

Taking stock of global immunisation coverage progress: the gains, the losses and the journey ahead

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Despite the enormous benefits of vaccination, global immunisation coverage progress has stalled and remains suboptimal in many countries. In this commentary, we review the recently published update of the World Health Organization and United Nations Children's Fund Estimates of National Immunization Coverage. We highlight trends in which, despite substantial gains made in improving immunisation coverage at the global level, there remain numerous challenges with reaching and sustaining optimal coverage. We contextualise the trends by exploring plausible supply- and demand-side root causes. Based on these, we stress the need for targeted, context-appropriate strategies for reaching and maintaining optimal immunisation coverage.

Introduction

Vaccination is considered one of the greatest advances in health and one of the most effective means of disease prevention.¹ Despite the enormous benefits of vaccination, global immunisation coverage progress has stalled and remains suboptimal in many countries.² As the Global Vaccine Action Plan 2011–2020 (GVAP) enters its final year, it becomes important to critically take stock of the journey so far, where gains have been made and where opportunities have been missed.³ Endorsed by the World Health Assembly in 2012, the GVAP calls on all countries to reach $\geq 90\%$ national coverage with all vaccines in the country's national immunisation schedule by 2020.² It is now imperative to learn the lessons for shaping the post-2020 agenda, through which the world can sustain its hard-won gains and expand the benefits of immunisation to those currently missing out, irrespective of where they are.

Immunisation coverage trends

In July 2019, an update of the World Health Organization (WHO) and United Nations Children's Fund (UNICEF) Estimates of National Immunization Coverage (WUENIC) was published.⁴ The estimates were derived from multiple sources, including official reports submitted annually by WHO member states, through the

WHO/UNICEF Joint Reporting Form and population-based household surveys.

Looking at global estimates from 1980 through 2018, the world has sustained demonstrable increases in immunisation coverage. However, when examined at regional and national levels, there are variations in the magnitude, direction and pace of progress. It can be seen that immunisation coverage has markedly improved in many countries, while either improving less substantially or declining in others. A closer look at the data reveals that the incremental changes in immunisation coverage are of larger magnitude in low- and middle-income countries (LMICs; most of which started from very low levels of coverage) compared with high-income ones. The trend becomes more conspicuous when estimates are compared across WHO regions, with relatively lower-income regions (most of which started from very low levels of coverage) showing better progress relative to their higher-income counterparts. It is important to note that, in spite of their relatively better progress, the immunisation coverage rates of most countries in the African and Southeast Asian WHO regions still fall short of the $\geq 90\%$ national target recommended by the GVAP.²

Between 2000 and 2018, the average global coverage of the first dose of measles-containing vaccines (MCV1) has appreciably increased from 72% to 86%. While the average regional

coverage for MCV1 has substantially increased in the African (from 53% to 74%) and Southeast Asian (from 63% to 89%) regions, it increased less substantially in the Eastern Mediterranean (from 71% to 82%) and Western Pacific (from 85% to 95%) regions. The increase has been marginal in the European region (from 91% to 95%) and has declined in the American region (from 93% to 90%).

Similarly, in the same period (between 2000 and 2018), the average global coverage of the third dose of diphtheria-tetanus-pertussis-containing vaccines (DTP3) has significantly increased from 72% to 86%. Estimates of DTP3 coverage have improved considerably in the African (from 52% to 76%) and Southeast Asian (from 64% to 89%) regions. Coverage increased less considerably in the Eastern Mediterranean (from 72% to 82%) and Western Pacific (from 85% to 93%) regions, almost stalling in the European region (from 93% to 94%) and declining in the American region (from 91% to 87%). DTP3 is one of the surrogate indicators of immunisation programme performance for which countries are expected to reach at least 90% national coverage.² Remarkably, despite these relatively more substantial increases in immunisation coverage in the African region, the region's average coverage level in 2018 is still lower than the coverage levels of the Western Pacific, European and American regions in 2000.

