

from around the world

• focus on India

India Wakes Up to the Threat of Cardiovascular Diseases

*K. Srinath Reddy, MD, DM, MSc
Public Health Foundation of India
New Delhi, India*

The 2007 union budget presented by the Finance Minister of India, on February 28, allocated 4 million U.S. dollars (USD) to a National Program for the Prevention and Control of Diabetes, Cardiovascular Diseases, and Stroke and 9 million USD to a Tobacco Control Program. Although very modest and much delayed, these are welcome because the former marks the first ever attempt at initiating a national program to counter the hitherto neglected threat of cardiovascular diseases (CVDs) and the latter represents an 800% increase over the previous year's allocation for tobacco control.

Epidemiologists in India and international agencies, such as the World Health Organization (WHO), have been sounding an alarm on the rapidly rising burdens of CVD for the past 15 years (1–3). The reported prevalence of coronary heart disease (CHD) in adult surveys has risen 4-fold over the last 40 years (to a present level of around 10%), and even in rural areas the prevalence has doubled over the past 30 years (to a present level of around 4%). Cardiovascular disease is now the leading cause of death, accounting for 29% of all deaths in 2005, according to the WHO (2). A verbal autopsy study conducted in 45 villages of a southern state, in 2004, revealed that 32% of all deaths were due to CVD, outranking infectious diseases, which were responsible for 13% (4). The risk factors of CVD are also on the rise, as evidenced by a number of community surveys in different regions of the country. India, already the diabetes capital of the world with 32 million persons with diabetes, is projected to have 69.8 million in 2025. The count of “hypertensive” individuals is expected to rise from 118 million in 2000 to 214 million in 2025 (5).

If these looming threats of escalating epidemics of diabetes and CVD are neglected, the adverse effects on development are likely to be unaffordable for a country that is now on the fast track for economic development and aspires to be a major economic

power in the 21st century. Cardiovascular disease, now the leading cause of death, strikes Indians early and kills many in their productive mid-life years.

Cardiovascular disease, now the leading cause of death, strikes Indians early and kills many in their productive mid-life years.

Deaths due to CVD, in the age group of 35 to 64 years, resulted in 9.2 million potentially productive years of life being lost in 2000 (570% more than the corresponding figure for the U.S.) (Fig. 1) and are expected to rise to a loss of 17.9 million years in 2030 (940% more than the projected figure for the U.S.) (6). The WHO estimates that, over the next 10 years, India will lose 237 billion USD due to heart disease, stroke, and diabetes (3).

The lack of a public health response so far, despite these dire dangers, was mostly due to perceptions among both policymakers and the public that CVD is largely a problem of the urban rich. Infectious diseases, malnutrition in children, and unsafe pregnancies have so far rightly been accorded the highest attention and allocated the largest resources, as they are problems of the poor. However, several recent studies have shown that the social gradient is now reversing, for many CVD risk factors and CVD related events, with the poor becoming the dominant victims as health transition advances the CVD epidemic. Tobacco is far more widely consumed by the poor, in both rural and urban settings, while urban slums are manifesting high diabetes prevalence rates over 10%. Case control studies in 2 large Indian cities have shown that those with low levels of education are at twice as much risk of experiencing a heart attack as persons with a high educational attainment (7).

Lack of clarity about risk factors that contribute to excess and early CHD-related mortality, observed in

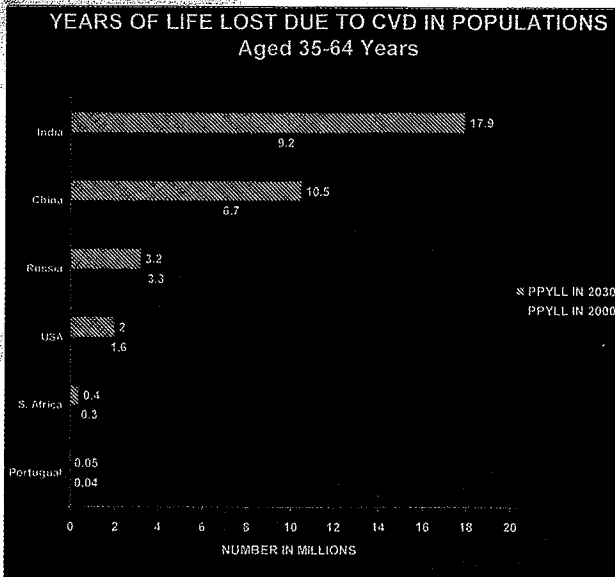


Figure 1. Productive Life-Years Lost Due to Early Cardiovascular Deaths

Based on data from Leeder et al. (6). CVD = cardiovascular disease; PPYLL = potentially productive years of life lost.

