



## LATIN AMERICA:

### AVOIDING THE NUTRITION TRANSITION “TRAP”

#### 10<sup>TH</sup> DR ABRAHAM HORWITZ LECTURE

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#### *Introduction*

Chile, my country of birth, is a developing nation where obesity and nutrition-related chronic diseases are the most significant public-health problems, while undernutrition is considered a problem of the past. Guatemala, whose rural population I studied while pursuing my doctorate, is also a developing country. However, its indicators reflect that stunting, low birthweight and micronutrient deficiencies are still major problems for most of the population, yet, obesity and diabetes are increasingly a public health concern among the adult population. I spent the summer of 2003 working in México's “*Oportunidades*” (Opportunities) programme; this country experiences a nutritional situation between that of Chile and Guatemala. México has moved rapidly to an advanced stage of nutrition transition, yet there are remaining regions in which nutritional deficiencies are prevalent. Latin America is my region; a region of cultural diversity and social disparities. It is a region where the nutrition transition evolves at different rates and which faces the challenge of the double burden of diseases. Its two agendas appear to be in contradiction with each other: a traditional agenda associated with nutritional deficiencies, and a new one, associated with obesity and nutrition-related chronic diseases. Is it possible for the region to decrease malnutrition due to deficit without increasing malnutrition due to excess? Is it possible to adapt nutritional policies and programmes to prevent chronic diseases? Is a common agenda achievable? Is it too late to avoid the nutrition transition “trap” in Latin America?

The following are what I consider to be some answers to these questions, from the perspective of someone involved in programme evaluation and applied research in nutrition in order to inform public health policy-makers. Let us begin by reviewing the conceptual framework necessary to assess the nutrition transition in developing countries using, as an example, the data provided by a supplementation trial in rural Guatemala between 1969 and 1977. The nutritional situation in Latin America will be discussed and approaches developed there to respond to nutritional deficiencies and nutrition-related chronic diseases. Specifically, data from a Chilean national programme providing childcare and supplementary food to low-income children (< 6 y) will be used to illustrate the changing role of nutrition-assistance programmes in developing countries. We will conclude with general recommendations on how to tackle malnutrition in all its forms with a unified agenda from the perspective of Latin America.

#### *Nutrition transition in developing countries*

“Nutrition transition” refers to changes in body composition patterns, diet and physical activity brought on by complex interactions among economic, demographic and environmental factors (Popkin 1994). In the case of developing countries, nutrition transition is primarily identifiable by a shift from a situation in which energy-poor plant food based diets, intense physical activity and undernutrition are prevalent, to one in which high consumption of energy-dense processed foods and animal products, sedentarism and high rates of obesity and nutrition-related chronic diseases are the norm (Figure 1). The driving forces of these changes are multiple and include urbanization, economic development, educational and healthcare improvements, market globalization and technological advancements, among others.

There are three main features of nutrition transition in developing countries. The first is that these changes are taking place at an unusually rapid speed (Popkin 2002). The second is that health problems associated with undernutrition (ie, infectious diseases, micronutrient deficiencies) and overweight (ie, cardiovascular diseases, cancers) coexist within the same population. This has been denominated the “double burden of disease” (WHO 2003). The extent to which undernutrition is being replaced by, or compounded with, overnutrition depends, in most cases, on a country's level of economic development. In several developing countries, stunting and overweight have been reported to coexist not only at community level but also within the same household, adding an extra layer of complexity to the nutritional situation of these countries (Doak et al. 2005). The third main characteristic is that it

