985–95²⁵

Age group (months)	Obesity*		% change
	1985	1995	
0–11	3.8	8.2	+104
12–23	3.8	6.6	+74
24–72	5.0	7.1	+42
Total	4.6	7.2	+56

* Defined as % weight/height >2 SD, NCHS reference¹⁰.

27.3 kg m⁻² for women and 27.8 kg m⁻² for men¹². Obesity increased with age and in women was worst in low socioeconomic groups, reaching a level of 29.3% obesity. Four years later, the same study in a representative sample of Santiago, with the same methodology, demonstrated an increase of obesity in men to 20.5% and in women to 39.9%. The most impressive rise was observed in women of low socioeconomic status with an increase to 49.7%²⁷.

The same situation has been observed in Brazil, where the proportion of obese Brazilians has increased in the lower income groups, measured in two large nationally representative cross-sectional anthropometric surveys in 1974–75 and 1989²⁸. Poverty and low levels of education emerge repeatedly as the most powerful variable explaining why disease and death are particularly high for the poor²⁹.

Cholesterol

Cholesterol patterns have also been changing. In populations, diet is one of the main factors of high total cholesterol. Total energy intake, type and amount of fats, protein, carbohydrates and cholesterol can modify serum cholesterol levels. In Chile, population studies carried out in Concepción³⁰ on 2102 urban children of both sexes, aged 5–18 years, demonstrated an average value of total cholesterol of 160 ± 23 mg dl⁻¹ in healthy children without a significant difference in both sexes. The percentage of total cholesterol over 200 mg dl⁻¹ was 9% in boys and 12% in girls, and low-density lipoprotein cholesterol was over 130 mg dl⁻¹ in 10% of males and 11% of females. Studies done in young adults (mean 24 years) of high socioeconomic level have shown high serum total cholesterol levels (220 ± 42 mg dl⁻¹)³¹. In the survey on risk factors for chronic diseases carried out in a representative sample of adults in the metropolitan area of Santiago³² an increase of mean values for total cholesterol in both men and women was found in the period 1988–92 with marked differences between lipid profiles in different socioeconomic levels, with a significantly higher total cholesterol in the wealthy. The same finding had been demonstrated previously in a non-representative sample of obese women of low and high socioeconomic level²¹.

In general, high cholesterol levels are related to the 'western' diet and an increase in intake of animal products and fat. This has occurred in Chile over the last 10 years, as well as in China, where there have been large increases in the dietary intake of edible oils, sugar, eggs, and dairy and meat products, with people consuming more than 25% of their energy from fat. As in Chile, high-fat diets are more frequent in the higher income urban sample⁴.

Discussion

In Chile, a rapid nutrition transition has occurred in less than 20 years. Nowadays, cardiovascular diseases are the main cause of death and they contribute a higher percentage to the global burden of disease⁶. This is in agreement with the first two causes of death in the world, described by Murray and Lopez: ischaemic heart disease and cerebrovascular disease³³. Obesity and hyperlipidaemias are important risk factors for most cardiovascular diseases and are related to a pattern of diet rich in saturated fats, sugar and refined foods – the 'western' diet. The increase in salt and sugar intake is associated with modern food production, food storage, processing and marketing. Total fat consumption increases and the balance between saturated and unsaturated fat is altered, while the intake of antioxidants is decreased.

In many low income countries that are still developing policies to address nutritional problems related to deficiencies, concerns related to excess have begun to appear. Such a situation is rapidly developing in China³⁴, and was the situation in Chile in the 1980s. Undernutrition was an important problem in Chile in the 1960s and 1970s, when a National Council for Food and Nutrition (CONPAN) was created. This implemented well-targeted and integrated nutrition programmes: a basic National Complementary Food Program (PNAC) was set up for all pregnant and lactating women who were attending pre- and postnatal care and for all children under 6 who attended health check-ups in the National Health System. All mothers and children who were at risk or undernourished were checked more frequently and received more food and those children who were moderately or severely malnourished were hospitalized in special recovery centres (CONIN). As well as this, two large food programmes operated in the educational sector: the Day Care Food Program (JUNJI) for preschool children and the Food School Program (PAE) for school children aged between 6 and 14 years of age. As a result of this policy, with high coverage of the population (80% of mothers and children with the PNAC; 62 000 preschool children with the JUNJI; and 600 000 school-age children with the PAE) and a high cost for the country (US\$200 million year⁻¹), malnutrition decreased²⁴.

In the middle of the 1980s, undernutrition was still a problem coexisting with overnutrition, in particular in women of low socioeconomic status. Thus, it was possible to observe undernourished children whose mothers were obese^{22,35}. This transition situation changed rapidly to a new situation in the 1990s – where diets commonly contain more fat, especially from animal products, sugar and processed foods, and less fibre – and a predominance of overnutrition problems have been observed.

In the 1990s, even when malnutrition disappeared as a public health and nutrition problem, and obesity continued to increase, the original programmes were still in place delivering huge amounts of food to beneficiaries who were not malnourished. The new nutrition problems, not being addressed, were related to being overweight and obese as a disease as well as a risk factor for the most prevalent causes of mortality and morbidity in the country: cardiovascular diseases and cancer.

Policy implications

Taking into account the successful food and nutrition policy experience related to malnutrition in the 1970s through CONPAN, the nutrition, scientific and technical communities (which had been surveying food and nutrition policies²⁴) created the Food and Nutrition Forum in 1994. The purpose of the Forum was to propose new food and nutrition policies to the authorities, and to disseminate nutrition information to the population. As a consequence of the Forum, the Ministry of Health created the Food and Nutrition National Commission (CONAN) in January 1995 to elaborate the National Plan of Food and Nutrition and to follow up the agreements of the government with the 1993 International Conference on Nutrition. The Commission and the Forum have been working with four task groups: food security for the poor, food and nutrition programmes, promotion of healthy lifestyles, and food quality control¹⁵. The main accomplishments of these task groups have been the elaboration of dietary guidelines for the Chilean population³⁶, reformulation of the food and nutrition programmes according to new dietary guidelines, and the promulgation of the Food Sanitary Regulations for the country according to the International Food CODEX, including food labelling.

In general, the main purpose of the Forum and CONAN is to update the food and nutrition programmes in line with the current epidemiological and nutrition situation of the country.

Conclusions

Development brings about a change not only in the constituents of nutrition, but also in the culture of

eating. Processed foods are marketed with compelling messages to eat. The public is bombarded by advertising that encourages consumption. In Latin American countries, with a rapid urbanization process, the influence of international fast-food restaurants in the dietary habits of the urban population has increased dramatically in very short periods of time, changing long established food habits. The same phenomenon has occurred in East Europe, Asia and the rest of the world.

Considering the high speed of socioeconomic change and its consequences on health, an ongoing analysis of the epidemiological and nutrition situation is crucial to enable food and nutrition policies in Latin American countries to adapt to new food and nutrition patterns. With increasing food supplies in most regions of the world, and the importance of chronic diseases as causes of mortality and morbidity, overnutrition should be considered as an important problem. Obesity and hyperlipidaemias are important risk factors for most chronic diseases, and are related to diet. Quantitative increases in food supply should go with a qualitative improvement of the food and with nutrition education for the population. Prevention of nutrition excess problems should be one of the main food and nutrition policies in developed and developing countries.

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