These trends are maintained when estimates are compared across the World Bank income blocs. Between 2000 and 2018, while the average MCV1 coverage has immensely increased in low-income countries (LICs; from 54% to 75%), it improved less remarkably in middle-income countries (MICs; 73% to 87%), with a marginal increase in high-income countries (HICs; from 91% to 94%). The same can be said for DTP3. While the average coverage has significantly improved in LICs (from 52% to 78%), there has been a less significant increase in MICs (from 73% to 83%), with a marginal increase in HICs (from 93% to 95%). It is also noteworthy that, despite the substantial relative increases in MCV1 and DTP3 immunisation coverage in LMICs, the 2018 average coverage levels in these countries are still lower than the coverage levels achieved in HICs nearly 2 decades ago in 2000.

While these are regional trends that may mask disparities between and within countries, they imply that millions of children around the world are still missing out on lifesaving vaccines for which they are eligible. Despite substantial progress in LMICs, immunisation coverage rates are still below the optimal national target recommended by the GVAP. This means that many children in those countries are still not having optimal access to the vaccines they need. These trends also indicate that children who are missing out on vaccines they are eligible for may be found anywhere in the world, from the most far-flung communities of the world's poorest countries, to well-resourced neighbourhoods in some of the world's richest countries. In the next sections we explore the supply- and demand-side factors as well as broader immunisation programme and health systems dynamics influencing the observed global, regional and national immunisation coverage trends.

Supply-side dynamics of suboptimal immunisation coverage

Improved vaccine financing, procurement and delivery have enabled much of the observed progress in LMICs. This is largely

driven by Gavi (the Vaccine Alliance), an innovative vaccine financing alliance created in 2000 to support immunisation programmes in many of these countries, by accelerating access to new and underutilised WHO-recommended vaccines.⁵ Recurrent outbreaks of vaccine-preventable diseases, such as yellow fever and measles, in many LMICs are an indication that immunisation coverage gains are yet to reach optimal levels.⁶ For instance, even with the remarkable increases in DTP3 immunisation coverage in LMICs, the current average coverage levels of 78% in LICs and 83% in MICs are still lower than 90% as recommended by the GVAP.²

Recent data reported by countries through the WHO/UNICEF joint reporting process show that each year at least one-third of countries experience one or more vaccine stockouts lasting for at least 1 month.⁷ Inadequate vaccine supply and stockouts, which are more prevalent in LIC contexts, interrupt immunisation service delivery, often leading to unavailability of vaccines and missed opportunities to vaccinate children.⁸ Supply-side challenges encompass immunisation programme factors such as vaccine procurement, cold chain and logistics management, service delivery and vaccine information systems. Vaccine supply is also hampered by broader health systems factors such as gaps in immunisation policy, standards and guidelines; governance and management; human resource availability and sustainable financing.⁹

In Ethiopia, for instance, suboptimal immunisation coverage has been attributed to supply-side issues such as inaccessibility of health facilities and routine immunisation services, poorly motivated health and immunisation workers, inadequate training of vaccinators and inefficient vaccine cold-chain management and logistics. Others include inconvenient immunisation timing, lack of information about immunisation schedules, long waiting times and poor compliance with the vaccine open vial policy (OVP) for multidose vials.¹⁰

Drivers of suboptimal vaccine demand and uptake

Obviously vaccines can prevent disease only if they reach the intended target populations. The mere availability of and access to vaccines are no longer enough to sustain immunisation coverage at optimal levels. In recognition of this, the second strategic objective of the GVAP envisions helping 'individuals and communities to understand the value of vaccines and demand immunisation as both their right and responsibility'. That objective is distinct from the other objectives, as it does not focus on supply-side aspects of immunisation programmes but rather on public demand for vaccines and immunisation services.³

