

Obesity and cardiovascular disease in developing countries: a growing problem and an economic threat

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Purpose of review

This review examines the rise of risk factors for cardiovascular disease, especially obesity, in developing countries and the implications for both health and economics.

Recent findings

In the majority of developing countries fertility and infant and child mortality have fallen markedly, and life expectancies have increased. Rapid urbanization, rising food prices, and globalization of economies have contributed to an increase in risk factors for chronic disease. Recent work indicates that the prevalence of these risk factors, including obesity, is rising faster than the historical experience of the West. The transition is affecting women in particular, and increases in risk factors are more marked among lower incomes in growing economies than among the wealthy. Rather than the stereotypical problem of the rich, chronic disease is now a problem for the poor.

Summary

Significant research in this area of global health has only been undertaken in the last decade. Additional field research is needed in every dimension of the transition, both to document the problem itself and to determine its economic and societal impact and cost-effective responses. Two critical factors are virtually absent from existing work and should be emphasized. First, the impact of rising risk factors for, and mortality from, cardiovascular disease in the work force may imply a growing threat to continued economic progress. Second, because risk factor reduction requires society-wide strategies, broad public-private coalitions will be needed to mobilize sectors beyond healthcare.

Keywords

cardiovascular disease, developing countries, economic development, obesity

Introduction

Behind the headlines of the tragedies in places like the Sudan and Haiti is another story of the developing world. This story never makes the front page and rarely is told at all. It is a story of economic growth, demographic advancement, and health progress. It is also a story with largely unrecognized consequences.

The developing world has bifurcated. Left behind are the few nations which in the last five decades have failed to grow economically, whose people remain yoked to poverty and die young from a range of communicable diseases. Now, these high mortality, high fertility 'least developed' countries (as designated by the United Nations Statistics Division on the basis of a combination of economic, social, and human condition indicators) account for only 4.4% of the world's population [1].

Simultaneously, a larger number of 'less developed' countries are pulling ahead. In 1950, 1.8 billion people lived in countries with a per capita daily intake of 2200 calories; today fewer than 450 million do [2]. By 2020 there will be more people in the developing world over the age of 65 years than under the age of 5 years, and the median age of much of the developing world will approach that of the West [1]. Since 1980, infant mortality has been halved, child mortality has fallen by 43%, and immunization coverage has risen from 20% to nearly 80% [1].

The pace of the demographic transition is faster than that experienced in the West. In the United States it took 70 years for the over-65 age group to increase from 5% to 12% of the total population; Latin America will have 35 years to accommodate the same growth, beginning a decade ago [1].

The consequence is that, combined with economic and cultural globalization, behaviors and living situations have also changed, and with them disease patterns. The rise of obesity and other risk factors in middle income countries is the leading edge of a wave of chronic disease, especially cardiovascular disease. That wave is breaking over economies which are still fragile, health systems that are poorly structured to respond, and nations inexperienced in the needed collaboration between public and private sectors.

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The transition to chronic disease

A number of authors recently noted the transition to chronic diseases in general [1,2,3*,4**,5,6*]. By 2020, 80% of deaths in the developing world will be attributable to non communicable diseases. Within this trend, cardiovascular disease represents three-quarters of that mortality [4**]. Already in China and India, accounting for a third of the world's population, cardiovascular disease causes the majority of mortality [4**].

Yusuf *et al.* [5] looked closely at the transition to chronic disease globally, and specifically in developing regions. They predict that mortality from ischemic heart disease and stroke will triple in the next two decades in Latin America, the Middle East and even Africa. That rate of increase will be far higher than the 30–60% increase expected in industrialized nations [5].

Diabetes provides a stark picture of the health transition, and also a particularly potent entrée to the discussion of changing obesity patterns. The period between 1995 and 2025 will see a 48% increase in the prevalence of diabetes and a 170% increase in the number of diabetics in the developing world. Among developing regions, the greatest prevalence of diabetes will be in Latin America, although it is estimated even now that 20% of the urban population of Egypt is diabetic. The greatest expected change in prevalence will be in China, with an increase of 68% and India with an increase of 59% [7].

The role of obesity

The traditional focus was on infectious diseases and reproductive health. Recently, however, interest has begun to shift as the realities of aging, urbanization, and improved economic and societal conditions have become evident.

Risk factors that spur increases in cardiovascular disease in particular have been found to be the same the world over, for men and women, for young and old, and in every region. A study of 52 countries on every inhabited continent involving 15 152 cases and 14 820 controls found that smoking, hypertension, diabetes, alcohol consumption, abdominal obesity, diet, and physical activity were all related to cardiovascular disease everywhere [8*]. Collectively, they accounted for 90% of population attributable risk factors in men and 94% in women.

