

Lessons Learned in Using Mathematical Modelling for Priority Setting in Health

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Abstract:

The COVID-19 pandemic has highlighted the need for priority setting in health financing and resource allocation, spotlighting the limitations of traditional health financing strategies. This commentary explores the relevance of mathematical modeling in enhancing allocative efficiency within the health sector, especially in the aftermath of the pandemic. We draw from the World Bank's experiences in supporting over 20 countries to employ mathematical optimization models for priority setting, aiming to achieve optimal health outcomes within constrained budgets. The pandemic's impact on economic growth, revenue collection, debt stress, and the overall fiscal space available for health financing has necessitated a paradigm shift towards prioritizing efficiency improvements in health service delivery. We outline lessons learned from such modeling and chart future directions to enhance efficiency gains, including for integrated, patient-centered approaches to health service delivery. We advocate for flexible and effective localized priority-setting, leveraging data-driven insights to navigate the complexities of health financing in a post-COVID era.

Lessons Learned in Using Mathematical Modelling for Priority Setting in Health

Conventional approaches to health financing focus on five dimensions: First, increase economic growth, so there is a larger pie to share. Second, improve revenue collection so governments can capture a larger share of the economy for public expenditure. Third, strive to mitigate debt stress so countries have more resources to allocate to health and the social sectors. Fourth, improve allocative efficiency in the health sector through better prioritization, allowing Ministries of Health and their development partners to direct funding to areas where it can have the greatest impact on population health outcomes. Fifth, enhance technical and production efficiency to allow Ministries of Health to deliver health services using modalities and mechanisms that ensure cost-effective delivery.¹

COVID-19 has profoundly and differentially affected health financing

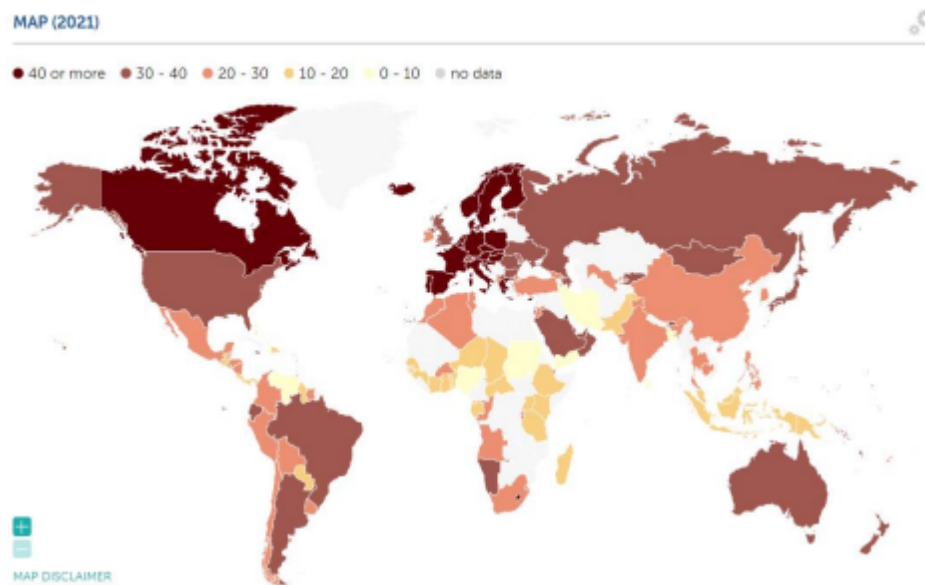
In this commentary, we focus not only on the lessons of COVID, but also the lessons about using modeling for prioritization. COVID has made lessons about prioritization more urgent than ever because of its impact on economies, budgets and health financing, health system performance, and the workforce.

The COVID-19 pandemic has profoundly affected five dimensions: (a) Economic growth is stunted, especially in low-income countries that need funding the most, putting extraordinary

strain on health budgets and fiscal space available for allocation to the health sector. Kose et al. showed that many countries, especially lower-middle-income countries, will have smaller economies by 2025 than they would have had without COVID-19.² (b) In terms of revenue collection, even prior to COVID-19, many countries especially low- and middle-income

countries raised less revenue as a share of gross domestic product (GDP) (Figure 1).³ Lower revenue collection as a share of GDP in low- and middle-income countries (LMICs) is often due to high levels of informal economic activity. In these settings, the most efficient revenue collection methods, such as taxes on the consumption of cellular or internet services, or mobile money, may disproportionately affect low-income groups.⁴ COVID-19 exacerbated the informality, resulting in proportionately reduced revenue collection. (c) COVID-19 has amplified the need to use every health dollar well: allocative, production, and technical efficiency are arguably much more critical than in the past. In the aftermath of COVID-19, both development assistance and national domestic budgets, especially for health, are more limited and debated. This situation indicates that it is crucial for Ministries of Health to prioritize efficiency improvements.⁵

Figure 1: Government revenue as a share of GDP is much lower in low-income countries



Source: IMF, 2023.

<https://www.imf.org/external/datamapper/rev@FPP/USA/FRA/JPN/GBR/SWE/ESP/ITA/ZAF/I>

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Governments are facing increasing pressure as their health resources, already limited, continue to diminish in some cases.. They must simultaneously re-build essential services, enhance both essential and public health services, prepare for future health emergencies regardless of etiology, address the rising disease burden, meet the demands for person-centered health care and budget for an expanding range of new health products, from innovations in vaccines to cancer treatments. This comprehensive and expanding agenda will only intensify with the additional challenges posed by climate change.

To address this agenda, a multi-pronged approach is needed. Economic growth in LMICs is critical to increase resources available for health. Equitable and efficient tax collection strategies are needed to increase public revenue collection. Allocative efficiency improvements through priority-setting can help optimize national health budget allocations and expenditures. Finally, when implementing health services, it is important to consider both technical and production efficiency. This commentary focuses on allocative efficiency improvements through priority-setting and examines lessons learned from the application of modeling for improvements in efficiency.

Prioritization is critical to post-COVID health financing considerations

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