



# Obesity in developing countries: Causes and implications

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## Prevalence of obesity worldwide

The prevalence of obesity is increasing worldwide (Figure 1), including in some developing countries with previously very low prevalences (WHO, 1998). The result of chronic positive energy balance, obesity is associated with many chronic diseases, such as diabetes, heart disease, hypertension and some forms of cancer (WHO, 1998). It is particularly important to determine those factors that influence the prevalence of obesity in developing countries since these countries generally lack the infrastructure to treat the chronic diseases associated with obesity adequately. In this article, the aetiology of obesity in developing countries is described and the policy and economic implications of the increasing prevalence of obesity in transitional countries are discussed.

## Possible causes of obesity in developing countries

The World Health Organization defines obesity as "a condition of abnormal or excessive fat accumulation in adipose tissue, to the extent that health may be impaired" (WHO, 1998). Chronic positive energy balance normally precipitates the accumulation of excess adipose tissue. This positive energy balance is believed to be influenced by a number of environmental and physiological factors, such as high-fat diets and/or decreased physical activity. The specific causes of obesity are beyond the scope of this paper and detailed reviews are available in both scientific review articles and textbooks (Rosenbaum, Leibel and Hirsch, 1997; Bray, Bouchard and James, 1998). How these factors are manifested in developing countries is central to the recent

increase of obesity in countries undergoing an economic transition.

As the economies of developing countries continue to improve, the risk of becoming obese increases across all socio-economic classes as a result of improved access to food, decreased physical activity, and the consumption of “western” diets (Popkin, 1993; Cavalli-Sforza *et al.*, 1996; Drewnowski and Popkin, 1997). These factors create an environment that may predispose people to becoming overweight or obese. In particular, it has been found that although urbanization and related dietary changes improve health to a certain extent, they place a city-dweller at risk of certain health problems, including obesity. The question has also been raised as to what extent undernutrition early in life may predispose a person to becoming obese.

## Urbanization

Urbanization is a phenomenon that has received considerable attention because of its many effects on economic and physical well-being (Phillips, 1993; Solomons and Gross, 1995; Stephens, 1995; Caballero and Rubenstein, 1997). In the past 50 years there has been a twofold increase in the percentage of the world’s population living in urban areas (UN, 1999). Approximately 25 years ago less than one-third of the world resided in urban areas. And yet in less than 25 years it is anticipated that almost two-thirds of the world’s population will be living in cities. Remarkably, as world population starts to exceed 6 thousand million people (Figure 2), there has been a minimal increase in the populations of developed countries (1.9 to 1.21 thousand million) compared with those of developing countries (4.87 to 6.9 thousand million) (UN, 1999). More important, the percentage of the world population living in urban areas will increase less in developed regions (from 54.9 to 83.5) than in less developed regions, where it will increase from 17.8 to 56.2 (UN, 1999). Therefore, the burden of the world population increase will essentially be placed on the urban areas of developing countries. Urbanization is highly associated with several dietary and

behavioural risk factors not only for chronic disease, but also for obesity (Figure 3) (Popkin, 1993; Cavalli-Sforza *et al.*, 1996; WHO, 1998).

