Obesity and Diabetes in the Developing World — A Growing Challenge

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Globally, the prevalence of chronic, noncommunicable diseases is increasing at an alarming rate. About 18 million people die every year from cardiovascular disease, for which diabetes and hypertension are major predisposing factors. Propelling the upsurge in cases of diabetes and hypertension is the growing prevalence of overweight and obesity — which have, during the past decade, joined underweight, malnutrition, and infectious diseases as major health problems threatening the developing world.[1] Today, more than 1.1 billion adults worldwide are overweight, and 312 million of them are obese. In addition, at least 155 million children worldwide are overweight or obese, according to the International Obesity Task Force. This task force and the World Health Organization (WHO) have revised the definition of obesity to adjust for ethnic differences, and this broader definition may reflect an even higher prevalence — with 1.7 billion people classified as overweight worldwide.[1]

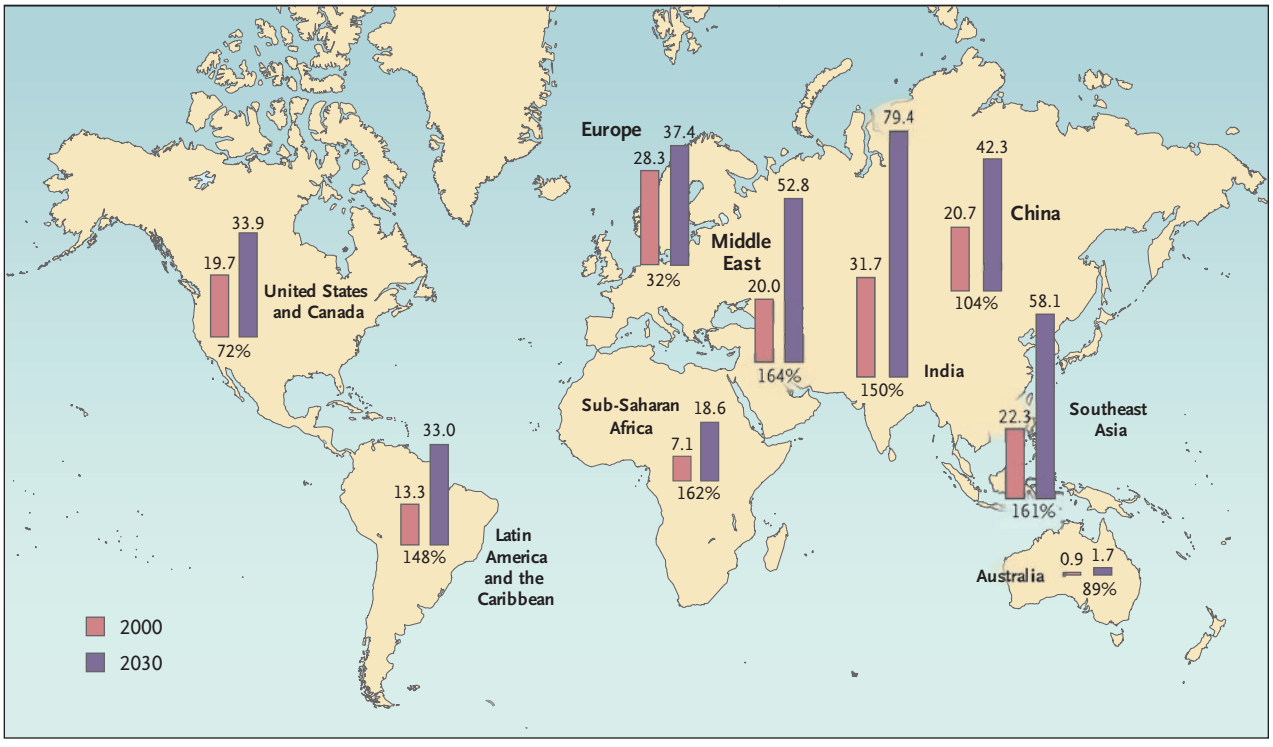
In the past 20 years, the rates of obesity have tripled in developing countries that have been adopting a Western lifestyle involving decreased physical activity and overconsumption of cheap, energy-dense food. Such lifestyle changes are also affecting children in these countries; the prevalence of overweight among them ranges from 10 to 25%, and the prevalence of obesity ranges from 2 to 10%. The Middle East, Pacific Islands, Southeast Asia, and China face the greatest threat. The relationship between obesity and poverty is complex: being poor in one of the world's poorest countries (i.e., in countries with a per capita gross national product [GNP] of less than $800 per year) is associated with underweight and malnutrition, whereas being poor in a middle-income country (with a per capita GNP of about $3,000 per year) is associated with an increased risk of obesity. Some developing countries face the paradox of families in which the children are underweight and the adults are overweight. This combination has been attributed by some people to intrauterine growth retardation and resulting low birth weight, which apparently confer a predisposition to obesity later in life through the acquisition of a "thrifty" phenotype that, when accompanied by rapid childhood weight gain, is conducive to the development of insulin resistance and the metabolic syndrome.

The human and financial costs of obesity are also mounting: a higher body-mass index (the weight in kilograms divided by the square of height in meters) has been shown to account for up to 16% of the global burden of disease, expressed as a percentage of disability-adjusted life-years. In the developed world, 2 to 7% of total health care costs are attributable to obesity. In the United States alone, the combined direct and indirect costs of obesity were estimated to be $123 billion in 2001. In 2004 in the Pacific Islands, the economic consequences of noncommunicable diseases, mainly obesity and diabetes, amounted to $1.95 million — almost 60% of the health care budget of Tonga.[2]

The growing prevalence of type 2 diabetes, cardiovascular disease, and some cancers is tied to excess weight. The burden of these diseases is particularly high in the middle-income countries of Eastern Europe, Latin America, and Asia, where obesity is the fifth-most-common cause of the disease burden — ranking just below underweight. The high risk of both diabetes and cardiovascular disease associated with obesity in Asians may be due to a predisposition to abdominal obesity, which can lead to the metabolic syndrome and impaired glucose tolerance.

