IndiaSim: An Agent-based Model for Estimating the Health and Economic Benefits of Secondary Prevention of Coronary Heart Diseases in India[1]

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Abstract

Objectives: To estimate the epidemiological and financial benefits and the distributional consequences of policy interventions for coronary heart disease (CHD) and secondary Acute Myocardial Infarction (AMI) prevention in India.

Design: Agent-based simulation model of India's population and health system.

Population: Nationally representative sample population of one million.

Interventions: Policies of Universal Public Provision (UPP) and Universal Public Finance (UPF) for scaling up availability of four drug therapies: aspirin only; aspirin with beta blocker; aspirin with beta blocker and angiotensin-converting-enzyme inhibitor (ACEI); and aspirin with beta blocker, ACEI, and statin.

Main outcome measures: Incremental health (deaths averted) and financial (out-of-pocket medical expenditure averted, impoverishment averted, and value of financial risk protection) outcomes by wealth quintile, compared to baseline.

Results: Scaling up the four interventions can potentially avert between 25.4 (24.4–26.4) and 119.1 (118.2–120.0) deaths per year per 100,000 persons aged 30 or older. Under UPF, out-of-pocket (OOP) medical expenditures increase by $1,283 (1,085–1,481) per 100,000 persons in the aspirin-only case, but decreases by $14,641 (14,466–14,816) per 100,000 when all four drugs are scaled up. The UPP lower bound scenario, which assumes no change in people's provider choice, increases OOP expenditure by up to $105,587 (105,369–105,806) per 100,000 persons. The UPP upper bound case, in which people change their health care provider after the policy, averts OOP costs by up to $14,289 (14,100–14,468) per 100,000. The burden averted relative to

income is typically highest for the first and fourth income quintiles. The policies also provide a very high and progressive-with-income value of insurance, barring a few exceptions. Finally, UPF and UPP upper bound policies prevent as many as 131 patients per 100,000 people from falling into poverty due to OOP expenditure.

Conclusion: Conditional upon provider choice behavior, the UPP and UPF policies may lead to a significant drop in both disease and financial burdens. The degree of averted burden varies across income groups, with higher relative benefits accruing to the poor.