## Changing lifestyles

### Diets

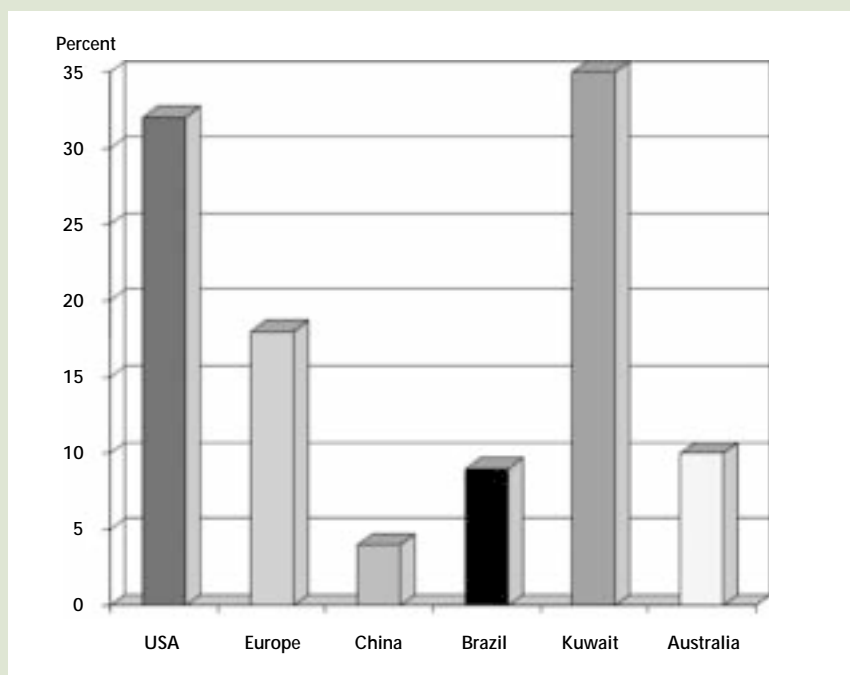
Dietary changes associated with urbanization are related to the fact that rural dwellers tend to be more self-reliant in obtaining food and also tend to eat traditional diets that are high in grains, fruit and vegetables, and low in fat. Once they arrive in urban areas, these same people tend to rely more on external forces for sustenance, resulting in a shift from production of their own food to the purchase of processed foods (Popkin, 1993). Together with these changes it has been reported that groups moving from rural to urban areas experience an increased intake of energy, sugar, refined grains and fat (Monteiro *et al.*, 1992). This dietary profile, referred to as a “western” diet, has been reported to be associated with diabetes, heart disease and excessive caloric intake and obesity (Popkin *et al.*, 1995; Drewnowski and Popkin, 1997; WHO, 1998).

### Physical activity

People living in lower socio-economic situations who have recently moved to large cities tend to find work primarily as day labourers or factory workers. They leave behind continuous, physical labour and adopt sedentary, sporadic work (Popkin, 1998). While some people are able to carry out work that may actually increase their daily physical activity, this is generally not the case. A low level of physical activity has been indirectly associated with weight gain and obesity in several developed countries. It is thought that physical activity, the one controllable component of total energy expenditure, accounts for 15-30 percent of daily energy expenditure.

Thus, a person experiencing a change in labour practices may see a decline of as much as 1 000 calories per day, which translates into more than a 50 percent reduction in physical activity. This decline in total energy expenditure, if not accompanied by a reduction in energy intake, may result in weight gain and potential obesity.

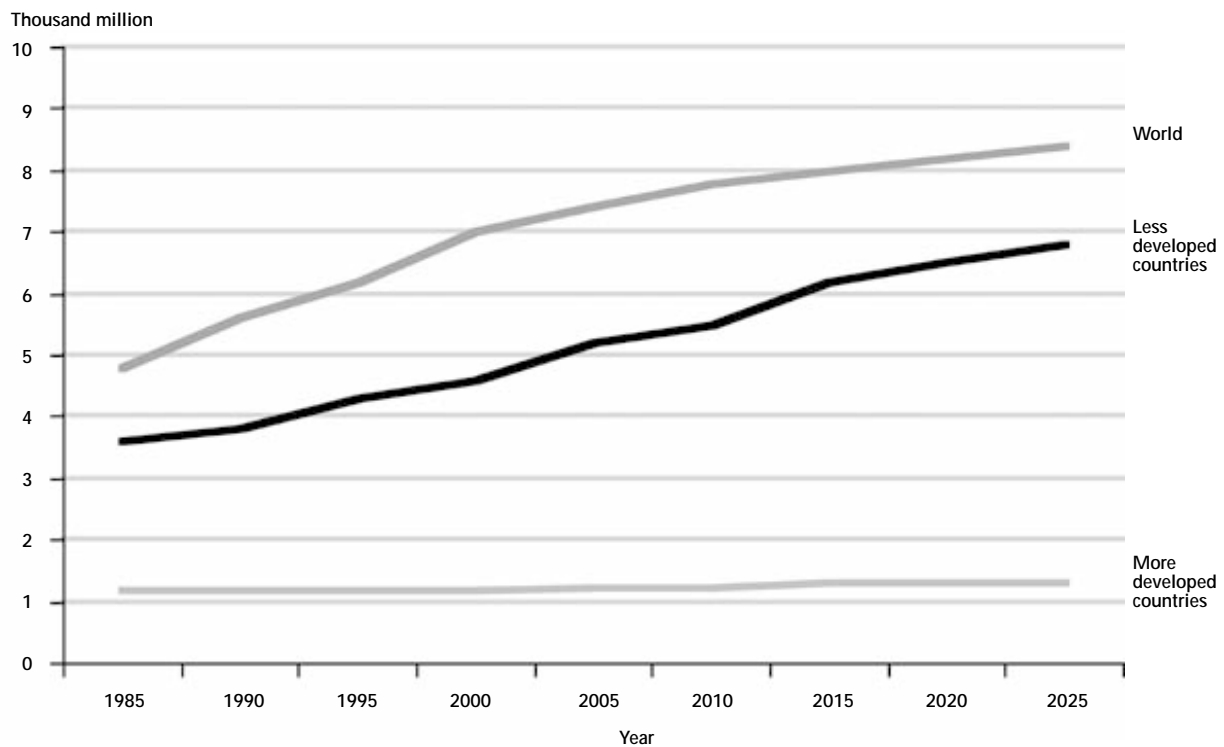
FIGURE 1  
Prevalence of obesity in some countries



