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Cardiovascular Diseases in India Compared With the United States



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ABSTRACT

This review describes trends in the burden of cardiovascular diseases (CVDs) and risk factors in India compared with the United States; provides potential explanations for these differences; and describes strategies to improve cardiovascular health behaviors, systems, and policies in India. The prevalence of CVD in India has risen over the past 2 decades due to population growth, aging, and a stable age-adjusted CVD mortality rate. Over the same time period, the United States has experienced an overall decline in age-adjusted CVD mortality, although the trend has begun to plateau. These improvements in CVD mortality in the United States are largely due to favorable population-level risk factor trends, specifically with regard to tobacco use, cholesterol, and blood pressure, although improvements in secondary prevention and acute care have also contributed. To realize similar gains in reducing premature death and disability from CVD, India needs to implement population-level policies while strengthening and integrating its local, regional, and national health systems. Achieving universal health coverage that includes financial risk protection should remain a goal to help all Indians realize their right to health. (J Am Coll Cardiol 2018;72:79–95) © 2018 by the American College of Cardiology Foundation.

In response to the United Nations Declaration on Noncommunicable Diseases (NCDs) in 2011, the World Health Organization (WHO) set the goal of reducing the risk of premature mortality (30 to 69 years of age) from NCDs, including cardiovascular diseases (CVDs), by 25% by 2025 (1). Beyond 2025, the United Nations has also created Sustainable Development Goals, including the goal of promoting good health and well-being, with an even more ambi-

tious subgoal of reducing the burden of premature mortality from NCDs, including CVD, by one third by 2030 (2). Thus, cardiovascular (CV) health promotion and disease prevention and control are firmly on the global agenda.

Overall, the absolute burden of CVD has increased globally and has shifted heavily toward low- and middle-income countries (LMICs) such as India, largely because of population growth and aging (3).

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ABBREVIATIONS AND ACRONYMS

ACS = acute coronary syndrome

BMI = body mass index

CV = cardiovascular

CVD = cardiovascular disease

DALY = disability-adjusted life year

LMIC = low- and middle-income countries

NCD = noncommunicable disease

SDI = sociodemographic index

STEMI = ST-segment elevation myocardial infarction

WHO = World Health Organization

As an LMIC, India has not experienced a decline in age-adjusted CVD event rates and continues to undergo an epidemiological transition from predominantly infectious diseases to NCDs. This transition has occurred over a compressed time frame, leading to a dual burden of disease, albeit with substantial subnational variation. Addressing this significant burden of CVD in such a large, complex, and rapidly developing country requires an understanding of the complex dynamics of CVD risk factors and their interactions.

Therefore, based on the formidable disease burden, global health goals, and regional contexts, the objectives of the present paper were to: 1) describe trends in the burden of CVD and its risk factors in India

compared with the United States; 2) provide potential explanations for these differences; 3) describe recent and ongoing strategies to improve CV health behaviors, systems, and policies in India; and 4) describe CV research needs in India.

TRENDS IN CVD IN INDIA AND THE UNITED STATES

MORBIDITY AND MORTALITY TRENDS. CVDs remain the leading cause of death globally, including in India and the United States. In 2016, there were an estimated 62.5 and 12.7 million years of life lost prematurely due to CVD in India and the United States, respectively (4). Ischemic heart disease and stroke were estimated to account for approximately 15% to 20% and 6% to 9% of all deaths in these regions (5).

Table 1 displays trends in age-standardized CVD prevalence per 100,000 and the estimated number of prevalent cases of CVD in India and the United States in 1990 and 2016. The estimated age-standardized prevalence of CVD in India in 2016 was 5,681 per 100,000 (4). This rate was lower than the age-standardized prevalence in the United States (7,405). However, because of India's large population, the absolute estimated prevalence of CVD in India (54.6 million) is >60% larger than in the United States (33.6 million).

CVD death rates in India are estimated to have risen from 155.7 to 209.1 per 100,000 between 1990 and 2016, although this number seems to be almost entirely due to population aging (3). However, there is substantial state-level variability in the burden of CVD in India, including a 9-fold variation in the burden of ischemic heart disease disability-adjusted life years (DALYs) per 100,000 persons between the

states with the highest (Punjab) and lowest (Mizoram) burdens. Likewise, there was a 6-fold variation in the rate of stroke DALYs between the highest-burden (West Bengal) and lowest-burden (Mizoram) states (Figure 1) (6). Reasons for state-level differences in mortality and morbidity are myriad, and are likely driven by differences in risk factor burden, treatment, control, management of acute manifestations of CVD, and, perhaps, baseline event rates. Analysis of the CVD burden attributable to modifiable risk factors suggests that common risks, such as smoking, may play a variable role among Indian states (4). In contrast, the long-term U.S. trend shows a decline in CVD mortality, from 300 deaths per 100,000 in 1990 to 176 deaths per 100,000 (age-standardized) in 2016. Over the past 5 years, CVD age-standardized death rates are no longer declining in the United States, a trend not entirely accounted for by population aging (5).

CVD SURVEILLANCE IN INDIA AND THE UNITED STATES.

Table 2 compares general methods of CVD surveillance in India and the United States. Comprehensive, high-quality, vital registration systems track deaths in the United States, and population-based mortality data are increasingly available in India, with some limitations. These data include the physician-certified cause of death for urban regions throughout the country (but with <30% coverage) and, more recently, data on causes of death for the entire country via the India Sample Registration System, which uses verbal autopsy. Although verbal autopsy is a widely implemented method for ascertaining cause of death based on post-mortem interviews, it is limited by potential misclassification, lack of specificity, and heterogeneous coverage (7).

Both the United States and India have implemented systematic and recurring population-based health examination surveys. In India, the India Annual Health Survey, India District Level Household Survey, India Longitudinal Aging Study, India Clinical Anthropometric and Biochemical Survey, and the India Noncommunicable Disease Risk Factors Survey all provide high-quality population-based surveillance for CV risk factors in a subset of states. In India, surveillance is fragmented, and the health management information system at the national level is rudimentary and only recently has received much-needed attention. Ongoing cohort studies provide additional information on risk factors, treatment, and case fatalities but are largely located in the United States (8,9). Several notable, prospective, longitudinal studies in India are summarized in Table 3.

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