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Review

Projections of costs, financing, and additional resource requirements for low- and lower middle-income country immunization programs over the decade, 2011–2020

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ABSTRACT

The Decade of Vaccines Global Vaccine Action Plan has outlined a set of ambitious goals to broaden the impact and reach of immunization across the globe. A projections exercise has been undertaken to assess the costs, financing availability, and additional resource requirements to achieve these goals through the delivery of vaccines against 19 diseases across 94 low- and middle-income countries for the period 2011–2020. The exercise draws upon data from existing published and unpublished global forecasts, country immunization plans, and costing studies. A combination of an ingredients-based approach and use of approximations based on past spending has been used to generate vaccine and non-vaccine delivery costs for *routine* programs, as well as *supplementary* immunization activities (SIAs). Financing projections focused primarily on support from governments and the GAVI Alliance. Cost and financing projections are presented in constant 2010 US dollars (US$). Cumulative total costs for the decade are projected to be US$57.5 billion, with 85% for routine programs and the remaining 15% for SIAs. Delivery costs account for 54% of total cumulative costs, and vaccine costs make up the remainder. A conservative estimate of total financing for immunization programs is projected to be $34.3 billion over the decade, with country governments financing 65%. These projections imply a cumulative funding gap of $23.2 billion. About 57% of the total resources required to close the funding gap are needed just to maintain existing programs and scale up other currently available vaccines (i.e., before adding in the additional costs of vaccines still in development). Efforts to mobilize additional resources, manage program costs, and establish mutual accountability between countries and development partners will all be necessary to ensure the goals of the Decade of Vaccines are achieved. Establishing or building on existing mechanisms to more comprehensively track resources and commitments for immunization will help facilitate these efforts.

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1. Introduction

The collective recognition of immunization's potential to reduce the threat of vaccine-preventable diseases and improve lives led the global health community to call for the "Decade of Vaccines" (DoV). The vision for the DoV is a world in which all individuals and communities enjoy lives free from vaccine-preventable diseases [1]. To bring this vision to life, experts in immunization, health, and development came together to develop a Global Vaccine Action Plan (GVAP) [2]. In order to ensure adequate, predictable, and sustainable resources over the DoV, a clear understanding of the costs of immunization programs and gaps in financing was deemed crucial. A technical working group[7] was convened between October 2011 and February 2012 to develop costing and financing projections and to describe the investments needed to make the DoV vision a reality. The objectives of this paper are to provide a detailed overview of the methodology and assumptions, describe the headline results, and discuss the main implications and limitations of the projections exercise.

2. Methodology

2.1. Analytic structure, underlying principles, and main data sources

Three principles were established to guide the costing exercise: (i) reliance on validated approaches and existing information; (ii) alignment to country plans and priorities; and (iii) use of defensible and transparent data and assumptions. Given the complexity of the undertaking as well as the availability and structure of required data, separate analyses and projections were developed to determine the vaccine and delivery costs associated with routine immunization and supplemental vaccine programs and associated financing flows. The underlying data, analysis assumptions, and projection methodologies were then standardized to enable consolidation. This resulted in a set of linear and fixed projections.[8]

The methodology and assumptions previously developed for the Global Immunization Vision and Strategy (GIVS) cost and financing analyses were used as a starting point for this exercise [3]. The assumptions were refined with information obtained from the GAVI Alliance [4], the Global Polio Eradication Initiative (GPEI) [5], the Measles-Rubella Initiative [6], the Maternal and Neonatal Tetanus Initiative [7], the Yellow Fever Initiative [8], and the Malaria Vaccine Initiative (MVI), as well as from other relevant published [9] and unpublished data sources [10]. For the reference-style data underlying the projections (e.g., population data), the analysis employed datasets validated by third-party multilateral agencies [11–15]. The analysis also leveraged published price data such as those published by United Nations Children's Fund (UNICEF) and Pan American Health Organization (PAHO), or other relevant and obtainable price estimates [16,17]. The cost projections were developed relying heavily on data obtained from country immunization plans that are reported in a standardized format—i.e., comprehensive multi-year plans (cMYPs) [18,19]. A conscious decision was made not to create a complex model based for example on statistical inference techniques or non-linear functions in order to remain as closely aligned with the assumptions in these plans as possible.[9]

2.2. Country scope and categorization

The projection exercise focused on low and middle-income countries, which face the greatest challenge of financing their immunization programs including introduction of new vaccines. The World Bank Country Income Classification database and GAVI's Country Eligibility Policy served to identify 94 countries for analysis inclusion. The 94 countries included 35 Low Income Countries (LICs), 57 Lower Middle-Income Countries (LMICs), and two Upper Middle-Income Countries (UMICs) that are in the process of graduating from GAVI-eligible support (i.e., Azerbaijan and Cuba).[10,11]

[7] See Acknowledgements.

[8] The projections are described as "linear" because constant returns to scale have been assumed; i.e., the costs of inputs are assumed to be constant over the range of immunization coverage levels projected. The projections are described as "fixed" because it has been assumed that all inputs take a single value (by contrast, a 'flexible' model would allow inputs to be characterized as variables that could take a range of values). The reasons for, and implications of these methodological choices and simplifying assumptions are provided in the Section 4.

[9] Since cMYP data available at the time of analysis mainly provide costing estimates through 2015, the 'delivery cost' projections in the analysis presented here covering the second half of the decade are based on simple extrapolations of the trends defined in cMYPs for the period 2011–2015. Furthermore, since the majority of the 'expanded portfolio' of vaccines are not assessed by countries in the set of cMYPs available at the time of analysis, a combination of global demand forecasts and incremental unit costs (derived from an analysis of the cMYP dataset) were used. Further details on the definition and derivation of 'vaccine costs' and 'delivery costs', the vaccine categorization (i.e. the different 'portfolios of vaccines') used in the analysis, and the derivation and application of incremental unit costs are described in the remainder of Section 2.

[10] World Bank income classification released July 2011, based on 2010 Gross National Income (GNI) per capita. Low-income countries have a 2010 GNI per capita of $1005 or less. Lower middle-income countries have a GNI per capita of between US$1006 and $3975.

[11] See Web Annex 1 for full list of countries included in this analysis.