Source: adapted from the World Health Organization, 1998

FIGURE 2

## World population



Source: World Bank, 2000.

### Genetic factors

Changes in both dietary habits and physical activity create an environment in which a person predisposed to weight gain may become obese. Such predispositions include either a genetic factor, as seen in the Pima Indians in Arizona (United States), or undernutrition early in life. The Pima Indians living in the United States are morbidly obese and suffer from high rates of diabetes and hypertension (Ravussin and Swinburn, 1993). This is in sharp contrast with their genetic counterparts living in Mexico where body weight and chronic disease prevalence are normal (Esparza *et al.*, 2000). It has been suggested that the Pima Indians possess a “thrifty gene” that predisposes them to weight gain when environmental conditions such as sufficient food supply, high-fat diets or decreased physical activity are favourable (Ravussin and Swinburn, 1993). In addition, recent work has shown a correlation between nu-

tritional stunting (growth retardation attributed to undernutrition during childhood) and later obesity in developing countries (Sawaya *et al.*, 1995; Popkin, Richards and Monteiro, 1996; Schroeder, Martorell and Flores, 1999).

### Early life

The general concept that early life stimuli may have permanent effects on metabolism and development was first conclusively demonstrated by Wiesel and Hubel (1965). In their experiments with newborn kittens, only one eye was allowed to receive visual stimulus following birth for a period of three months. It was found that the covered eye lacked significant and proper ocular development compared with the uncovered eye. In humans, it has been reported that children deprived of proper nutrition through formula feeding had lower cognitive scores on standard examinations compared with children who were

breastfed. In 1995 Sawaya *et al.* reported that obesity and undernutrition coexisted in the same households of the shantytowns in Brazil. Nutritional stunting has been associated with obesity later in life in several transitional countries, such as China, South Africa, the Russian Federation and Brazil (Popkin, Richards and Monteiro, 1996). Finally, Schroeder, Martorell and Flores recently published a report (1999) suggesting that adolescents who were stunted were more likely to be overweight compared with their peers who were not stunted. Physiological reasons for these observations vary from improper muscle development that affects substrate oxidation and physical activity to poor development of food intake and satiety controls during critical periods. Finally, stunting has been found to be associated with both metabolic and psychological risk factors for obesity. A cross-sectional study in Brazil found that stunted children oxidized a

lower percentage of energy as fat compared with healthy children (Hoffman *et al.*, 2000c) and consumed more energy per unit body weight than healthy children (Hoffman *et al.*, 2000a).

Thus, the developing world appears to be faced with a potentially grave nutritional situation as more countries experience rapid economic and social

development. In addition, it is becoming even more important to study the effect of a large population of obese people on developing economies and health care systems.

Economic development is undoubtedly related to a country's ability to maintain and stimulate economic growth, decrease external debt and foster productivity. Nutrition and poverty are intimately linked by the

and weight gain are somewhat particular. In many transitional countries, the poorest populations, in terms of energy intake and wages, often reside in rural areas. Among the urban poor, energy intake and wages may have improved with regard to their rural counterparts, but the *quality* of energy consumed is of utmost importance. That is, while the urban poor may

## The double burden of under- and overnutrition presents a potentially grave situation which deserves attention from both health and economic agencies promoting development

development. It seems plausible that those countries that have had traditionally high prevalences of undernutrition and stunting may be faced with a double burden of under- and overnutrition. More important, these countries, already poorly equipped to handle acute and chronic diseases, will face the increased economic burden of supporting an overweight or obese population, together with the associated, costly chronic diseases that accompany a high fat mass. This final point deserves particular attention from both health and economic agencies overseeing and promoting the development of transitional countries.