Examining changes in behaviors, Popkin and his colleagues [9*] have documented the nature and speed of shifts in dietary and physical activity patterns in the US, Europe, and lower and middle income countries of the developing world. In Mexico, Egypt, and South Africa, levels of overweight exceed those of the United States [9*]. In Nauru in the South Pacific, 70% of the population

is clinically obese, and 25–50% of the population of Colombia and the Philippines is obese [10].

The pace of increase of the problem is also striking. In Brazil, obesity prevalence increased from 4.2% to 14.3% in the two decades between 1975 and 1997 [9*], an annual rate of increase higher than that of the US. Rates of increase in the prevalence of obesity in adult men and women in Asia, North Africa and Latin America are two to five times higher than those of the US. In a study of West Sumatra, the short decade and a half period of rapid economic growth (1983–1999) and related shift in the labor force from agriculture to industry and services, increased food availability, reduced food expenditures as a percent of income, and more than doubled the percentage of dietary intake from fat, from 9.1% in men and 12.1% in women to 23.2% in men and 23.6% in women [11].

The role of income: wealth and disease part ways

Data contradict the assumption that these trends are a problem only for the wealthy [12]. Changes in lifestyle, consequent rises in risk factors including obesity, and associated rises in the prevalence of chronic disease are pervading developing societies. Although research is still relatively scarce, a review of studies reported between 1989 and 2003 indicates that the burden of obesity tends to shift to lower income groups as gross national product increases [13**]. In both Brazil and Mexico, obesity has become a characteristic of low income families [14].

Studies of diet in China also showed an inverse income pattern. Between 1989 and 1997, the decline in the intake of cereals in low income groups was more than twice that of middle and high income groups. Low income groups also had a larger decline in the intake of fruits and vegetables, and a fast rate of increasing the adoption of a high-fat diet [15].

A 100-country study of risk factors for cardiovascular disease showed body mass index increasing rapidly with increases in national incomes, beginning at US\$5000 per capita. body mass index peaked at US\$12 500 for women and US\$17 000 for men, then flattened and eventually declined. Blood pressure, on the other hand, was elevated at all income levels. Thus the combination of obesity and blood pressure as cardiovascular risk factors characterized not the highest income levels, but those of middle income countries [16**].

Similar inverse relationships between socioeconomic status and obesity in women were found in 37 countries, although the income levels at which socioeconomic status ceases to confer protection against obesity were much

lower. In this study, when gross national product reaches US\$2500 per capita, obesity starts to be concentrated among women in lower socioeconomic groups [13**].

The data are not uniform and age may matter. Obesity among pre-adolescents and adolescents 9–15 years of age in India shows higher prevalence among higher income families than among lower income families, and Nigeria displays a similar pattern [17].

The importance for women's health

Studies of both obesity as a risk factor and cardiovascular disease as a cause of death indicate that changes in risk and disease patterns are particularly important for women's health.

In the Middle East, Central Europe, and Latin America, a nearly equal or greater portion of women are overweight or obese compared with the US. In the Middle East and North Africa, over 40% of women are overweight or obese [14]. In Turkey, 25% of women are obese compared with only 10% of men [18].

Obesity in women has an income dimension as well, especially for poor women in economies that are growing. In 14 studies published between 1989 and 2003, 10 revealed a statistically significant inverse association between obesity and income for women but not for men. Obesity rises as income declines among women, but the obesity–income relationship is either neutral or positive for men [19*]. Other analyses indicate that the inverse relationship is particularly important for low income women in upper or middle income countries. In Brazil, the fastest growth in obesity among women has been among the poorest 30% [7]. This is a marked change in the last two decades of the 20th century. In 1975, there were two underweight Brazilian women for every obese woman. By 1997, there were two obese women for every underweight woman [20*]. A study of 32 countries between 1992 and 2000 indicated that the number of women who were overweight exceeded those who were underweight in well over half the countries. The median ratio of overweight to underweight was 5.8 in urban areas and 2.1 in rural areas [21**]. Low gross national income and low urbanization saw obesity concentrated among more highly educated women. As incomes and urbanization rose, obesity began to be concentrated in lower socioeconomic groups, reaching as high as 50.9% of urban women in the lowest education quartile [21**].

