Summary of Key Evidence Related to Economic Benefits of Immunization for Zero-Dose Children

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Key Points

- Vaccines are an efficient investment that yield a significant return.
- Immunization programs protect zero-dose families from the significant medical expenses required to treat vaccine-preventable diseases, averting medical impoverishment.
- Zero-dose prevalence is typically higher among the poorest families, highlighting the existing economic inequities in vaccine coverage that can be improved through targeted immunization efforts.
- Increasing immunization coverage among zero-dose children may also improve educational attainment, therefore increasing a child's future earning potential.
- The economic benefits of vaccines emphasize the cross-sectoral benefits of routine immunization and strengthen the case for future investment in these programs.

As part of Gavi 5.1's ambitious agenda to "leave no one behind with immunization" on the path to achieving the 2030 SDGs, Gavi has commissioned the International Vaccine Access Center (IVAC) to produce evidence-based and policy-relevant knowledge products relevant to Gavi's equity approach in wider political and policy spaces. This knowledge summary is the last in a series of six (6) documents which aim to provide a snapshot of recent key evidence related to a specific topic or area of interest. **This document focuses on the economic benefits of immunization among zero-dose children.** Key findings are briefly described below in the form of an annotated bibliography but the related advocacy brief presents additional information about the topic and contextual details.

Introduction

Vaccines are known to be among the most cost-effective health interventions, protecting children from vaccine-preventable diseases while also providing broad economic benefits. Childhood immunization programs require a significant investment but are estimated to save millions of lives and billions of dollars in healthcare costs, transportation costs, and productivity lost due to illness[1-5]. Currently, there is limited evidence about the direct costs associated with immunizing zero-dose children and the expected return on investment (ROI) specific to this underserved population. Few papers discuss potential costs associated with

scaling up immunization coverage, including expansion to reach isolated communities, marginalized populations, urban slums, and other hard-to-reach areas in particular. However, some studies suggest that costs to extend coverage to these underserved areas—where many zero-dose children and their families reside—may be 2-3 times the routine costs per dose[3,6,7]. Given the dearth of literature estimating costs directly related to zero-dose, we assess the potential economic benefits of immunization among zero-dose children by presenting evidence about the value of immunizations in general and for families living in extreme poverty, discussing implications for improving equity, and examining how vaccination of zero-dose children can increase lifelong earning potential.

Vaccines Provide a Strong Return on Investment

A growing body of evidence on vaccination in low-and-middle income countries (LMIC) has shown that vaccines in general are an efficient investment that bring important economic benefits and yield a significant ROI[2,4,8].

A 2020 analysis estimated the ROI of immunization programs targeting 10 antigens (Haemophilus influenzae type B [Hib], hepatitis B [HBV], human papillomavirus [HPV], Japanese encephalitis, measles, Neisseria meningitidis serotype A, rotavirus, Streptococcus pneumoniae, rubella, and yellow fever) across 94 LMICs between 2011–2030[4]. The analysis found that in Gavi-supported countries, the ROI for immunization programs ranges from 23.6–54.0. In other words, **between 2011–2030, immunization programs in Gavi-supported countries are estimated to yield a net return anywhere from 24–54 times greater than the initial investment.**

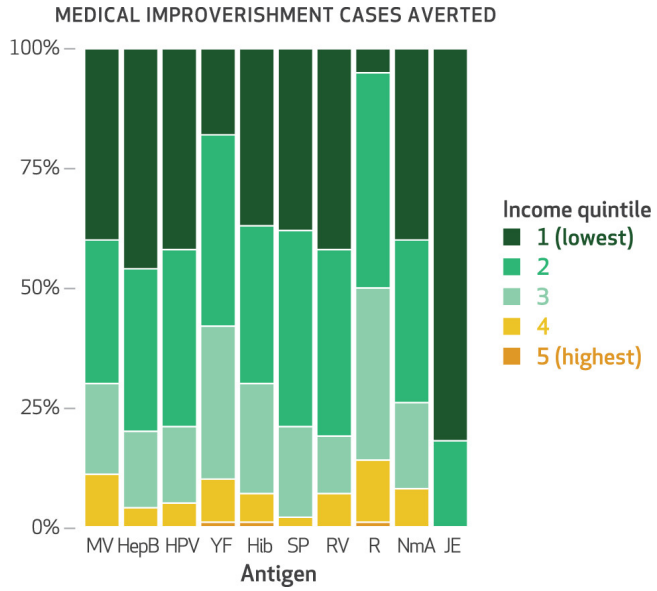
Vaccines Protect Vulnerable Families from Catastrophic Medical Expenses