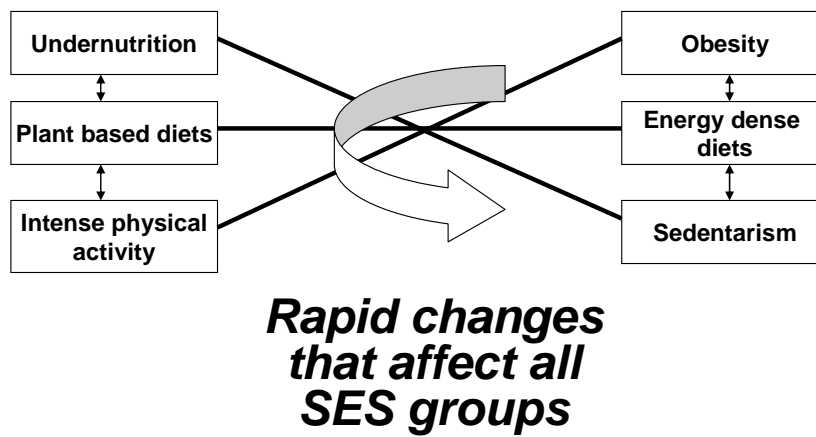


Figure 1 Main characteristics of the nutrition transition in developing countries

affects people from all socio-economic groups. The nutrition transition is characterized by initially affecting mainly the higher socio-economic (SES) groups, but as the nutrition transition progresses, there is a shift to the lower SES groups which constitute the vast majority of the population (Monteiro et al. 2004). In fact, the nutrition transition becomes an important risk factor for increasing the inequalities in health already observed in developing countries. Low-income people are more vulnerable to infections and undernutrition during childhood; as they grow older, however, they are now exposed to the obesogenic environment linked to poverty (ie, high cost of fruits and vegetables, lack of access to recreational facilities, etc.). Even more, it has been suggested that foetal and infant malnutrition could magnify the detrimental consequences of the nutrition transition as manifested by high relative risk of diabetes and central obesity in the adult population. This theory has been denominated the developmental origins hypothesis.

The developmental origins of adult-health hypothesis states that exposure to undernutrition during critical periods of early life predisposes individuals to chronic diseases in later life (ie, diabetes and cardiovascular disease) by increasing their susceptibility to chronic disease risk factors (Barker 1998). This hypothesis is particularly relevant for low SES people in developing countries because the speed of the nutrition transition increases the likelihood of a mismatch between early nutritional deprivation and later nutritional affluences. Although evidence to support this theory in developing countries remains scarce and not fully consistent, it is now well accepted that nutritional experiences during critical periods of life can have permanent effects on one's later responses to the environment. This highlights the need for a life-course approach to health, especially in developing countries experiencing rapid nutritional changes.

#### ***Early stages of the nutrition transition in Latin America: the Institute of Central America and Panama (INCAP) supplementation trial example.***

The supplementation trial conducted by INCAP in collaboration with US universities, has provided valuable information on the dynamics of the nutrition transition in Latin America, and the possible impact of early undernutrition on the later development of chronic diseases. As part of that trial, women and men born between 1962 -1977 in four villages in rural Guatemala were studied, and have been followed to the present, including a recent follow-up in 2002-2004 (Martorell et al. 2005).

The pattern of growth of this cohort exemplifies the changes associated with early stages of the nutrition transition. At birth, the subjects studied were lighter, shorter, and thinner than the corresponding US population, and during childhood, the prevalence of stunting was high (63.2% at year 3) while overweight was almost nonexistent. As these children reached adulthood, overweight became more common with increasing age, acquiring levels close to those seen in developed countries (Corvalán, Stein et al. 2005). Obesity rates disaggregated by sex, showed that the prevalence was more than twice as high in women as in men, suggesting that women have a higher susceptibility to the changes associated with the nutrition transition. Analysis stratifying obesity prevalence by years of schooling, showed that prevalence of overweight was close to 50% without differences by schooling, providing evidence to support the idea that, as the nutrition transition moves into further stages, all social classes are affected (Ramírez-Zea, Gregory et al. 2005). Finally, the unusual rapidity of these changes was illustrated by the prevalence of overweight more than doubling in both sexes in only 5 years (1997-8 and 2002-04) (Ramírez-Zea, Stein et al. 2005).