Even where undernutrition is widespread, urban women in developing countries show high rates of obesity. A study in The Gambia, where 18% of the population is undernourished, found that most obese persons were women, that 32.6% of urban women over the age of 35 years were

obese, and that obesity was associated with elevated levels of glucose, triglycerides, and uric acid [22].

When rising life expectancy and hence higher median ages combine with rising incomes, the implications for urban women are sobering. And urbanization itself is rising. In 1985, 20 years ago, less than a third of the population in less developed countries was urban. In 2025, 20 years hence, that portion will rise to over 50%, and net of the very least developed countries, the developing world will be nearly 60% urbanized. Even in Africa, city dwellers will comprise 50.7% of the population by 2025, compared with 29% in 1985 [23].

While urbanization is clearly important, the trend for women is not isolated to metropolitan urban areas. A study of the Mapuche aboriginal group in Chile found that 32% of women in rural areas were obese compared with 15% of men, and a study of a small city in Thailand found that 21% of women were overweight [7]. In the 32-country study, in highly urbanized countries with relatively high incomes, as many as 37.8% of rural women were overweight [21**].

While few comprehensive data are available to examine the cardiovascular disease consequences of obesity in developing countries, its role as a precursor to diabetes and hypertension points to the importance of changing epidemiology for women.

Women's health in developing countries has long been dominated by concerns for reproductive diseases and population control. An examination of cause of death data for women 15–44 years of age in nine countries, however, showed that, in seven out of nine countries, deaths from cancer, cardiovascular disease, and diabetes accounted for twice the percentage of deaths as reproductive conditions and HIV combined at ages 15 through 34. Between ages 35 and 44, these three conditions accounted for over four times the percentage of deaths as reproductive conditions and HIV combined. The exception was India. The pattern was not related to level of development as measured by gross national income [24**].

Key elements being missed in current work

Virtually all of the current work on risk factors and cardiovascular disease in developing countries misses two critical dimensions of its importance. Compared to the situation in industrialized countries, these changes are not threats to old age, they are threats to the labor force, and the next 20 years of economic growth is dependent on that labor force. Second, the levers of change for the emerging health crisis in developing nations are not solely in the hands of the health sector.

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They are in the hands a diverse range of institutions who, to date, have not been party to health strategy.

A labor force at risk

The economic implications of the changes in demographics and health are profound. The consequent rise in healthcare costs, both direct and indirect, is widely appreciated. The deeper economic implication of these trends is less widely acknowledged.

Unlike in the West, the emerging trends are not about the elderly. Mortality rates from cardiovascular disease in the working aged populations in developing countries are multiples of those of developed countries. Indeed, developing region rates are equal to and sometimes higher than those experienced in the United States in the 1950s [4**]. The age and sex-adjusted cardiovascular disease death rate for males aged 35–64 years is 71 per 100 000; in India it is 81, and in Brazil it is 71. In the United States that rate is currently 55.9 [4**]. An examination of the distribution of risk factors for cardiovascular disease from the World Health Organization's Global Burden of Diseases study found a similar pattern, with a concentration of risk factors in those under the age of 60 years [25].

As the population of the developing world ages and greater numbers of people enter the labor force, these rates will compromise economic growth. For example, in Brazil, where obesity has also risen dramatically, by 2030 an estimated 28% of cardiovascular mortality is between the ages of 35 and 64 years, compared with 12% in the US. In South Africa, 31% of cardiovascular mortality will be in the working ages, and in India 25% will be in working ages [4**].

This pattern is also seen in diabetes, for which those most frequently affected in developed countries are aged 65 years and older, whereas those most frequently affected in developing countries are aged 35–64 years [3*].

The years of productive life lost will skyrocket. In 2000 in these three countries, cardiovascular deaths in working ages resulted in 10.5 million years of productive life lost. By 2030, this will rise to 20 million years [4**].

These trends have a very important time dimension. Birth rates have fallen rapidly and are converging with those of the West. The next two decades will see a decline in the numbers of children who must be supported by the working aged population. Twenty years hence, this dependency ratio will begin to rise once again, not because of increased numbers of children, but because of increased numbers of elderly. In the West, the economic costs of elderly dependency are three times that of youth dependency, due to the need for both social security payouts and increased unit costs for healthcare.

What does this mean for the developing world? Raymond pointed out that less developed countries have a 20-year window of opportunity to reinvest the productivity of their labor force and their capital assets back into their economies before dependency rises again [2]. In economic history, it is this opportunity, the chance to maximize reinvestment without excessive dependency payout, that has fueled sustained economic growth. Less developed countries are on the threshold of that opportunity.

