



Commentary

Identify, target, monitor: Experiences of a fresh approach to addressing immunization inequities in Pakistan



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Globally, vaccines save 2–3 million lives every year [1] – but millions continue to die from vaccine-preventable diseases. In addition to saving lives, vaccines reduce healthcare costs, spread of infectious diseases and prevent anti-microbial resistance; they also contribute to increased work productivity, school attendance and educational outcomes [2]. Vaccination is the most cost effective public health intervention; for every dollar invested in vaccination, an estimated US\$ 16 are saved in healthcare costs [3].

1. Challenge: Stagnant coverage and growing inequity

In 2018, a record of 116 million children were vaccinated globally; however, 19.4 million children under 1 year of age worldwide did not receive the three recommended doses of Diphtheria-Tetanus-Pertussis (DTP) vaccine. About 4.8 million of them (25%) live in just three countries: Afghanistan, Nigeria and Pakistan. South Asia is home to 4.4 million un or under immunized children, representing 23% of the global population of un or under immunized children in 2018. Pakistan alone is home to 1.4 million un or under immunized children (Fig. 1).

Many low and middle-income countries face challenges to reach the most marginalized children. Multiple factors, including conflict, under-investment in national immunization programmes, vaccine stock-outs, and disease outbreaks, contribute to the disruption of health systems and prevent sustainable delivery of vaccination services. About 1 in 5 (nearly 4 million) of the un- and under-vaccinated infants live in fragile or humanitarian settings, including countries affected by conflict [4].

Despite achieving relatively high rates of immunization coverage, populous developing countries contribute significantly to the number of unvaccinated children as immunization programmes have struggled to keep up with growing birth cohorts. India, for example, is home to 2.6 million of the under-vaccinated in spite of having 89% coverage of a cohort of approximately 23 million surviving infants. Efforts to raise global immunization levels will require a strong focus on the countries where the highest numbers of unvaccinated children live – while also ensuring that countries where children are most likely to miss out on immunization are

not neglected [4]. Monitoring data at subnational levels is critical to helping countries prioritize and tailor vaccination strategies and operational plans to address immunization gaps and reach every person with lifesaving vaccines [5]. Moreover, vaccine coverage is often higher among the socioeconomically advantaged as opposed to disadvantaged groups [6]. This disparity in vaccination coverage remains one of the intractable challenges in public health. However, if resolved, equitable vaccination can play a role in reducing overall health disparities and poverty – because the benefits from vaccination accrue predominantly in the lowest income quintiles [7].

Pakistan is a country in which vaccines often do not reach the most disadvantaged children. In 2018, only 51% of the children in the poorest wealth quintile received a third dose of the Diphtheria-Tetanus-Pertussis vaccine (DTP-3) compared to 91% in the richest wealth quintile. Further, there are wide gaps in DTP-3 coverage in urban and rural areas across the four provinces. In Sindh, DTP-3 coverage is 74% in urban areas versus 46% in rural areas, 81% in urban Khyber Pakhtunkhwa (KP) versus 62% in rural KP, and 57% in urban Balochistan versus 26% in rural Balochistan [8]. While many disparities in vaccination coverage between the advantaged and disadvantaged appear to have decreased between the 2017–18 Pakistan Demographic Health Survey and prior surveys, there are still significant inequities that warrant tailored strategies for reaching missed children [9].

Possible reasons why countries like Pakistan are struggling to achieve equity in immunization include inadequate guidance, insufficient analysis of coverage and equity, and limited data to identify – and therefore respond to – subnational inequities.

2. ITM: identify, target, monitor

ITM is a novel, simple operational approach that enables immunization managers to think logically to identify children in high-risk urban, remote rural and conflict areas with a clear focus on subnational, context-specific targeting. Based on their experience, local knowledge and available data, managers can develop strategies to target children who are being continuously missed by the health system and regularly track progress and bottlenecks.