### Implications of obesity in developing countries

Many countries that historically sought and used national and international funds to combat micronutrient deficiencies and undernutrition are now facing the coexistence of under- and overweight people among the lower-income sectors of society. This enigma appears more dire when the social and economic implications are considered. These effects are created by the medical implications associated and precipitated by excess adiposity and weight. Thus, the importance of studying how and why obesity is becoming more prevalent in developing countries becomes more ur-

relationship between nutrition and work capacity, such that poor nutrition is not only a result of, but perhaps a cause of poverty as well (Ray, 1998). Poverty is influenced by poor nutrition in that a poor person has a reduced ability to purchase nutritious foods and in turn has a lower work capacity that perpetuates a low income.

While this vicious circle clearly illustrates the poverty cycle that is perpetuated in relation to nutritional status, obesity

earn and consume more, the quality of the food they eat may lead towards weight gains that will eventually limit their work capacity and return them to a state of lower income. This idea has not been explored extensively in transitional countries for many reasons.

### Obesity and productivity

Studies from Europe and the United States demonstrate quite unequivocally that obe-

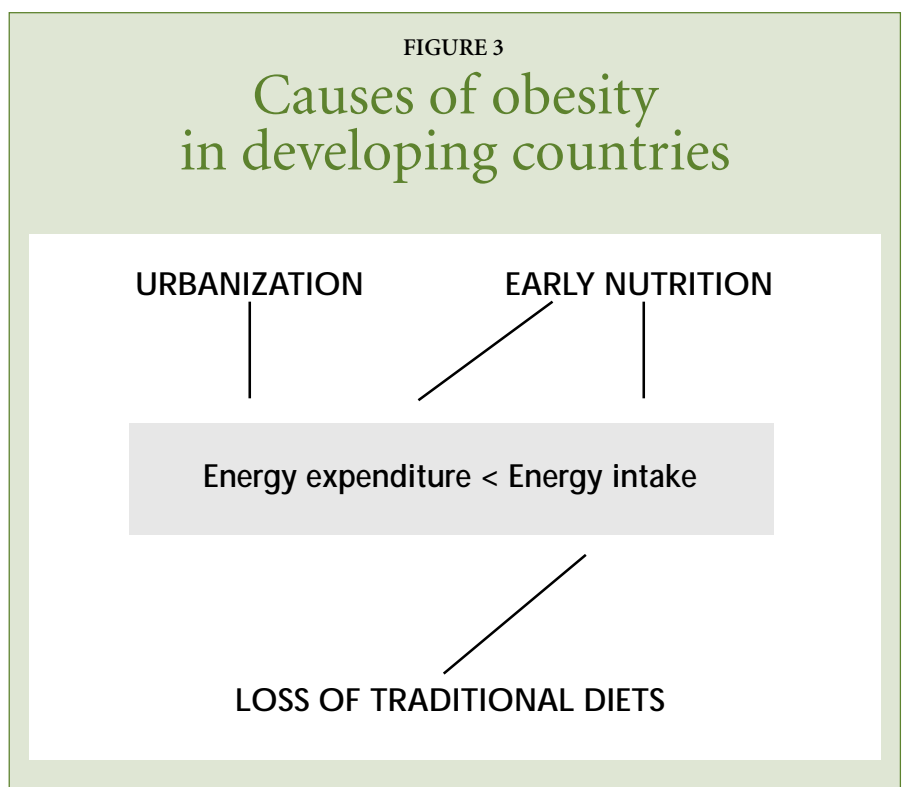
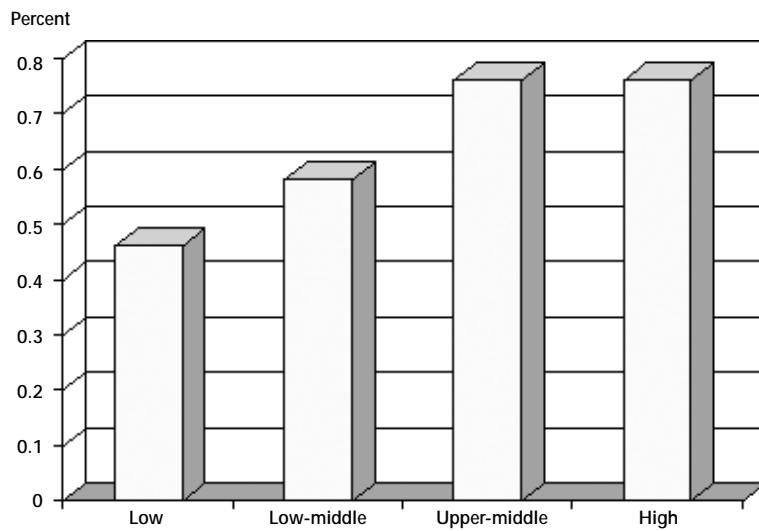


