Is the Horse Already Out of the Barn in Rural India?

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The 20th century saw unparalleled increases in life expectancy and a major shift in the causes of illness and death throughout the world. A century ago, cardiovascular disease (CVD) accounted for fewer than 10% of all deaths; today, it accounts for approximately 30% worldwide. The increase in CVD, through a proliferation of risk factors that are heavily influenced by lifestyle choices, is the new challenge for many developing countries.

At the end of the last century, investigators projected the future epidemic of CVD in developing countries. Many of the projections were for regions determined by economic and geographic factors according to World Health Organization (WHO) and World Bank definitions; however, these regions are supranational and thus beyond the scope of the units of government in which decision making to combat the CVD burden occurs, either at the national or state/provincial level. A country or provincial level of information is required for planning. Both health ministers who are in the process of developing systems of primary care for chronic diseases and the financial and commercial leaders who are trying to understand the size of future labor forces or government programs (such as social security later in life) are in need of better sources of data.

Furthermore, what few estimates we have of the CVD burden in developing countries are based on urban centers, where the highest concentrations of providers and healthcare facilities are found. Much less is known about rural areas of developing countries, where up to 70% of the population lives (compared with only 21% of the US population). In this issue of Circulation, Joshi and colleagues provide a much clearer understanding of the CVD epidemic in rural Andhra Pradesh. They report not only on the mortality data but also on the prevalence of CVD and its risk factors, as well as secondary prevention treatment patterns, in the rural villages of this southeastern state of India.

A further challenge for healthcare policy makers and investigators alike is that there is some lack of accuracy in the assessment of CVD burden, either due to the infrastructure available for data collection or due to the quality of the data.

Many of the estimates are based on old or incomplete data. For example, few developing countries have anywhere near total death certificate completion rates or a centralized registry of CVD or other causes of death. Just more than one third of deaths in India were registered in 1999. Nearly 75% of deaths in developing countries such as India occur in the home, where certification by a physician is unlikely to occur. Equally challenging is the determination of the prevalence of disease when access to healthcare facilities and providers is lacking.

Joshi et al used 2 tools that are less commonly used in developed country research settings to address the lack of providers and healthcare facilities that are often integral to data collection in developed countries. First, for mortality estimates, they used a verbal autopsy instrument. This tool involves an interviewer ascertaining antecedent symptoms and signs from someone close to the deceased. These data are then used by 2 physicians to assign cause of death. This methodology has been validated in India and other developing countries with sensitivities of up to 95% compared with a hospital-based certification process, although it is somewhat less sensitive for circulatory disorders, at 79%. Furthermore, the verbal autopsy strategy was shown to reduce the proportion of deaths attributed to unspecified or unknown causes from 54% to 23% in urban areas and from 41% to 26% in rural areas in other validation studies. Clearly, these numbers suggest the system is not perfect, but they are an improvement over the very limited system currently in place.

More studies are needed to improve this methodology for CVD until complete vital registries are in place.

The other tool was the use of multipurpose health workers for the verbal autopsy and questionnaire. The use of multipurpose health workers or community health workers for data collection was invaluable for multiple reasons. First, by definition, the community health workers came from the villages being studied and thus were able to identify the deaths in an environment where few deaths occur in the hospital setting and would otherwise be missed in a community without a centralized registration system. Second, the interviewees were more likely to respond to the request for a verbal autopsy interview if it was made by someone whom they either knew or who resided in the community. Perhaps more important is the role these community health workers may play in the care of these patients moving forward. With limited numbers of health professionals in developing countries and even lower numbers in rural areas, community health workers will need to play a role in the management of those with CVD or at high risk for it.

One limitation of the study, however, was the reliance on patient reporting for the prevalence of disease. Although the methods used have been validated, if knowledge about risk factors is low, then overall health awareness may be limited.
Furthermore, the limited access to physicians may have limited the availability of diagnostics. This would possibly lead to an underestimate of the disease prevalence rates.

What comes as somewhat of a surprise is the very high rate of CVD mortality and prevalence in this rural region. Joshi et al. found mortality rates of nearly 31% for ischemic heart disease and stroke combined in rural Andhra Pradesh; however, according to the Global Burden of Disease estimates, ischemic heart disease and stroke deaths are estimated to be approximately 20% and 10%, respectively, for the South Asian Region, which includes India. Other studies in India around the same time as the Global Burden of Disease study suggest that the prevalence of and death rates due to CVD are as much as 2 to 3 times higher in urban areas than in rural areas. If this is true, we may be grossly underestimating the burden of CVD in South Asian countries today.