The design of the INCAP supplementation trial also allowed for the assessment of the impact of early



life factors on the later development of chronic diseases. Fatness and particularly abdominal fatness have been associated with higher risk of nutrition-related chronic diseases, therefore it was studied how increasing body mass index ( $BMI = \text{weight (kg)} / \text{height}^2 \text{ (m)}$ ) during early life can impact adult body fat distribution. It was found that gaining BMI during the first three years of life had a minor impact in the development of central obesity in adulthood whereas gaining BMI between 3-7 years had a major impact (Corvalán, Gregory et al. 2005). It has been proposed that the first two years of life would be critical for preventing undernutrition and therefore, represent a “window of opportunity” (World Bank 2006). Our results suggest that nutrition-assistance programmes implemented in these age groups appear not to present considerable increase in the risk of nutrition-related chronic diseases. On the other hand, it is known that programmes targeted to pre- and school-age children are less effective in the prevention of undernutrition and stunting. Our results indicate that gaining BMI during this period would be also critical for the later development of central obesity.

### ***How is Latin America responding to the nutrition transition?***

A similar situation to that described in the cohort of the INCAP supplementation trial can be seen in much of the rest of Latin America. Over the past 20 years, the prevalence of underweight and stunting has declined in this region; low birthweight (<2500g) and underweight (weight-for-age <-2SD) are below 10% in almost all countries of the region and at present, stunting (height-for-age <-2SD) corresponds to the most important pending issue in terms of nutritional deficiencies (<http://latinut.net>).

Nutritional assistance programmes have played an important role in achieving these rates. A good example of the positive results obtained from well-targeted and well-designed nutrition programmes is provided by Mexican’s “*Oportunidades*”. This is an incentive-based development programme with a nutritional intervention. Evaluations have shown that the intervention has been associated with improved linear growth among low-income infants, among other benefits (Rivera 2004). Mandatory micronutrient fortification is the most common intervention for preventing micronutrient deficiencies in Latin America. At present, all countries have national programmes for ensuring universal salt fortification with iodine and universal wheat flour fortification (and maize flour in Guatemala, México, and Venezuela) with iron, folic acid and other B-vitamins depending on the country. All countries in Latin America have at least one program oriented toward vulnerable age and sex groups: young children, pregnant and lactating women. Most of these activities correspond to food distribution programmes and a few of them also consider cash transfers. Almost all these programmes are targeted based on socio-economic criteria and thus, nutrition-assistance programmes in Latin America are seen as significant components of the social welfare system (<http://latinut.net>).

At the same time, the prevalence of obesity has risen steadily in the region. In most of the countries, overweight exceeds wasting among preschool children, indicating that stunted children, rather than being under or normal weight, are overweight (de Onis, et al.2000). Nutrition-related chronic diseases have increased in their relative importance as causes of morbidity. In particular, diabetes will become a major problem for Latin America. It is estimated that between 1995 and 2025, the number of diabetes cases in the region will have increased from 15 million to 39 million; also in 2025, Mexico and Brazil will be among the ten countries with the highest prevalence of diabetes (King et al.1998). At present, cardiovascular diseases are the leading cause of death in the region and, overall, their relative contribution to total mortality is twice that of communicable diseases (<http://latinut.net>).

Despite this clear trend, nutrition-assistance programmes in Latin America are still oriented towards decreasing nutritional deficiencies. In a recent survey conducted among eight Latin American countries (Colombia, Costa Rica, Cuba, Chile, Guatemala, México, Perú and Venezuela), it was found that none of these countries reported having a programme for the prevention of nutrition-related chronic diseases (<http://latinut.net>). Although within countries there may be some local initiatives to prevent such diseases, coordinated interventions at the national level are at present, almost nonexistent. Thus, to respond to the question “What is Latin America doing to respond to the nutrition transition?,” the answer would unfortunately be, “nothing or next to nothing.” This inaction is worrisome not only because it presages an unmanageable burden of chronic diseases, but also because it has been suggested that programmes, which in the past were successful in decreasing nutritional deficiencies, may unintentionally contribute to the increasing obesity rates if they are not adequately adapted (Uauy and Kain 2002).