The ITM framework (Fig. 2) supports program managers to address equity issues in a systematic and standardized manner

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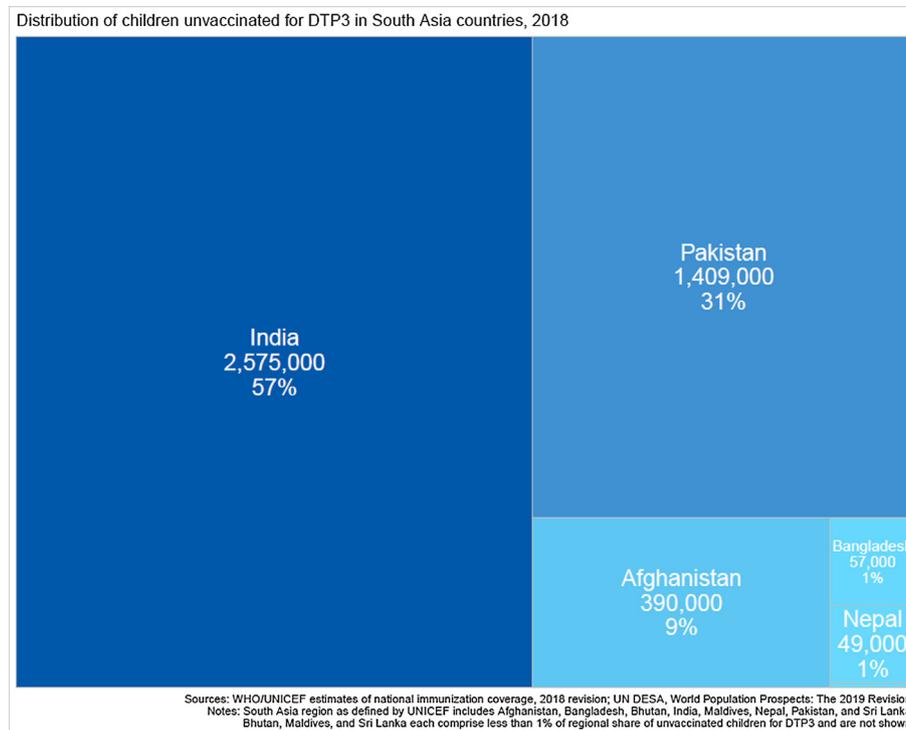


Fig. 1. Distribution of children unvaccinated for DTP3 in South Asia countries, 2018.

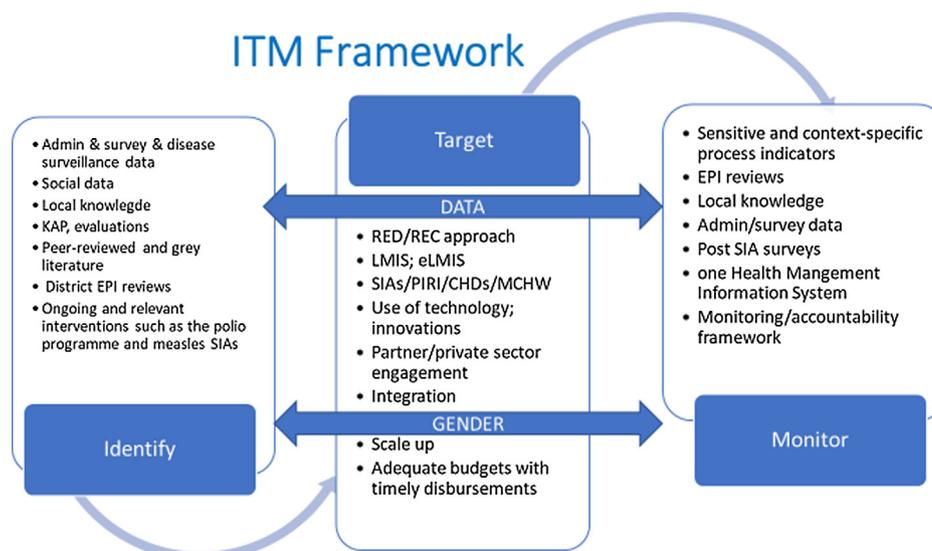


Fig. 2. Identify, Target Monitor: a three-pillar framework for action on immunization inequity.

by guiding: (i) improved understanding of reasons for inequities in the subnational context ('Identify'); (ii) a description of current best practices in addressing inequities ('Target'); and, (iii) the development of monitoring strategies to track equity ('Monitor') with data and gender as cross cutting priorities. The ITM approach aims to improve equity-based programming in immunization.