The declines or less substantial increases in immunisation coverage observed in some countries, particularly in Europe and the Americas, may have been due in part to the fact that sustained increases become more difficult to achieve at higher immunisation coverage baselines. However, a broad range of factors have been attributed to suboptimal vaccination demand and uptake in these contexts, including perception of the low incidence and risk of vaccine-preventable diseases, unfounded fears of vaccine adverse effects and misperceptions—all of which fuel anti-vaccine sentiments.^{11,12} The findings of a recent global survey of vaccine confidence by the Wellcome Trust lent some context to this trend. According to the Wellcome survey, 95% of people in South Asia

and 92% in eastern Africa felt that vaccines are safe. While 72% of people in northern America and 73% in northern Europe felt so, only 59% of those in Western Europe and 50% in Eastern Europe felt that vaccines are safe.¹³

Given these realities, there is a need to understand demand-side factors such as vaccination trust, confidence and decision making in their broader sociocultural context.¹⁴ With the growth of consumerism in healthcare, there has been a shift in the traditional locus of power away from healthcare professionals as sole directors of patient care to shared decision making in which there is greater involvement of patients in the decision-making process concerning their health.¹¹ The validity of science and the legitimacy of medical authority are increasingly being scrutinised, with more individuals being likely to question the relevance of vaccination in the contexts of consumerism. Such a paradigm shift has been more evident in HICs.^{15,16}

The term vaccine hesitancy has been used to describe the broad range of psychosocial factors attributable to reduced vaccination demand and uptake. Specifically, vaccine hesitancy refers to a delay in acceptance or a refusal of vaccines despite the availability of vaccination services. It includes factors such as complacency, convenience and confidence.¹⁷ It is an increasingly worrisome and complex global health problem that, if left unaddressed, can reverse the enormous gains and successes of vaccines.¹⁸ Recognising this enormous danger, the WHO, in January 2019, declared vaccine hesitancy as one of the top 10 threats to global health.¹⁹

Vaccine-hesitant individuals are a heterogeneous group of people with varying levels of concerns, doubts and perceptions about specific vaccines or vaccination in general. The increase in vaccine hesitancy has made it difficult to reach and maintain high vaccination coverage.²⁰ The consequences are already evident, contributing to low vaccine coverage that is driving a measles epidemic that has swept across Europe with >41 000 cases reported across the region in the first 6 months of 2018, the highest in the past decade.²¹ In the USA there was a total of 704 cases reported between January and April 2019, the highest number since 1994.²² More recently, following an increasing reports of measles cases, the UK lost its 'measles free' status in August 2019.²³

The roles of vaccine-related events in shaping vaccine perception, confidence and trust have also been explored.²⁴ A study evaluating the state of vaccine confidence in 67 countries found low vaccine safety confidence in many European countries, with the least confidence observed in France.¹⁶ This was attributed in part to vaccine-related events that occurred in France, including rumours about multiple sclerosis and other demyelinating diseases associated with the hepatitis B vaccine, which led to temporary withdrawal of the vaccine by French health authorities in 1998.¹²

The way forward

Fulfilling the vision of the Expanded Programme on Immunisation requires sustained investments in routine immunisation. Maintaining an adequate supply of vaccines requires effective health systems leadership and governance, improved procurement and supply chain management, adequate human resources, innovative information systems and efficient service delivery.⁹

Governments at all levels need to demonstrate ownership of their immunisation programmes by finding sustainable financing solutions and integrating immunisation services into broader health systems service delivery. Such efforts are particularly essential in LMICs, complementing investments from external sources such as Gavi.⁵

Key focus areas for improving vaccine supply and availability at a programmatic level include the development of strategies to address supply chain gaps, which can improve vaccine adequacy and availability to the last mile. Many innovative strategies have been piloted in several countries.⁸ These include the use of energy-efficient cold-chain technologies and locally responsive logistics management in resource-limited settings. Another approach is the deployment of improved supply, inventory and stock management information systems to monitor vaccine stock levels in real time. These can enable the timely evaluation of supply-side performance while facilitating informed procurement and stock management decision making. Another vaccine stock management approach involves the crowdsourcing of reports of stockouts from patients and community volunteers. These reports are then sent to relevant health system entities to elicit system changes for improving vaccine availability.⁷