It is important to note, however, that this does not imply that all nutrition-assistance programmes should be abandoned as a country moves into further stages of the nutrition transition. Increasing food security need not imply increasing obesity. In fact, if we take a different perspective, nutrition-assistance programs can become a central and promising way to respond to the challenges associated

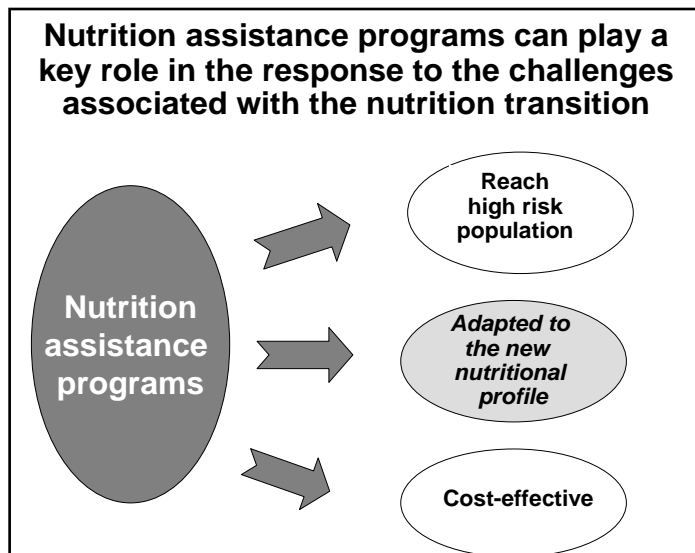


Figure 2

with the nutrition transition if the energy and micronutrient content of the food is carefully determined and physical activity and healthy behaviours are encouraged. Nutrition-assistance programmes reach an important part of the population, especially those who are, or will be, at higher risk in developing chronic diseases. They also represent a more cost-effective alternative than starting from zero because they already have material and human resources that ensure their functioning (Figure 2). In the following section we will present the case of a national welfare programme in Chile, a country experiencing advanced stages of the nutrition transition, in order to demonstrate the changing roles and opportunities of nutrition assistance.

#### ***Changing the role of nutrition-assistance programmes in developing countries: the Chilean National Nursery School Council Programme (JUNJI)***

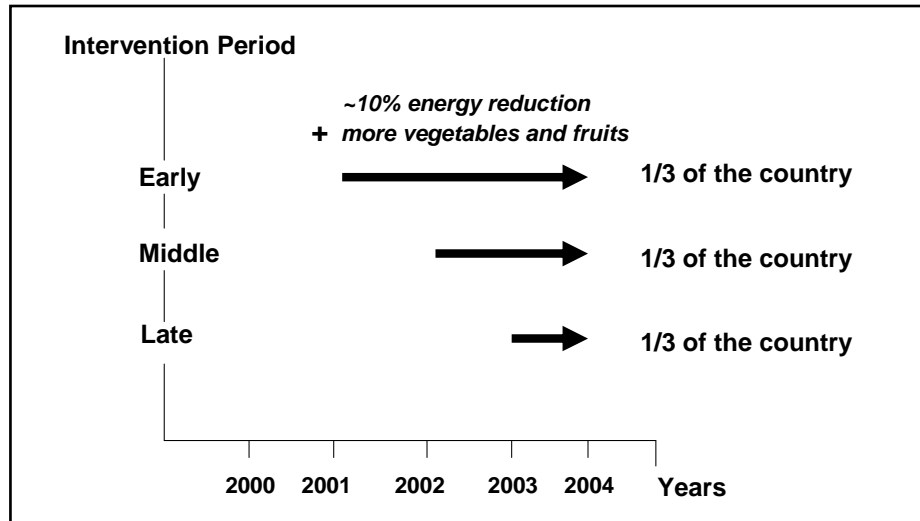
The JUNJI is a national programme whose main objective is “to give free education (including supplementary food and social care) to children between three months and five years of age, in nursery schools and non-conventional programs of preschool education”. It targets children of low-income families, households with a single mother, and families whose mothers work outside the home; actual coverage is around 75% of those in need. In 2004, approximately 125,000 children from all regions of the country were registered in the programme, and this number is expected to increase in future due to preschool education being designated as a government priority. Almost 90% of the beneficiaries are children 2 to 5 years old with the remaining being infants under 2 years. JUNJI provides various educational programmes in order to reach families with different needs (i.e. families from rural or isolated regions, seasonal workers, etc.). The “Classical Nursery School” is the largest educational programme, and as part of it, children attend the nursery school 11 months per year, 5 days per week, all day (8:30am to 4:30pm), and receive breakfast, lunch and an afternoon snack. Until 2001, the daily food offered provided 800 kcal per day for children under 12 months; 900 kcal for children age 12 to 24 months; 900 kcal for children age 2 to 3 years and 1000 kcal for age 3 to 5 years, covering 75% of the daily caloric needs. An additional 100 kcal/day were provided to cases with “nutritional deficit” (weight-for-height < -2SD).

