Planning Interventions for Preventing Cardiovascular Diseases in India

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Abstract

Cardiovascular diseases (CVDs) have emerged as a leading cause of premature mortality in India, and are responsible for a significant amount of morbidity and healthcare costs. Though effective handling of the growing burden of CVDs in resource-constrained settings presents a major challenge, experiences from high-income countries reveal that CVDs are mostly preventable. However, prevention strategies are in very primitive stages, and limited information is available on the impact assessment of these interventions in India. Based on the literature on prevention approaches and the availability of secondary data on tobacco consumption in India, smoking has been identified as a behavioral risk factor to be focused upon in this research. Four preventive care interventions (i) increasing tobacco price, (ii) restricting youth access, (iii) educating about tobacco hazards, and (iv) behavioral counseling have been identified for this study. It is not feasible to implement these interventions and assess their impact on the real population. Therefore, the present study aims to use computational methods to estimate the potential health and economic impact of the interventions.

A modeling framework is developed to estimate the impact of smoking cessation interventions. The model incorporates data on smoking prevalence, cause-specific mortality, smoking rates, and plausible cessation scenarios. A set of future scenarios associated with the different plausible pattern of smoking initiation, quitting, and relapse rates in the population have been examined. The model was initialized with an initial population of the year 2010 as a base case and displayed projections till the year 2050. Analysis of the simulated output reveals that restricting youth access to tobacco could generate considerable health and economic benefits at the national level. Further, restricting youth access could produce relatively better results in the urban population and education about tobacco hazards could work better in the rural population. Cost-effectiveness analysis shows that these interventions would be 25-30 times more cost-effective than the USA. This research demonstrates the usefulness of system dynamics in planning and evaluating population care interventions. The simulation modeling framework provides us an opportunity to evaluate and choose the best possible intervention without losing precious resources and time.

Keywords: Cardiovascular disease (CVD), public health, modeling and simulation, system dynamics, preventive care, smoking, quality-adjusted life year (QALY)