



Commentary

Immunization programs are investments, not spends

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Through effective immunization programs, the World is free from smallpox since 1980, a devastating human disease, as well as from rinderpest, an important animal disease since 2011. On August 25th, 2020, Africa was also declared free of Polio, a milestone for the Polio eradication program, with only Pakistan and Afghanistan currently fighting against wild poliovirus transmission. These examples illustrate that immunization programs are one of the most effective medical intervention. However, there is still a significant proportion of the world's population that consider vaccinations unnecessary and unsafe, a waste of funding resources, and believes that the decision for children to take vaccines rely only on an individual parents' decision, rather than on recommendations issued by WHO or country's public health directions. Moreover, not all politicians agree on the strategic value of these programs in public health and consider mistakenly only their costs as spends (such as vaccine purchase, consumables, infrastructure and personnel costs) and not investments (such as the result of the immunizations programs in saving lives and money from decreased spends in hospitalizations, health care support and increase in labor and economical productivity).

In this scenario, a recent study showing the good return on investment (ROI) from immunization against different pathogens in several low- and middle-income countries led by Sim and colleagues¹ is an important contribution to understand the economical importance of immunization programs. The study is an update of previous work by Ozawa et al. [2], covering the 2011–2020 decade and also forecasting the next decade (2011–2030). The authors used two different approaches, one based on cost-of-illness (COI) and the other based on the value-of-a-statistical-life (VSL) to estimate the return of investment from immunization programs. COI measures and compares the economic burdens of the diseases to the society and VSL considers the local tradeoff rate between fatality risk and money in order to estimate the population's willingness to pay for risk

reduction and the marginal cost of enhancing safety. In the study, the estimates by COI and VSL were analyzed with immunization program costs to derive the ROI from immunization programs against 10 pathogens for 94 low- and middle-income countries for the period of 2011–30. The immunization programs considered were against *Haemophilus influenzae* type B, hepatitis B, human papillomavirus, Japanese encephalitis, measles, *Neisseria meningitidis* serotype A, *Streptococcus pneumoniae*, rotavirus, rubella, and yellow fever.

In the study by Sim and colleagues [1] using the COI approach, the ROI for 1 US\$ dollar invested in immunization programs against the 10 pathogens was US\$ 26.10 for the 94 countries from 2011 to 2020 and US\$ 19.80 from 2021 to 2030. Using the VSL approach, ROI was US\$ 51.00 from 2011 to 2020 and US\$ 52.20 from 2021 to 2030 [1]. This analysis shows that immunization programs are positive investments. Depending on the approach, in the analysis for each 1US\$ dollar invested, the ROI was around 20 or 50 US\$. However, this may not necessarily apply for all the immunization programs and each program must be carefully analyzed. For instance, the ROI can vary among the countries, according to diseases and periods of time. The ROI estimates from the study by Sim and colleagues [1] will inform and help country policy in funding the efforts to these programs and initiatives. However, the full benefits of an immunization programs will not only depend on sustained commitment and investment in these programs, but also on a better understanding of the immunization programs by the public that will support these decisions and actions.

The approach of measuring ROI should be extended and utilized by policy makers to augment public support for new immunization programs. This is particularly important to consider in the current days when politicians are being pushed against immunization programs by antivax campaigns or by cuts in scientific investments. Some examples are related to vaccine developments of emerging infectious disease, such as the case of Zika virus epidemic and the COVID-19 pandemic [3–5].

The immunization of the population against COVID-19 is also an example of investment and not spend. Although this vaccination would cost hundreds of millions to billions of US\$ depending on the size of a population and on the vaccine used, this will save lives and money from hospitalizations and it is expected to have a huge positive impact on the country's economy health. The immunized countries will likely be able to resume industrial production sooner and will have an economical advantage in comparison to non-immunized countries or countries with delayed anti-COVID 19 vaccination programs.

The study by Sim et al. [1] is timely and strategic for current and future global public health planning. It justifies the decisions already

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made by several policy makers in different countries worldwide to invest in immunization programs against different diseases, which can also help to bring equity and diminish inequalities in a Global scale [6,7].

Contributors

Paulo Lee Ho conceived the idea and wrote the text; Milena Apetito Akamatsu and Carolina Yumi Takano discussed the content, helped to write the text.

Declaration of Competing Interest

The authors declare that there are no competing interests.

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