This programme has most likely contributed to the notable decline in underweight and stunting observed in the Chilean preschool population during the past decade, but may also be contributing to the increased obesity rates (Uauy, Corvalán et al. 2005). Between 1996 and 2000, the prevalence of obesity among JUNJI beneficiaries increased from 8.6% to 12.1%. This increase was similar across sex, age groups and community poverty level, with girls and older children consistently more obese. Overall, prevalence of obesity among JUNJI children was greater and increased more rapidly than the levels reported by the Chilean Ministry of Health for the same period, indicating that this is a population prone to overweight. Analysis comparing the prevalence of obesity in children of the same age but with different length of time of participation in the programme showed that obesity rates increased with a longer participation at the programme; the impact of programme participation, however, was weaker than the external impact, due to the fact that most children are already obese before starting the programme (Corvalán, Lera et al. 2006).

In 2001, because of the increasing prevalence of obesity observed in these children, JUNJI decided to reduce the caloric contribution to 700 kcal for those under 12 months; 800 kcal for those aged 12 to



Figure 3 Scheduling of the caloric reduction at the JUNJI programme



24 months; 800 kcal for those from age 2 to 3 years; and 900 kcal for those from age 3 to 5 years (a 10-12% reduction for all age groups), covering 60% of the daily caloric needs based on FAO/WHO 1985 recommendations (equivalent to 72%, of the latest FAO/WHO 2004 recommendations); in addition, more fruits and vegetables and semi-skimmed milk were introduced. Due to existing contracts with the providers of the meals, this change was not immediately implemented throughout the entire country; rather the new dietary programme was phased into the nursery schools, from 2001 to 2003, one third at a time as contracts were completed (Figure 3). This phasing-in, in conjunction with the availability of continued registries (at baseline, during the changes and after the changes) of weight and height for each preschool child enrolled at JUNJI, allows for the evaluation of the effectiveness of this dietary change. These data represent work in progress; however, preliminary unadjusted analysis reported by the programme shows a drop in obesity rates after the implementation of the energy reduction and improvement in food quality.

Making changes at the programme level and only in the dietary component, however, may not be enough. Higher impact may be attained by simultaneously addressing multiple aspects of the programme (ie, dietary intake, nutritional education, physical activity, etc.) and the environment of the JUNJI children. Information regarding home, programme and country environments will be collected in order to identify risk factors and potential barriers to change at the different levels. The final goal is to better understand the environment in which JUNJI functions, in order to provide more effective recommendations to adapt the programme to the new profile of its target population.

**General recommendations: preventing childhood malnutrition in Latin America**

Four concepts should be considered as central for preventing malnutrition in all its forms in Latin America (Box 1).

**ATTACKING THE PROBLEMS OF OBESITY AND NUTRITION-RELATED CHRONIC DISEASES SHOULD BE A PRIORITY FOR LATIN AMERICA**

It cannot be denied that undernutrition remains a significant problem in some countries of Central America and the Caribbean (ie, Guatemala, Honduras and Haiti) and in deprived sectors and regions of several countries in Latin America. Nonetheless, it is also undeniable that obesity and nutrition-related chronic diseases are increasingly the major health threat for the region, especially among the underprivileged. At present in Latin America, nutrition problems related to deficits and excesses are inter-related and should be seen as part of a single and more global problem of malnutrition rather than one of opposite extremes.