Alternatively, this region or the country of India as a whole may be unique in adopting the epidemiological transition quite rapidly. The epidemiological transition is a shift that is highly correlated with changes in personal and collective wealth (the economic transition), social structure (the social transition), and demographics (the demographic transition). This transition generally results in a decreasing proportion of CVD from infectious causes such as rheumatic disease (first stage) to a profile of man-made–induced CVD. In most countries, this transition begins with an increase in hemorrhagic stroke first (second stage). The third stage includes an increase in ischemic heart disease and ischemic stroke and a reduction in hemorrhagic stroke, with a resultant predominance in ischemic heart disease. Ultimately, countries begin to reduce the burdens of both with declines in age-adjusted death rates from CVD even as the overall burden increases with aging populations during the fourth stage.

Although this transition began in industrialized countries over the course of more than one and a half centuries, it is occurring at a much more compressed rate in developing countries. With rates of ischemic heart disease equal to or greater than stroke rates, it appears that this region of India is well advanced in the transition. Perhaps a cultural diet rich in saturated fats such as ghee (clarified butter), which is the primary source of cooking oil, has allowed it to proceed to this advanced third stage more quickly than anticipated without the high rate of isolated hemorrhagic stroke normally observed in the second stage.

Perhaps even more sobering is the age at which Indians are dying of CVD. This study reports that 50% of deaths occurred at less than 70 years of age. In the United States, fewer than 10% of deaths occur among those younger than 65 years of age. Although this is consistent with the third phase of the epidemiological transition, in which risk factor and disease prevalence rates approach the highest levels and the level of disease management and prevention is the lowest, it is still concerning when it occurs in an area where the resources to combat the epidemic are limited. In comparison, when the developed economies went through the third transition in the 1940s through the 1960s, they had many more established healthcare systems and a public health infrastructure to address the epidemic. The economic implications of such a loss of early life are profound. Conservative estimates in Brazil, China, India, Mexico, and South Africa indicate that each year, at least 21 million years of future productive life are lost because of CVD. In a WHO analysis, the estimated loss in both direct and indirect costs in China from ischemic heart disease, stroke, and diabetes was estimated to be more than $250 billion in 2005.

At least some of the premature deaths are likely due to inadequate population-based strategies to reduce disease and the limited use of secondary prevention treatment in these rural villages. A study in the United Kingdom found that nearly 70% of the decline in age-adjusted mortality was attributable to changes in individual treatments for secondary prevention and to population-level changes in risk factors, particularly smoking. Knowledge about lifestyle habits was insufficient in these villages for substantial changes in population levels of risk factors. Just 60% of those with CVD were aware of the risks associated with smoking, physical inactivity, and fat and salt intake. This is in comparison to rates of knowledge >80% about the same lifestyle risk factors in urban settings in India and other developed countries.

Treatment levels for secondary prevention in rural Andhra Pradesh were worse. Aspirin, β-blockers, ACE inhibitors, and statins, 4 standard treatments for those with coronary heart disease, were severely underutilized. Of the patients with ischemic heart disease, fewer than 16%, 25%, 10%, and 6% were using aspirin, β-blockers, ACE inhibitors, and statins, respectively. Similar underuse existed for stroke. These numbers are not only lower than what is reported in developed countries but are also much lower than in many urban settings of developing countries. In the WHO Premise study, rates of use of the same medications were 94%, 46%, 41%, and 38%, respectively, for ischemic heart disease patients. The populations studied in the WHO study were from urban centers of >500 000 people and were recruited from outpatient clinics affiliated with primary, secondary, and tertiary centers. This suggests a large urban-to-rural gap in appropriate medication use.

The hope among investigators and policy makers is that if an epidemiological transition followed the economic, social, and demographic transition that occurred in developed countries, there should be enough time to prevent a large proportion of the projected burden of CVD. Through the introduction of education, prevention, and treatment programs, it is believed we can alter the rise in risk factors and unhealthy lifestyle choices that accompany the transitions and the resultant increase in CVD. In the case of India, the horse may already be out of the barn, and efforts will have to be directed not only at limiting the transition but also at managing the already large burden that exists today.

Disclosures

None.

References


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