FIGURE 4

## Percent of public expenditures allocated to health, by country income, from 1990-1997



Source: World Bank, 2000.

sity is negatively associated with a person's productivity and work performance. An increased fat mass has been reported to inhibit spontaneous movement, result in poor health that reduces overall activity and inhibit various movements (Seidell,

ciety where they are still able to place demands in terms of food and health care needs. An obese person reportedly experiences a 50 percent increase in lost productivity and visits a doctor 88 percent more than a healthy person during a six-

reported that obese people were up to two times more likely to have a large amount of sick leave in one year compared to lean people either through absence from illness or for a doctor's appointment. In both cases, obesity contributes to absenteeism and directly reduces the productivity of a population.

### Health care systems and obesity

An example of such an economic drain is the influence that an increased prevalence of obesity has on the health care systems of developing countries. Historically, health care systems in developing countries have been designed to treat and manage only acute diseases, such as diarrhoea or minor infections (FAO, 1997). The ability to treat large populations with relatively little money has been accomplished primarily through the use of satellite clinics staffed by nurses and health aides. Although these efforts have been successful in minimizing health care expenditures, it is not certain whether or not the burden of obesity-related diseases could be accommodated by the present system. Essentially there will be an increased need for health care targeting chronic diseases that may not always be met by an increase in the necessary appropriate expenditures.

In Europe and the United States, it has been shown that obesity reduces a person's overall activity. It affects productivity and increases morbidity and mortality

1998). Several studies have reported a strong relationship between body mass index, decreased physical functioning and a reduction in overall productivity (Rissanen, 1996; Seidell, 1998). Moreover, obesity exerts its effects on productivity not only by an increase in mortality, but also through an increase in morbidity. Increased morbidity removes individuals from the workforce but leaves them in so-

year period in the United States (Wolf and Colditz, 1994). This creates a situation in which the chronically ill person not only contributes less to the economy, but also essentially requires more, creating a drain on economic resources. The more sick a person is the greater his or her degree of absence from the workplace; chronic diseases related to adiposity and obesity increase absenteeism. Narbro *et al.* (1996)

Moreover, as the World Bank recently reported (Figure 4), public health care expenditures are directly related to the relative wealth of a country (World Bank, 1999). This implies that poor countries can do little to meet the double burden of infectious and chronic diseases as the prevalence of obesity increases.

Little research on the economic impact of obesity in developing countries has been

undertaken, making it difficult to assess the impact accurately. At the same time, however, speculation as to the economic impact of obesity in the developing countries can be made using data from developed countries. In terms of real costs, the combined effects of decreased productivity and increased absenteeism are quite significant.

tional societies as the prevalence of overweight and obesity increases. An important distinction is that these economic forces will be combined with an unstable economic infrastructure, especially in terms of health care costs and infrastructures.

The ability or willingness of a country to increase health care expenditures is in-

Based on these observations it may be concluded that an increase in the number of obese people in developing countries could slow economic growth. Given that the GDPs of developing countries are reliant less on technical and service oriented work and more on industrial and labour-intensive work, a loss of this workforce

## Tremendous strides in reducing the prevalence of communicable diseases, undernutrition and infant mortality have been made. These efforts may provide models to impede the trend towards obesity