The ethos of ITM is completely aligned with the Reaching Every District/Reaching Every Community (RED/REC) approach that is core to immunization programmes. Implementation of RED/REC tends to be particularly weak at local levels where effective, community-based micro-planning would allow for much greater

understanding of the service delivery gaps in both unreached and underserved areas. The activities under the ITM framework are often missed by programme managers because of the lack of focus on the lowest operational level coupled with sub-optimal implementation, and weak monitoring and accountability mechanisms.

In April 2019, the Government of Pakistan, with technical assistance from UNICEF, organized a four-day workshop to test the feasibility, relevance and appropriateness of ITM with immunization program managers, decision-makers and in-country partners. The workshop was designed to engage national and subnational implementers to address inequity in immunization based on the ITM

framework. The workshop provided a simple, practical approach to reposition childhood vaccination programmes to deliver innovative, evidence-based, and gender sensitive strategies to reach key populations and individual children that are currently missed.

The ITM approach is promising as it created excitement amongst the participants of the workshop to simplify their existing approaches to reach missed children in high risk urban, remote rural, conflict areas, and to better understand gender-related barriers to immunization, based on their local knowledge and data. Furthermore, the workshop enabled them to reflect on what is working and what is not working with regards to current strategies to reach missed children. In addition, it also provided an opportunity for the provinces to learn from each other and from colleagues working in polio to collaborate on solutions to address priority equity issues. The planning for sub national workshops is already underway to institutionalize equity metrics at all levels.

2.1. Pillar 1: Identify

Analyses suggest that three groups often lose out on the benefits of vaccination: the urban poor, children living in remote rural areas, and children living in conflict affected areas [8]. Research also indicates that inequities are exacerbated by gender-related barriers such as limited education and health literacy, and women's lack of decision-making power, among others [9–11].

Participants in the Pakistan workshop used available data (administrative data, surveillance data, the Pakistan Demographic and Health Survey (PDHS), Pakistan Social and Living Standards Measurement Survey (PSLM), Multiple Indicator Cluster Survey (MICS), local knowledge, EPI reviews, zero dose data shared after Polio campaigns, the EPI management information system (MIS), social data, data triangulation) to identify unimmunized children or areas with high inequities, focusing on the three population groups listed above and the gender dimension. They drew on their experiences and knowledge to describe the specific context for these disadvantaged populations, and related barriers and challenges. Participants then determined whether these groups could be identified in existing data. They found that high and low coverage communities often cross administrative boundaries.

District level administrative recording and reporting systems often produce unreliable data further creating challenges. In addition, robust surveys provide stratified coverage results but are not often practical at district level. Triangulating data by leveraging administrative data and population-based survey results at national and first subnational levels coupled with targeted local rapid assessments for equity-based strategy development should be the standard practice. An important balance must be struck between additional data disaggregation to enable a targeted approach, and overburdening health workers with superfluous data recording, collection and analysis.

Taking into account these data challenges, participants agreed that inequities in coverage are highly context specific, and that local knowledge and data are required to identify gaps and target underserved populations. Triangulation of district and sub-district data for decision making is critical to effective targeting of inequities. However, in Pakistan, data are generally insufficiently disaggregated at the local level, and health management information systems are often fragmented. Data reporting systems do not adequately capture disparities across socioeconomic quintiles, geography, mother's education etc. In addition, those analyzing data generally have inadequate understanding of gender-based factors and there is a lack of effective tools and appropriate metrics to identify gender-based barriers to immunization.

Gender in immunization programmes is traditionally limited to an assessment of the percentages of boys and girls vaccinated with no consideration of the key barriers that might impact parents'

decision or ability to vaccinate their children (whether male or female). Past surveys only provide sex disaggregated data at the national or first sub national level hence, they do not capture gender related disparities at the lowest operational level. Furthermore, EPI Pakistan never reports on sex disaggregated data. This workshop was used as an opportunity to reiterate the need to focus on gender related barriers, which is expected to be a key area of focus in the World Health Organization's Immunization Agenda 2030 and the next strategic plan for Gavi, the Vaccine Alliance (Gavi 5.0).