The increase in the prevalence of type 2 diabetes is closely linked to the upsurge in obesity. About 90% of type 2 diabetes is attributable to excess weight. Furthermore, approximately 197 million people worldwide have impaired glucose tolerance, most commonly because of obesity and the associated metabolic syndrome. This number is expected to increase to 420 million by 2025.

Population-based surveys of 75 communities in 32 countries show that diabetes is rare in communities in developing countries where a traditional lifestyle has been preserved. By contrast, some Arab, migrant Asian Indian, Chinese,



Millions of Cases of Diabetes in 2000 and Projections for 2030, with Projected Percent Changes.
Data are from Wild et al.[3]

and U.S. Hispanic communities that have undergone westernization and urbanization are at higher risk; in these populations, the prevalence of diabetes ranges from 14 to 20%. In addition, most of the population growth in the developing world is taking place in urban areas.

Consequently, diabetes is rapidly emerging as a global health care problem that threatens to reach pandemic levels by 2030; the number of people with diabetes worldwide is projected to increase from 171 million in 2000 to 366 million by 2030 (see map).[3] This increase will be most noticeable in developing countries, where the number of people with diabetes is expected to increase from 84 million to 228 million.[1] According to the WHO, Southeast Asia and the Western Pacific region are at the forefront of the current diabetes epidemic, with India and China facing the greatest challenges. In these countries, the incidence and prevalence of type 2 diabetes among children are also increasing at an alarming rate, with potentially devastating consequences.

The serious cardiovascular complications of obesity and diabetes could overwhelm developing countries that are already straining under the burden of communicable diseases. The risk of cardiovascular disease is considerably greater among obese people, and this group has an incidence of hypertension that is five times the incidence among people of normal weight. Hence, overweight and obesity are contributing to a global increase in hypertension: 1 billion people had hypertension in 2000, and 1.56 billion people are expected to have this condition by 2025.[4] This increase will have a disproportionate effect on developing countries, where the prevalence of hypertension is already higher than that in developed countries and where cardiovascular disease tends to develop earlier in affected persons. The effect of diabetes on complications of cardiovascular disease is also more severe among members of most ethnic minority groups in Western countries as well as among the populations of developing countries, where an increased waist-to-hip ratio is a strong predictor of ischemic heart disease and stroke. The estimated risk of cardiovascular disease is higher among South Asians than among white Westerners or

persons of African origin; this difference is attributable to earlier onset and later detection of diabetes and to higher blood pressure.

In addition, in 2000, in developing countries, 2.41 million premature deaths, primarily from cardiovascular causes, were attributed to smoking. This emerging epidemic of tobacco-related illnesses is exacerbating mortality related to obesity, diabetes, and hypertension.

Obesity, diabetes, and hypertension also affect the kidneys. Diabetic nephropathy develops in about one third of patients with diabetes, and its incidence is sharply increasing in the developing world, with the Asia–Pacific region being the most severely affected. According to a survey published in 2003,[5] diabetic nephropathy was the most common cause of end-stage renal disease in 9 of 10 Asian countries, with an incidence that had increased from 1.2% of the overall population with end-stage renal disease in 1998 to 14.1% in 2000. In China, the proportion of cases of end-stage renal disease that were caused by diabetic nephropathy increased from 17% in the 1990s to 30% in 2000. In India, diabetic nephropathy is expected to develop in 6.6 million of the 30 million patients with diabetes. These statistics raise the daunting prospect of an epidemic of diabetic nephropathy in a developing world unable to cope with its repercussions — a world where end-stage renal disease is a death sentence.

Furthermore, renal involvement has a major "multiplier" effect on the rates of diabetes-related complications of cardiovascular disease and related deaths. The WHO Multinational Study of Vascular Disease in Diabetes showed that proteinuria was associated with an increased risk of death from chronic kidney disease or cardiovascular disease, as well as of death from any cause.

Changes in lifestyle that lead to weight loss reduce the incidence of diabetes and hypertension. But preventing obesity, diabetes, and hypertension will require fundamental social and political changes. Public health initiatives will be required to make affordable, healthful foods available, and initiatives in education and community planning will be needed to encourage and facilitate exercise. In 2003, the World Health Assembly adopted the Global Strategy on Diet, Physical Activity, and Health, which targets lifestyle modifications that can combat the increase in noncommunicable diseases. The WHO issued objectives for developing countries regarding school meals and healthy living. Some countries, including Brazil, India, and China, have initiated monitoring programs related to obesity and nutrition. Since these programs are still in their infancy, few data are available on the cost of their implementation, and many such initiatives will encounter fierce opposition from food manufacturers and rights-oriented consumer groups who resent their effects on civil liberties. The challenge will be to overcome these obstacles and implement acceptable strategies to curb the rising tides of obesity, diabetes, and hypertension.

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1. Haslam DW, James WP. Obesity. Lancet 2005;366:1197-209.
2. The world health report 2006: working together for health. Geneva: World Health Organization, 2006.
3. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes Care 2004;27:1047-53.
4. Kearney PM, Whelton M, Reynolds K, Muntner P, Whelton PK, He J. Global burden of hypertension: analysis of worldwide data. Lancet 2005;365:217-23.
5. Lee G. End-stage renal disease in the Asian-Pacific region. Semin Nephrol 2003; 23(1):107-14.