Approximately US\$70 thousand million, 9.4 percent of health care expenditures in the United States, are attributed to obesity-related diseases and an additional US\$24 thousand million are attributed to lack of physical activity (Colditz, 1999). Moreover, the cost associated with decreased productivity among the obese is estimated at US\$4 thousand million dollars (Wolf and Colditz, 1994). In terms of disability, there is a higher number of disability pensions among the obese compared with lean people in the Netherlands (Seidell, 1998). It would not be implausible to suggest that similar impacts will be seen in developing and transi-

fluenced primarily by the amount of public monies available. Many developing countries simply do not have the flexibility of large economic surpluses or gross domestic products (GDPs) from which monies may be drawn. In fact, most transitional countries spend a large percentage of their GDPs on external debt repayment (World Bank, 2000). The overall economic effects of obesity and higher health care expenditures will ultimately be coupled with other factors associated with obesity that could contribute to a slowing of both economic growth and develop-

will contribute to a slowing of overall growth and a reduction in GDP. Parallel with the economic effects will be a greater need for public monies for health care expenditures. This demand may impede the repayment of external debts, essentially creating a need for continued external borrowing and a slowing of the development process.

### Health improvements

Nevertheless, tremendous strides have been made in recent years in reducing the prevalence of communicable diseases, improving the infant mortality rate and re-

TABLE 5

## Combating undernutrition without promoting obesity

Percentage of malnourished children in developing countries: 1990 and 2020, various scenarios

Country/Region	1990	2020	
		Low investment	High investment
Developing	34.3	33.2	19.0
Latin America/Caribbean	28.4	22.9	5.4
Sub-Saharan Africa	28.4	31.2	20.0
East Asia/North Africa	134	17.0	2.9

FAO, 2000

ducing the prevalence of undernutrition (Table 5) in developing countries. These objectives have been pursued vigorously by both non-governmental organizations and government agencies alike and may provide a model by which transitional countries can impede or reverse the trend of an increasing population of overweight and obese people.

Serious attention still needs to be given to the increasing prevalence of obesity in developing countries and some form of preventive intervention is best undertaken sooner rather than later. One example could be to increase the surveillance of mildly overweight people in poor populations. People living in impoverished areas are generally cared for by health care teams at community health centres where implementation of minimal education can take place. Another example could be through educational programmes designed to increase awareness of the health risks associated with obesity. School programmes that educate children on health, especially in communities where public assistance through food aid is provided, are other ways in which increased education could be implemented. Finally, overall awareness of the long-term risks of obesity can guide social attitudes towards the benefits and risks of either maintaining or attaining health weights and body sizes.

At the macro level, development efforts need to consider the eventual impact of increasing economic development without corresponding improvement of health care systems. It is highly unlikely that a transitional economy would be able to host an obese population without sacrificing some segment of its public expenditures, such as education or infrastructure. Furthermore, programmes designed to strengthen the infrastructure and increase economic growth must be designed in conjunction with groups monitoring health and health outcomes. For example, the introduction of cattle production in countries with poor health care or high external debt could easily result in short-term economic success and long-term negative health consequences related to the increasing

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consumption of meat with a high fat content. Programmes such as these, while neither actively encouraged or discouraged, should be accompanied by studies and surveillance of weight and chronic disease related to overnutrition.

## Conclusions

The need for studies on the increasing prevalence of obesity in developing countries is greater now than ever before as more countries are reaching their development goals and more people are experiencing the nutrition and economic transition associated with development. Thus, the environment is being set for the manifestation of chronic diseases related to sufficient energy availability and changes in physical activity associated with development and urbanization. Obesity is just one of these outcomes but, unfortunately, it is also associated with many other chronic diseases, thereby compounding the problem. Significant efforts must be made to understand the aetiology of obesity in developing countries and create methods by which it can be prevented and controlled in societies not normally accustomed to dealing with overnutrition and chronic diseases. Furthermore, the influence that obesity may have on developing economies also needs to be addressed if the universal goal of development is to create a healthy world, in both economic and physical terms.



## Obesity in developing countries: causes and implications

The prevalence of obesity is increasing worldwide. The result of chronic positive energy balance, obesity is associated with many chronic diseases, including diabetes, heart disease, hypertension and some forms of cancer. In this article, the aetiology of obesity in developing countries is described and the policy and economic implications of the increasing prevalence of obesity in transitional countries are discussed.