Investing in immunization programs for zero-dose children also provides value for their families, who are often living in extreme poverty. In Gavi-supported countries, nearly two-thirds of families with zero-dose children live on less than US$1.90 each day[13]. These families are especially vulnerable to the significant medical expenses incurred when resources are required to treat sick children, which are known drivers of impoverishment in LMICs[14-15]. These out-of-pocket expenses often include the direct costs of treatment as well as indirect costs like transportation to health facilities and lost wages due to illness or caring for a sick child.

A 2018 analysis examined how vaccines targeting 10 antigens (Haemophilus influenzae type B [Hib], hepatitis B [HBV], human papillomavirus [HPV], Japanese encephalitis, measles, Neisseria meningitidis serogroup A, rotavirus, Streptococcus pneumoniae, rubella, and yellow fever) could potentially avert the number of cases of medical impoverishment to families in 41 LMICs between 2016–2030[15].

The study found that **between 2016–2030, immunization programs in these countries could have averted 24 million cases of medical impoverishment**, **with the economic benefits of immunization programs most impactful for families in the lowest income quintiles.** The researchers concluded that support and

expansion of routine immunization for all, particularly in economically poor and marginalized communities, would represent an important step toward reducing poverty and improving health equity.



Source: Chang et al., 2018[15]

Routine immunization protects the most vulnerable families from the significant medical expenses required to treat vaccine-preventable diseases. This chart illustrates that the greatest proportion of medical impoverishment cases averted by immunization is concentrated in the lowest income quintiles.

Economic Inequalities in Zero-Dose Prevalence are Particularly Pronounced in Low-Income Countries

Since 2019 and with the onset of the COVID-19 pandemic, the number of zero-dose children has increased by 37%, from 13.3 to 18.2 million children globally[11]. Among Gavi-supported countries, lower-income countries were notably impacted by the pandemic, with only 10 LMICs accounting for 62% of all zero-dose children in 2021[10,11]. Inequitable distribution of zero-dose children exists across as well as within countries[9,12].

A 2022 analysis of 89 LMICs assessed economic-related inequality in the prevalence of zero-dose children between poor and rich households and compared their gaps across the countries[12]. It found that, **in the majority of countries, zero-dose prevalence among the poorest quintile is at least twice as high as in the richest quintile**. The analysis also found that the rich-poor gap is more pronounced in low-income countries (LICs) than in lower-middle-income countries (LMICs) and high-income countries (HICs). Although this gap had narrowed in some countries, for the most part, inequality remained unchanged over time. Researchers concluded that **economic-related inequalities in zero-dose prevalence disproportionately affect LICs.**

Vaccines May Increase a Child's Future Earning Potential

In addition to the well-documented health benefits of vaccines, researchers have also begun exploring long-term, non-health benefits such as schooling attainment and lifelong earning potential[15-17]. A 2020 analysis, for example, examined the association between childhood immunization and school attainment in India by comparing the schooling attainment of 100,000 adults who were born before and after the country implemented its Universal Immunization Programme (UIP) in 1985[16].

It found that **school attainment for those born after the UIP was implemented was 0.18 grades higher than those born before implementation**. **This difference was more pronounced for women,**

as those born after UIP implementation attained 0.29 more grades of schooling.

Researchers concluded that immunization was positively and significantly associated with educational attainment, which past research has linked with higher wages.

Summary and Conclusions

These studies demonstrate that routine immunization not only reduces the risk of poor health outcomes but also decreases family- or household-level economic vulnerability, as serious illness can often lead to financial ruin or catastrophe. Although evidence directly relating zero-dose strategies to value from an economic lens remains sparse, these studies illustrate that attaining better health outcomes from vaccines can indirectly contribute to addressing poverty, particularly in low-income countries where health inequity is higher. This research also builds on the growing evidence of routine immunization as an enabler of good health and its cross-sectoral benefits.

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