South Asian populations at home and abroad, was another reason why public health action was delayed. Initial studies in Indian and other South Asian migrants, conducted in several countries and comparing them to many other ethnic groups, suggested that the conventional risk factors did not explain this excess risk and ascribed the South Asian propensity for CHD to several nonconventional risk factors (8,9). Many of these later came to be grouped as the “metabolic syndrome,” which is indeed highly prevalent among South Asians. These migrant studies were widely misinterpreted to mean that the conventional risk factors did not matter in the Indians, who were then thought to be genetically preordained to suffer premature CHD. However, studies that compared rural with urban Indians or Indian migrants in the United Kingdom with their home country siblings or peers clearly indicated that conventional risk factors like systolic blood pressure, plasma cholesterol, and overweight contributed to the excess risk of CHD in Indians moving to urban or migrant environments (10). It is likely that when different ethnic groups (with possibly different gene pools) are compared within the same environment, nonconventional risk factors appear more explanatory, whereas the conventional risk factors are more explanatory when the same gene pool confronts different

environments (as in rural-urban and migrant–nonmigrant comparisons). Indians appear to manifest high risk of CHD when the as yet undefined factors that contribute to ethnic susceptibility are triggered or magnified by an environment that promotes unhealthy living habits and superimposes conventional risk factors.

Indians appear to manifest high risk of CHD when the as yet undefined factors that contribute to ethnic susceptibility are triggered or magnified by an environment that promotes unhealthy living habits and superimposes conventional risk factors.

Though cohort studies identifying risk factor associations with incident CHD have just been initiated in India, the large multinational INTERHEART (study of risk factors for first myocardial infarction in 52 countries and over 27,000 subjects) case-control study has recently helped to clear the uncertainty about the importance of conventional (mostly lifestyle-related) risk factors in the Indian context (11). Analysis of the data-subset related to 5 South Asian countries, including a large fraction from India, showed clearly that the 9 risk factors, which were identified as being strongly associated with CHD across 52 countries, were also operative in South Asians. It also showed that differences in these risk factors explain why Indians experience their first heart attack at an earlier age than other populations (12). The recognition that behavioral risk factors like tobacco, physical inactivity, and unhealthy diets can no longer be ignored and the realization that biological risk factors like blood pressure, diabetes, and dyslipidemia need to be appropriately and adequately controlled have at last opened the strategic pathways for CHD prevention and control in India.

Now that both political will and scientific clarity are in favor of initiating action to combat the CVD epidemic through concerted public health and clinical approaches, the emerging National Program for Prevention and Control of Diabetes, Cardiovascular Diseases, and Stroke must be embraced and enhanced by Indian cardiologists. They must catalyze a coalition of multiple stakeholders who can energetically work for early initiation and effective implementation of the recently initiated CVD prevention and tobacco control programs. These small steps must mark the beginnings of a major march forwards.

REFERENCES

1. Reddy KS. Cardiovascular disease in India. *World Health Stat Q* 1993;46:101-7.
2. Reddy KS, Shah B, Varghese C, Ramadoss A. Responding to the challenge of chronic diseases in India. *Lancet* 2005;366:1744-9.
3. World Health Organization. *The World Health Report 2005. Preventing Chronic Diseases: A Vital Investment*. Geneva: WHO, 2005.
4. Joshi R, Cardona M, Iyengar S, et al. Chronic diseases now a leading cause of death in rural India—mortality data from the Andhra Pradesh Rural Health Initiative. *Int J Epidemiol* 2006;35:1522-9.
5. Kearney PM, Whelton M, Reynolds K, et al. Global burden of hypertension: analysis of worldwide data. *Lancet* 2005;365:217-23.
6. Leeder S, Raymond S, Greenberg H, Liu H, Esson K. *A Race Against Time. The Challenge of Cardiovascular Disease in Developing Countries*. New York, NY: Columbia University, 2005.
7. Rastogi T, Reddy KS, Vaz M, et al. Diet and risk of ischemic heart disease in India. *Am J Clin Nutr* 2004;79:582-92.
8. McKeigue PM, Shah B, Marmot MG. Relation of central obesity and insulin resistance with high diabetes prevalence and cardiovascular risk in South Asians. *Lancet* 1991;337:382-6.
9. Enas EA, Yusuf S, Mehta J. Prevalence of coronary artery disease in Asian Indians. *Am J Cardiol* 1992;70:945-9.
10. Bhatnagar D, Anand IS, Durrington PN, et al. Coronary risk factors in people from the Indian subcontinent living in west London and their siblings in India. *Lancet* 1995;345:405-9.
11. Yusuf S, Hawken S, Ounpuu S, et al., INTERHEART Study Investigators. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Lancet* 2004;364:937-52.
12. Joshi P, Islam S, Pais P, et al. Risk factors for early myocardial infarction in South Asians compared with individuals in other countries. *JAMA* 2007;297:286-94.

doi:10.1016/j.jacc.2007.04.097