International agencies and academia should play a central role in delivering these key messages to the entire population. Policy-makers and the general public should acknowledge this new epidemiological and nutritional situation and not only support but encourage the implementation of actions to prevent the burden of nutrition-related chronic diseases. As a final outcome of all these efforts, governments and international agencies should adapt their focus of action with nutrition policies that will meet the new requirements of the population.

**ADAPT NUTRITION-ASSISTANCE PROGRAMMES TO THE NEW NUTRITIONAL PROFILE OF THE POPULATION**

As mentioned, adapting ongoing nutrition programmes and making use of available resources to re-



## Box 1 General recommendations for preventing childhood malnutrition in all its forms

### 1. Make obesity and nutrition related chronic diseases a priority for Latin America

- International agencies and academia should deliver key messages
- Policy makers and general public should acknowledge the new nutritional and epidemiological situation
- Governments and international agencies should adapt the focus of their actions

### 2. Adapt nutrition assistance programs to the new nutritional profile of the population

- Use anthropometric data to assess trends and nutritional status of target population
- Consider weight, height and age when targeting and monitoring nutritional interventions
- Ensure adequate micronutrient content of food provided rather than just energy-density
- Deliver interventions that are diverse, implemented at multiple levels and that take into account biological and social differences of the target population

### 3. Focus on long term health and overall nutrition

- Consider nutrition as central for alleviating poverty and improving health
- Focus on “malnutrition” in all its forms as an alternative to “under-nutrition” and “over-nutrition”; there are several common strategies
- Follow a life course approach
- Evaluate all nutrition interventions; use standards whenever possible

### 4. Build the capacity to respond to the challenge of the nutrition transition

- Collect information on national trends and define nutrition policies based on this information
- Generate local evidence to define and adapt programs
  - Academia should become an active actor of nutrition policy making
- Re-define human and material resources
  - Train the workforce to make them able to respond to the new situation
  - Facilitate partnerships with other sectors, industry, etc.
  - Build healthy and safe environments for living and working

spond to the challenges associated with the nutrition transition is promising because it permits reaching a significant number of people, and particularly those who are at higher risk of developing nutritional deficiencies and nutrition-related chronic diseases.

Most nutrition-assistance programmes collect anthropometric data from their beneficiaries in order to assess the impact of their interventions. The quality and consistency of this information should be assessed and, if possible, used to evaluate the trends and current nutritional status (eg, stunting, overweight, etc.) of its target population. This information should be used to define the priorities and objectives of the programmes.

Weight, height and age should be the central anthropometric components for targeting and monitoring nutritional interventions in children. In early stages of the nutrition transition, attention should be put on increasing weight in relation to height but not in excess of it. As countries advance into further stages of the transition, nutrition programmes should focus on decreasing stunting, particularly during the first three years of life.

In most regions of Latin America, access to food is no longer a concern, whereas food quality remains a major problem. Food distributed as part of nutrition-assistance programmes should be carefully selected in order to ensure the adequate nutrient content (ie, iron, zinc, vitamin A, etc.) rather than just being energy-dense. Delivering fortified food or even micronutrient supplements should be considered as primary options.

Strategies implemented as part of nutrition-assistance programmes should be diverse (ie, supplementary food, physical activity, education, etc.), should consider actions at multiple levels (ie, individual, family, community, etc.) and should take into account biological and social differences by age, sex, socio-economic status and ethnic background of the population.