The immunization programme in Pakistan is starting to address these challenges. Computerized Union Council level micro plans are being rolled out across the country and the RED/REC approach is being scaled up in all 25 districts of Khyber Pakhtunkhwa province. The province's MIS helps EPI managers to plan, set targets, and identify unimmunized children. Despite this progress however, availability of quality practice-relevant data and adequate capacity of the immunization staff are still limited, with continued problems relating to data discrepancies, target estimation, limited gender data, and a fragmented information system.

2.2. Pillar 2: Target

To improve targeting, workshop participants proposed tailored strategies to reach under-immunized children based on context specific evidence and their experiences with gender-sensitive interventions. These strategies included improved microplanning using the REC approach with a focus on expanded outreach, community engagement, and district programme reviews. Interventions used to address inequities in immunization coverage were categorized in terms of health system components such as programme governance, service delivery, supply chain, human resources, health information systems, and financing for health, and immunization/polio outcomes (SIAs, new vaccine introductions, etc.). The underlying philosophy of the ITM approach is to move the focus away from coverage, and towards missed children. It is to understand who is being missed, why they are being missed, and what can be done to reach them. This is akin to the approach that the Global Polio Eradication Initiative has taken for some time of 'finding missed children'. This approach has successfully stopped polio transmission in many countries, although not yet in Pakistan. Furthermore, the polio program provides a wealth of data including the mapping of all children that can be used for EPI in conjunction with the ITM approach. Further, participants were encouraged to consider integration with other health services when developing interventions that promote equity in vaccination coverage.

Participants identified a range of strategies used to target inequities. These include expansion of outreach, recruitment of additional vaccinators, training of vaccinators (including female vaccinators), improved supply chains, expanding service hours, and strengthened social mobilization. Unfortunately, often strategies are not institutionalized, implementation is ad hoc, budgets limited, and highly dependent on donor funding. In addition, strategies are often impaired in areas and populations that are difficult to reach, e.g. in security compromised areas, remote rural communities, and urban slums. However, some innovative and high-impact strategies to target unimmunized children are emerging. These include digital registries linking to immunization services in Karachi, a 'hit-and-run' approach in Khyber Pakhtunkhwa province's Tribal districts, in which mobile health camps and 'one-stop-shops' are used in the security compromised areas; and rapid sweeps for unvaccinated children by health volunteers in high-risk areas of Balochistan.

The performance of the immunization programme in Pakistan varies significantly across provinces, calling for tailored subnational targeting. In Sindh, vaccinator attendance has been

identified as an issue due to low motivation and capacity. To counter this, Sindh province initiated Zindagi Mehfooz (ZM) - a digital immunization registry (DIR) to digitally register all eligible children and link them to EPI services. It is used for GIS tracking of the vaccinators, SMS reminders to parents for vaccination of their children and tracking defaulters. ZM is operational in 27/29 districts of Sindh province. Presently, the focus is primarily on coverage; however, ZM could be leveraged for the identification of children who are being continuously missed by the health systems especially in high risk urban areas with a clear strategy for programmatic and financial sustainability.

Similarly, in Punjab, which constitutes half the population of Pakistan, issues around vaccinator attendance are being tackled through an electronic system (“e-Vaccs”, developed by the Punjab Information Technology Board (PITB) in collaboration with the Department of Health) that tracks real-time vaccinator performance in the field, facility-level vaccine stock outs on a daily basis, and each vaccinated child. It will be worth leveraging digital technology to operationalize the ITM approach in high risk urban areas of four mega cities of Punjab under Gavi supported urban work. In addition, digital technology could also be used to systematically analyze information across various data sources i.e. coverage, surveillance, vaccine safety.

Further, during the 2018 national measles campaign, the EPI programme used Rapid Pro for real time monitoring and supportive supervision which, participants suggested, proved to be an extremely valuable experience and should be institutionalized in the EPI programme.

2.3. Pillar 3: Monitor

Monitoring equity is achieved by tracking context-specific process and outcome indicators that allow programmes to routinely assess progress towards equitable coverage. Workshop participants indicated that there is an increasing trend in Pakistan to use technology to monitor immunization programs, although innovations tend to focus on operational processes and immediate outcomes rather than on equity and have rarely been properly institutionalized.

