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### The Cardiovascular Disease Epidemic: Marching Forward in India

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# The Cardiovascular Disease Epidemic: Marching Forward in India

*Puneet Gupta*

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Cardiovascular disease (CVD) is the largest cause of mortality in the world with around 17.7 million victims each year<sup>1</sup> CVDs include coronary heart disease, ischemic heart disease, rheumatic heart disease, cardiomyopathies, and other diseases involving the heart and circulatory system. However, in contrast to the progress made in high-income countries, the burden of CVD and other noncommunicable diseases have only continued to rise significantly in low and middle-income countries, especially India. It is estimated that nearly 80% of CVDs will be burdened by developing countries by 2020.<sup>2</sup> Interestingly, India has been

disproportionately impacted by these CVDs. In India, the average age of 59 for heart failure patients is approximately ten years younger than the average age for heart failure (HF) patients in South America and China<sup>3</sup> In contrast to most western countries, HF is prevalent in both the young and elderly in India.<sup>4</sup> Moreover, India's estimated age-standardized death rate of 272 per 100,000 population due to CVDs is greater than the global average of 235 per 100,000 population<sup>5</sup> Both environmental and genetic factors are argued to contribute to this increased CVD susceptibility.<sup>6</sup> India has begun to research and implement innovative

<sup>1</sup> World Health Organization. (2017). Cardiovascular diseases (CVDs). Retrieved July 29, 2018, from [http://www.who.int/cardiovascular\\_diseases/en/](http://www.who.int/cardiovascular_diseases/en/)

<sup>2</sup> Reddy, K. S. (2004). Cardiovascular Disease in Non-Western Countries. *New England Journal of Medicine*, 350(24), 2438–2440. <https://doi.org/10.1056/NEJMp048024>

<sup>3</sup> Dokainish, H., Teo, K., Zhu, J., Roy, A., AlHabib, K. F., ElSayed, A., ... Mondo, C. (2017). Global mortality variations in patients with heart failure: results from the International Congestive Heart Failure (INTER-CHF) prospective cohort study. *The Lancet Global Health*, 5(7), e665–e672. [https://doi.org/10.1016/S2214-109X\(17\)30196-1](https://doi.org/10.1016/S2214-109X(17)30196-1)

<sup>4</sup> Reddy, S., Bahl, A., & Talwar, K. K. (2010). Congestive heart failure in Indians: How do we improve diagnosis & management? *Indian Journal of Medical Research*.

<sup>5</sup> Prabhakaran, D., Jeemon, P., & Roy, A. (2016). Cardiovascular Diseases in India: Current Epidemiology and Future Directions. *Circulation*, 133(16), 1605–1620. <https://doi.org/10.1161/CIRCULATIONAHA.114.008729>

<sup>6</sup> Sharma, M., Kartha, C. C., Mukhopadhyay, B., Goyal, R. K., Gupta, S. K., Ganguly, N. K., & Dhalla, N. S. (2017). India's March to halt the emerging cardiovascular epidemic. *Circulation Research*. <https://doi.org/10.1161/CIRCRESAHA.117.310904>

policies and interventions to help tackle this and achieve the WHO target goal of a 25% reduction in premature deaths from noncommunicable diseases by 2025.

### General Policies and Interventions

Policies and interventions for CVDs that can be adopted and successfully implemented in India have been an area of high focus. These often target behavioral risk factors (tobacco use, excessive alcohol intake, physical inactivity, poor dietary consumption, etc.), social determinants of health, and acute and chronic CVD care. Success of these interventions is dependent upon cross-collaboration between various industries within the private and public sectors.

Policies involving tobacco regulation have been effective in high-income countries, leading to India passing the Cigarettes and Other Tobacco Products Act (COTPA) in 2003, which includes prohibited public smoking, mandated health advisory labels, and restricted tobacco advertising.<sup>7</sup> Other food and environmental interventions that have been implemented in India or shown promising elsewhere for use in India include increased taxation of different foods or drinks, subsidies for fruits and vegetables, and even usage of low-emission cooking stoves.<sup>8 9</sup> Other general policies or interventions that have been of interest

include CVD awareness campaigns, increased preventive health screening, school education programs, expanded insurance coverage, increased funding for CVD research, and more.

In regards to clinical treatments, the concept of a polypill, which is a combination of multiple drugs (aspirin, angiotensin converting enzyme (ACE) inhibitor, etc.) in a single capsule, has been of recent interest. The concept of polypills arose when experts realized that although multiple different medicines (e.g. antiplatelet agents, blood pressure lowering agents, etc.) individually served well in primary and secondary CVD prevention, many other issues such as adherence and access to these groups of medicines could be improved through a single capsule medication. Much research today is now focused on developing and improving these polypills due to promising results from many past and ongoing clinical trials in regards to improved medication adherence and access.<sup>10</sup> However, although several of these polypills have become available, many physicians, such as those in India, have not been enthusiastic about using them, likely due to their lack of patient-specificity.<sup>10</sup>

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<sup>7</sup> Jain, D., Jadav, A., Rhoten, K., & Bassi, A. (2014). The enforcement of India's tobacco control legislation in the state of Haryana: A case study. *World Medical and Health Policy*, 6(4), 331–346. <https://doi.org/10.1002/wmh3.116>