#### FOCUS ON LONG TERM HEALTH AND OVERALL NUTRITION

Promoting good health rather than combating disease should be the main goal of nutrition-assistance programmes. “Myopic” interventions, only focused on decreasing a specific problem may have unin-



tended consequences in other aspects of health as has been suggested in the case of the JUNJI programme in Chile or in the case of accelerated size growth during childhood in Guatemala. The simultaneous coexistence of nutritional deficit and excess further complicates this scenario. What interventions can be recommended for a stunted child that will be at higher risk of developing obesity as an adult? Answers will be difficult to find if we think only in terms of either decreasing stunting or decreasing overweight. Conversely, solutions will become much clearer if nutrition is re-considered as central for alleviating poverty and ensuring health. From this perspective, interventions aimed at decreasing malnutrition, either due to deficit or excess, are part of the unique and major objective of decreasing inequalities and ensuring better health to the population.

In fact, a number of strategies are common to the global goal of decreasing malnutrition:

- In terms of growth, we should focus on decreasing stunting during the first years of life, ensuring normal-size growth during childhood and normal pre-pregnancy weight among women of reproductive age.
- Exclusive breastfeeding and appropriate complementary feeding should also be encouraged, as micronutrient levels during pregnancy and infancy are critical.
- Childhood and adolescence are key periods during which obesity tends to develop; therefore, emphasis should be placed on healthy dietary behaviours such as increased consumption of fruits and vegetables and increased physical activity.

In the long term, investing in education and programmes for alleviating poverty will also positively impact nutrition status of the population and vice versa.

Standards of normal growth, healthful dietary patterns and physical activity will be necessary for use as comparison when designing and evaluating interventions. The new standard for infant growth of WHO/UNU and the new FAO/WHO recommendations for energy intake based on energy expenditure, are a step in this direction but more will have to be done. In the meantime, we should base our actions on evidence already available with the caution of always evaluating not only intended impact but also the possible generation of unforeseen consequences.

### **BUILD THE CAPACITY TO RESPOND TO THE CHALLENGES OF THE NUTRITION TRANSITION**

Latin America, as a region, has its own particularities and even among its countries there are important differences. Therefore, it is important that each country gather at least:

*Information on national trends:* national surveys should be conducted in order to monitor nutritional trends. The priorities and objectives of nutritional policies should be adapted and based on the results of these surveys. The deliverance of universal or targeted interventions should also be defined based on the nutritional stage of the population.

*Local evidence in order to define and adapt their programmes:* the gathering of evidence relevant to the situation and context by country should be encouraged and considered a priority. Academia should become a full actor in nutrition policy-making by providing evidence to support and guide policies and by shaping the training of professionals capable of working in concordance with the nutritional needs of the country. Good examples of the role of academia in the policy-making process are provided by INSP in Mexico and INTA in Chile.

*Adequate professional and material resources:* each country should invest in preparing leaders at all levels, in training new people and in retraining the existing workforce in order to bring about the necessary changes and to ensure their sustainability over time. Material resources will also have to be adapted to the changing requirements of the population; the participation of different sectors, including the private sector, will be critical in achieving this goal. Finally, the physical environment will also have to be adapted. Ensuring healthy and safe environments for living and working provides the necessary structure for healthful behaviours.

Latin American countries should work together and support one another in facing the challenges associated with the nutrition transition; joint strategies and opportunities for providing mutual technical support should be developed by the region.

### **Conclusion**

Nutrition plays a central role in alleviating poverty and improving health, and therefore political and economic efforts are needed to ensure the adequate nutritional status of the entire population. In the last two decades, countries in Latin America have been successful in decreasing undernutrition. How-



ever, they now face a new but equally taxing challenge, with the emerging epidemic of obesity and nutrition-related chronic diseases. These problems are no longer just a threat but a stark reality for the region. The responses to date, however, are still almost non-existent. Countries in Latin America need to become aware of its new nutritional situation and take action now. Failure here will tip the balance into the nutrition transition “trap”.

### **Acknowledgements**

The author would like to thank Dr Reynaldo Martorell (Emory University), Dr Ricardo Uauy (University of Chile), and Dr Rafael Flores (Emory University) for their encouragement, support and intellectual guidance. The author is also indebted with Dr Juan Rivera (National Institute of Public Health of Mexico) for sharing data and personal experiences with her and Ms Cria Gregory (Emory University) for her assistance in editing this document.

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