

A System Dynamics Model of Community-Based Health Insurance System in Bangladesh

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Abstract

Introduction

In Bangladesh, the rising cost of out-of-pocket health expenditures is a significant obstacle to healthcare access, particularly for the low-income population. Although the government has developed a healthcare financing strategy (HCFS) in an endeavor to achieve universal healthcare coverage (UHC), providing healthcare protection for the large informal sector and their families remains a persistent concern [1,2]. Nongovernmental non-profit organizations (NGOs) are a part of Bangladesh's health system and provide primary healthcare services to the poor, vulnerable rural population with voluntary community-based health insurance (CBHI) schemes. To reach a greater portion of the informal sector in Bangladesh, CBHI initiatives managed by NGOs and microfinance institutions are aimed at the HCFS. However, there are barriers to implementing sustainable CBHI (such as slow growth in membership due to low enrolment and renewal, and a lack of self-sufficiency) and overcoming these obstacles is a policy priority for Bangladesh [3]. Therefore, the goal of this study is to identify appropriate policies which support a sustainable CBHI. To achieve this goal, a simulation model is constructed to identify where policies should be targeted and to then observe the impact of these policies over time.

Methods

In this analysis, we use data from a case CBHI scheme in Bangladesh from 2015 to 2020, and projections for the scheme for 2030. A System Dynamics approach is used to build the model, simulate, and evaluate policy scenario alternatives. The approach includes (1) understanding the problem behaviour, (2) undertaking a literature review and conducting interviews to develop the model structure, (3) data collection and processing to populate the model (4) performing tests such as Theil's inequality statistic for assessing model fit to data to enhance confidence in the model (5) simulation and policy analysis. Four policies were evaluated: door-to-door visits by community health workers, the inclusion of non-health grocery benefits to the benefit package, financial assistance for low-income families, and increasing service availability by offering telehealth and online consultation, ensuring the availability of higher-quality medicines, and providing healthcare services by paramedics to reduce physicians' workload to alleviate the problem and increase performance.

Results and Discussion

We developed a base model to simulate the historical behaviour of the CBHI scheme and projected the long-term behaviour to assess which policy interventions would be more effective. Our base model demonstrated that even after a decade of implementation, only one-third of the target population would be covered due to persistently low enrolment and significant drop-out rates. In addition, we discovered a widening gap between premium collection and overall expenses, which poses a threat to the scheme's self-sustainability in the long run. Therefore, we intend to test strategies through different scenarios analysis that are affirmed to increase population coverage by accelerating the enrolment and renewal processes.

The scenario analysis demonstrates that the best-performing scenarios can achieve 33% to 88% population coverage under different assumptions and recover 50% to 55% of the total cost through premium revenue. It was also noted that implementing all policies simultaneously is more effective than adopting them individually. Among the policies studied, the most impactful were the medicine discount policy, followed by telehealth services and additional paramedic services. However, medical service costs were determined to be the single largest contributor to the total costs. Therefore, we investigated the sustainability of CBHI by highlighting the significance of risk sharing among insured members. We found that, if 20% to 32% of insured members use healthcare benefits once during the duration of their coverage, and approximately 2% use healthcare benefits multiple times, the scheme will become sustainable approximately four years after its implementation from the baseline period.

This research indicates that voluntary CBHI may not be financially sustainable, i.e., it will not attain self-sufficiency, even if more than 80% of the population is covered. The likelihood of attaining self-sufficiency can be increased by ensuring risk-sharing among insured members, i.e., by ensuring that both high-risk and low-risk individuals join the scheme. For this reason, our research suggests incorporating health promotion and awareness activities at community level into the scheme to encourage healthier behaviour among the community. Such activities will allow for the spread of information about the scheme and will help to enroll more participants and enhance the health of the population. However, voluntary CBHI will require financial assistance prior to attaining financial sufficiency. This research revealed that CBHI will require external support for a reasonable length of time, at least four years in our model, prior to achieving self-sufficiency.

The viability of achieving self-sufficiency within small-scale, voluntary CBHI schemes is challenging in the absence of government interventions. These governmental interventions may include, but are not limited to, the provision of financial assistance by the government, integration with the broader health system to increase population coverage and ensuring a more comprehensive healthcare delivery system, as well as enacting legislation to foster a more balanced and equitable risk pool for the CBHI scheme.

Conclusion

In conclusion, CBHI schemes have the potential to effectively engage with the informal sector in Bangladesh, helping to integrate them into the planned social health protection scheme, provided they receive adequate financial and technical support from the government.