Determining those factors that influence the prevalence of obesity in developing countries is particularly important, since these countries generally lack the infrastructure to treat the chronic diseases associated with obesity adequately. As developing countries' economies improve and the population becomes urban, changes in dietary habits and physical activity create an environment in which a person predisposed to weight gain could become obese. Ironically, nutritional stunting early in life has been associated with obesity in later years.

The developing world appears to be faced with a potentially grave nutritional situation. It seems plausible that those countries that have had traditionally high prevalences of undernutrition and stunting may be faced with a double burden of under- and overnutrition. These countries are already poorly equipped to handle acute and chronic diseases. In the future, they will face the increased economic burden of supporting an overweight or obese population, together with the associated and costly chronic diseases that accompany a high fat mass. This deserves particular attention from both health and economic agencies overseeing and promoting the development of transitional countries.

## Les causes et implications de l'obésité dans les pays en développement

L'obésité est en constante augmentation dans le monde. Due à un excédent énergétique constant, l'obésité est associée à de nombreuses maladies chroniques, notamment le diabète, les cardiopathies, l'hypertension et certaines formes de cancer. Cet article décrit l'étiologie de l'obésité dans les pays en développement et les conséquences sur le plan de la politique et de l'économie, ainsi que la prévalence croissante de l'obésité dans les pays en transition.

Il est particulièrement important de cerner les facteurs qui influent sur l'obésité dans les pays en développement, car ces pays ne disposent généralement pas des infrastructures adéquates pour traiter les maladies chroniques dues à l'obésité. Avec l'amélioration des conditions économiques dans les pays en développement et l'urbanisation croissante, l'évolution des habitudes alimentaires et de l'activité physique crée un environnement où une personne prédisposée au gain de poids pourrait devenir obèse. Il est paradoxal de constater que le retard de croissance dû à la malnutrition à un jeune âge peut être un facteur d'obésité par la suite.

Le monde en développement semble confronté à une situation nutritionnelle potentiellement grave. Il est vraisemblable que les pays qui ont toujours connu de fortes prévalences de sous-alimentation et de retards de croissance se retrouvent aux prises avec le double fardeau de la dénutrition et de la suralimentation. Ils sont déjà mal équipés pour traiter tant les maladies aiguës que les maladies chroniques. À l'avenir, ils devront affronter des contraintes économiques accrues pour la prise en charge d'une population souffrant d'obésité ou d'excédent pondéral, avec toutes les conséquences des maladies chroniques et coûteuses qui y sont apparentées. Cette question mérite une attention particulière de la part des organismes sanitaires et économiques qui supervisent et favorisent le développement des pays en transition.

## La obesidad en países en desarrollo: causas y repercusiones

La prevalencia de la obesidad aumenta en todo el mundo. Al constituir el resultado de un equilibrio energético crónico positivo, la obesidad se asocia a muchas enfermedades crónicas, entre ellas la diabetes, cardiopatías, la hipertensión, y algunos tipos de cáncer. En este artículo se describe la etiología de la obesidad en países en

desarrollo y se analizan las repercusiones económicas y políticas de la prevalencia cada vez mayor de la obesidad en los países en transición.

Es de especial importancia determinar los factores que influyen en la prevalencia de la obesidad en países en desarrollo, ya que estos países carecen por lo general de infraestructuras para tratar de forma conveniente enfermedades crónicas asociadas con la obesidad. Debido a que las economías de los países en desarrollo mejoran y la población se desplaza a las zonas urbanas, los cambios en los hábitos alimentarios y en la actividad física crean un entorno en el que las personas con predisposición a aumentar de peso podrían convertirse en obesas. Irónicamente, el retraso del crecimiento por causas nutricionales en los primeros años de vida se ha asociado con la obesidad en años posteriores.

El mundo en desarrollo se enfrenta, al parecer, con una situación alimentaria potencialmente grave. Parece, pues, posible que los países que tradicionalmente han tenido una alta prevalencia de desnutrición y retraso del crecimiento se enfrenten con el doble problema de la desnutrición y la sobrealimentación. Estos países que se encuentran escasamente equipados para tratar enfermedades crónicas y agudas, en el futuro, se enfrentarán con el aumento de la carga económica que supone el poder mantener una población con sobrepeso u obesa, y aquejada de las costosas enfermedades crónicas asociadas con una condición de elevada masa lipídica. Esta cuestión merece especial atención por parte de los organismos económicos y sanitarios que supervisan y promueven el desarrollo de los países en transición.