The impacts of some strategies in addressing vaccine hesitancy and other demand-side issues have been reviewed and findings reveal that although some interventions have yielded positive results in some settings, there is no single strategy that works as a magic bullet in remedying the problem.²⁵ Hence interventions that employ multicomponent strategies that are adapted to the context produce the best results.²⁶ There is thus a vital need for tailored, context-appropriate, evidence-based strategies to address the underlying determinants of vaccine hesitancy at every level. One of the most important interventions is the improvement of communication strategies using well-targeted dissemination of appropriate information and risk communication to individuals and communities. These should include appropriate communication of potential side effects and how to manage them, strengthening surveillance of adverse events following vaccination and appropriate community engagement, especially during immunisation campaigns, to allay fears and misperceptions.^{1,24}

In the face of increasing public hesitancy to vaccinate, frontline immunisation programme personnel and health workers remain the most trusted advisors and influencers of vaccination decisions. Greater confidence in vaccine among general practitioners in Europe was found to correlate with greater confidence and a positive perception of vaccination among the general public.¹⁵ Because they are faced with time constraints, limited resources, inadequate information and insufficient training, frontline health personnel may have limited capacity and confidence to deal with emerging vaccine-related concerns and to clearly communicate vaccine benefits and risks. Identifying such human resource gaps presents a vital opportunity for instituting remedial frontline actions capable of having far-reaching impacts on the uptake of vaccines and immunisation services.

Recent findings reveal that the hotspots of recent measles outbreaks in the USA are communities where parents can opt out of vaccination.²⁷ Enforcing mandatory vaccinations is one of the strategies adopted by some countries, like Italy and France, to

address suboptimal vaccination uptake.²⁰ However, due to the human rights and civil liberty implications of such strategies, each country should find the most context-sensitive ways of implementing them to reach and sustain optimal vaccination coverage.

One of the key enablers of vaccine hesitancy is dissemination of misinformation through the internet, commonly through social media, especially following vaccine-related events.^{28,29} Facebook and Twitter have been used as channels for spreading hesitancy-inducing misinformation. There is a need for real-time surveillance and monitoring frameworks to promptly detect and respond to vaccine-related events, social media misinformation and emerging concerns.²⁸ Information technology tools might play an important role in this through timely and appropriate public education and strategic information sharing.²⁹

It is also vital to continue involving key stakeholders, such as religious leaders, civil society organisations and immunisation champions in disseminating evidence-based messages on vaccines.^{25,26} Appropriate surveillance and free management of side effects should be guaranteed and prioritised for national immunisation programmes and implementation partners for both routine immunisation and vaccination campaigns. Building trust within the target population is essential, and this can be achieved by providing access to reliable information and promoting discussion about the benefits and side effects of vaccines that can address the concerns of parents, caregivers and the general public in a respectful and culturally sensitive manner.

Conclusions

As the GVAP enters its final year, it is important to take stock of the journey so far: where gains have been made, where old challenges persist and where new ones are emerging. In view of the current suboptimal immunisation coverage in many LMICs despite achieving substantial increases in coverage, as well as the relatively marginal gains and declines in several HICs in spite of the substantial progress made at the global level, broad-based, context-specific strategies are needed to optimise access to immunisation services. Such strategies will have to address the various root causes of suboptimal vaccine financing, supply and availability, as well as demand-side barriers like vaccine hesitancy, while also instituting pre-emptive measures against the emergence of these problems in contexts where they are less prevalent. In addition to advancing the gains of vaccines in LMICs, global and national health systems have a collective responsibility to ensure the gains already made in high-income settings are not reversed. This is important for guaranteeing that the full benefits of immunisation are extended to all people, regardless of where they are born, who they are or where they live.

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