District-based reviews of local immunization data have facilitated monitoring the vaccination of migrants and resistant communities and has enabled targeted social mobilization through local community influencers. Computerized micro plans, geographic information system (GIS) mapping, electronic monitoring of vaccinators and digital tracking of vaccinated children are being used to monitor resources on the ground, digitalize field work and provide reliable data for decision making and track defaulter children and link them with the health system.

Over the past three years, Pakistan has tried different innovations. A promising practice from Punjab province includes effective and efficient management of processes which led to an improvement in immunization coverage by 35 percentage points between 2014 and 2017. A significant contributor to low performance of the EPI program was found to be vaccinator absenteeism. Therefore the Punjab Roadmap used technology to collect and validate data, including random visits to facilities by monitors armed with tablets collecting real-time data, and electronic tracking of vaccinators through the e-Vaccs system that focuses on low-performing catchment areas and child-level data and also issues SMS reminders for defaulter children, uses polio data to identify missed children and conducts six-monthly surveys to monitor progress towards coverage and equity goals. The program provided low cost android handsets to every vaccinator and GIS tracked vaccinator outreach visits. These data on vaccinator attendance and activities were provided to district managers through monthly reports and a real-time dashboard. Requirements of vaccinators through the sys-

tem was gradually ratcheted upwards. e-Vaccs proved to be a powerful tool to provide independent, validated, timely data on staff performance. Coupled with simple reports focused on the needs of district managers, it facilitated a timely turn-around for management engagement with the delivery of vaccination services. This model was later adapted by other provinces with the technical assistance of Government of Punjab. Participants suggested that regular monitoring with e-Vaccs has resulted in a positive impact on vaccinators’ attendance, geographic coverage and tracking of unimmunized children. The potential of appropriate implementation and use of technology in the support of reaching the unreached and underserved areas vis-à-vis traditional approaches is worth exploring. However, to date, no evaluation has been undertaken on the cost effectiveness and sustainability of these interventions. This needs further exploration.

The key challenges to the operationalization of each of the three components of ITM ranged from lack of policy direction to issues at operational level. Inadequate prioritization in national and provincial policy frameworks leads to inadequate budgeting for equity assessments at the sub national level. Prior to the workshop, there was no systematic focus on three key settings (high risk urban, remote rural and conflict) where inequities are the highest. Participants reported that provinces undertake irregular bottleneck analysis; not building on previous learnings and not focusing at the lowest administrative level where inequities are more pronounced. In addition, inadequate capacity coupled with limited budget for monitoring and weak accountability frameworks were reported to further compromise the situation. There are multiple data systems not interlinked and data is not used for action. On the other hand, there is substantial appetite to introduce innovations in the programme such as use of technology to address equity issues or go for intensive outreach, although at times without consideration of programmatic and financial sustainability.

The proposed way forward among participants was to institutionalize equity assessments, use the findings of these assessments for evidence-based planning, and ensure implementation focusing on low performing pockets of lowest two subnational levels with clear monitoring and accountability mechanisms to track progress.

3. What’s next?

In the April 2019 workshop, Pakistan’s immunization programme applied the ITM framework to address inequities within its planning and strategy development. The workshop oriented key immunization stakeholders on the ITM framework and possible ways of modifying their existing strategies to identify, target and monitor unreached and under-immunized children.

The end product of the workshop was a province-led equity assessment framework that was used to develop and submit a proposal to Gavi for health system strengthening investments. Furthermore, planning is underway for subnational equity metrics workshops in Pakistan strengthening the possibility that the ITM approach can be institutionalized in the programme. Further, efforts are in progress to integrate coverage and equity assessments using the ITM approach into national and subnational strategy development, planning, implementation and monitoring.

In the longer term, in order to achieve bigger and sustainable gains in immunization and other public health programmes, equity assessments and analyses need to be part of broader policy frameworks. Structured approaches such as ITM emphasize aspects of implementation that are often neglected and therefore should be systematically institutionalized, adequately resourced through the government budget, effectively monitored for accountability, and combined with a strong focus on the use of data for local action.

Disclaimer

The views and opinions expressed here are those of the authors alone and do not necessarily reflect those of their respective institutions.

Declaration of Competing Interest

The authors declared that there is no conflict of interest.

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