<sup>8</sup> Peñalvo, J. L., Cudhea, F., Micha, R., Rehm, C. D., Afshin, A., Whitsel, L., ... Mozaffarian, D. (2017). The potential impact of food taxes and subsidies on cardiovascular disease and diabetes burden and disparities in the United States. *BMC Medicine*, 15(1). <https://doi.org/10.1186/s12916-017-0971-9>

<sup>9</sup> Yamamoto, S. S., Phalkey, R., & Malik, A. A. (2014). A systematic review of air pollution as a risk factor for cardiovascular disease in South Asia: Limited evidence from India and Pakistan. *International Journal of Hygiene and Environmental Health*. <https://doi.org/10.1016/j.ijheh.2013.08.003>

<sup>10</sup> Roy, A., Naik, N., & Srinath Reddy, K. (2017). Strengths and Limitations of Using the Polypill in Cardiovascular Prevention. *Current Cardiology Reports*. <https://doi.org/10.1007/s11886-017-0853-y>

## Understanding India's Challenges

India's rapidly growing population has led to a major shortage of doctors, especially those involved in cardiac care. Only around 4,000 cardiologists were registered as of 2013 with the Cardiologist Society of India (the largest cardiologist organization) for a growing population of nearly 1.3 billion people.<sup>11 12</sup> The government needs to further develop India's medical education infrastructure and reduce its associated expenses to allow for more students to pursue medicine and other health professions. Moreover, a majority of hospitals and 74% of graduate doctors are located in urban areas, thereby serving only 28% of the Indian population.<sup>13</sup> These urban hospitals are very expensive, making affordable care difficult for many. This lack of doctors in rural areas has led to increasing numbers of unqualified providers prescribing and treating patients, putting many lives at risk. Financial or other incentives for investors, healthcare providers, and hospitals are needed to promote further expansion and development in rural areas. What further makes tackling CVDs in India

challenging is the large regional and ethnic diversity within the country. Differences in biological risk factors, access to proper care, adherence to treatments, and more may vary between different groups and regions, possibly due to religious, cultural, or social differences. Further research and careful consideration of these differences are critical for successful implementation of new interventions.

Within India, social determinants have a major impact on CVD diagnosis, outcomes, and spending. The poor are more frequently under-diagnosed, have reduced access to proper care or medicines, and face a larger financial burden from CVDs.<sup>14, 15</sup> Those of lower socioeconomic status (SES) are often less likely to have successful outcomes and receive different treatments compared to those of higher SES. For example, acute coronary syndrome patients of lower SES received different and less effective treatments than higher SES patients, which also likely contributed to their greater mortality rate.<sup>16</sup> Policies that can reduce

<sup>11</sup> Kalra, A., Pokharel, Y., Hira, R. S., Risch, S., Vicera, V., Li, Q., ... Virani, S. S. (2015). Cardiovascular disease performance measures in the outpatient setting in India: Insights from the American college of cardiology's Pinnacle India Quality Improvement Program (PIQIP). *Journal of the American Heart Association*, 4(5). <https://doi.org/10.1161/JAHA.115.001910>

<sup>12</sup> Venugopal, K. (2014). Cardiologist society of India. *European Heart Journal*. <https://doi.org/10.1093/eurheartj/ehu118>

<sup>13</sup> Yadav, K., Jarhyan, P., Gupta, V., & Pandav, C. S. (2009). Revitalizing Rural Health Care Delivery: Can Rural Health Practitioners be the Answer? *Indian Journal of Community Medicine : Official Publication of Indian Association of Preventive & Social Medicine*, 34(1), 3–5. <https://doi.org/10.4103/0970-0218.45368>

<sup>14</sup> Agyemang, C., & van den Born, B.-J. (2018). Limited access to CVD medicines in low-income and middle-income countries: poverty is at the heart of the matter. *The Lancet Global Health*, 6(3), e234–e235. [https://doi.org/10.1016/S2214-109X\(18\)30048-2](https://doi.org/10.1016/S2214-109X(18)30048-2)

<sup>15</sup> Vellakkal, S., Subramanian, S. V., Millett, C., Basu, S., Stuckler, D., & Ebrahim, S. (2013). Socioeconomic Inequalities in Non-Communicable Diseases Prevalence in India: Disparities between Self-Reported Diagnoses and Standardized Measures. *PLoS ONE*, 8(7). <https://doi.org/10.1371/journal.pone.0068219>

<sup>16</sup> Xavier, D., Pais, P., Devereaux, P. J., Xie, C., Prabhakaran, D., Reddy, K. S., ... CREATE registry investigators. (2008). Treatment and outcomes of acute coronary syndromes in India (CREATE): a prospective analysis of registry data. *Lancet (London,*

medical expenses to improve access to high-quality care for all socioeconomic classes will likely to lead to improved survival rates and a reduced CVD burden.

### **Marching Forward**

India's growing population and large socioeconomic disparities allow it to serve as a strong model for implementing various CVD policies in other low and middle-income countries. Successful CVD interventions in one of the most rapidly growing countries in the world will reduce the global health burden of CVDs and inspire other countries to take great strides forward as well. However, under-developed health infrastructures and insufficient proper resources make adoption of interventions and policies that have worked in high-income countries to lower and middle-income countries difficult. Nonetheless, it is imperative that India continues marching forward and invests resources into tackling the CVD epidemic in order to protect the health of its citizens and bring great prosperity to the country.

### **About the Author**

Puneet Gupta is a M.D. Candidate at the George Washington University School of Medicine. He may be reached on Twitter at [@PuneetGupta](https://twitter.com/PuneetGupta).