This is precisely, however, the two decade period in which chronic disease, and its risk factors such as obesity, will cut a swathe through the very workforce upon which productivity and reinvestment will depend. Without attending vigorously to the spread of risk factors and consequent cardiovascular disease death rates, the window of opportunity will close without the reinvestment needed to sustain growth. The development engine will stall, and all of the economic progress to date will be once again at risk as nations begin to pay for their growing elderly populations.

The imperative of coalitions in civil societies

It is clear that the tools to contain cardiovascular disease exist [26*]. Clinical management of chronic disease, especially through pharmacological intervention, clearly matters [27–29]. Wald and Law [30] suggest that the pharmacological options are far from fully exploited. They estimate that combining drugs to control hypertension and cholesterol, reduce homocysteine, and inhibit platelet function into a 'polypill' would benefit one third of people over the age of 55 years, gaining an average of 11 years of life free from ischemic heart disease or stroke [30].

Beyond clinical effort, population-based strategies, although more complex, also work. In Finland, for example, changes in agricultural policy together with media strategies and coalitions with the food industry changed dietary behavior and reduced cardiovascular disease [31].

In many places in the world, however, acting on the understanding of what can be done faces barriers. Health systems, long structured to focus vertically on infectious diseases and reproductive health, are not structured to respond to the horizontal, long-term disease management and complex risk factors inherent in chronic disease [26*,32*]. The rapid increase in chronic diseases, and in their risk factor has not been matched with resource commitments. A survey of 185 countries showed that only 39% – virtually all of them from the industrialized world – had budget line times for chronic disease prevention [6*].

The problem for middle income countries is more complex than simply appropriating more resources for public health agencies, however. The fact is that many of the

key levers on the problem do not rest in the hands of the health sector, especially in increasingly free and open civil societies.

Risk factor mitigation for chronic disease, including but not limited to obesity, requires changes in a vast array of societal sectors that may, at first glance, share very little in common. Public knowledge and education, personal behavior, cultural perceptions and mores are important, as are tax law, trade treaties, social security finance structures, labor markets, employer benefits plans, insurance regulations, land development and zoning laws, transportation subsidies. The list is long [33*].

Moreover, the complexity of the levers on risk factors is heightened by the spread of open societies. Between 1973 and 2003, the portion of nations that are free and open has risen from 54% to 75%. Today, the world is home to 120 elected democracies [34]. Two realities accompany freedom.

First, by definition, people are free to ignore common sense. Knowing that a third *crème brûlée* may have adverse health consequences does not mean we put our forks down. People can, and do, regularly and knowingly ignore public health and medical lectures.

Second, again by definition, decisions at the political and policy level reflect not the wisdom of technocrats, scientists and physicians but the give and take of the full range of self-interests in society, including those who produce, aid, abet, or otherwise have self-interests in the risks at issue. Open societies are characterized by the competition for ideas and the competition for public support across this full range.

Where does this leave health policy? In a fortunate place, indeed. By engaging in that give-and-take, in mobilizing that open, civil society in the interests of risk reduction and disease management, the resulting effort will reflect not narrow government dictate, but the consensus of the people. Its political power and longevity will, therefore, be much more robust.

Conclusion

The transition in developing countries from infectious to chronic diseases is well documented. The rising importance of risk factors, such as obesity, is more recently being documented, with a particular emphasis on the female population. Long financed to fight communicable diseases and address reproductive health, however, health systems are poorly positioned to provide the disease management and risk prevention strategies that are required. The difficulty is compounded by the different nature of chronic disease, for which causes, behaviors, and policies are not in the control of health sectors.

What is needed? There are two critical dimensions to the solution that have not characterized past health strategies in developing countries. The first is to encourage the emergence of voluntary civil society organizations (heart associations, diabetes associations, fitness associations) that build community knowledge about, self-interest in, and support for addressing key risk factors. Citizen groups alone, however, are insufficient, given the broader economic interests at play. The second requirement, therefore, is a purposeful effort to build a coalition of leaders across sectors to address risk factors, especially within the labor force. Employers, organized labor, medicine, finance, insurance, social security, education all have influence over elements of the problem or stand to be affected by its rapid escalation. Building a coalition of private leadership creates a self-interested representative in free and open debate about public policy. That broad coalition, backed by the voice of citizen groups, will be infinitely more powerful in open societies and open economies than will either the lone voice of public health or the brute force of narrow government initiative.

References and recommended reading

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Additional references related to this topic can also be found in the Current World Literature section in this issue (pp. 000–000).

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