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Immunization programs to support primary health care and achieve universal health coverage

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ABSTRACT

Gains in immunization coverage and delivery of primary health care service have stagnated in recent years. Remaining gaps in service coverage reflect multiple underlying reasons that may be amenable to improved health system design. Immunization systems and other primary health care services can be mutually supportive, for improved service delivery and for strengthening of Universal Health Coverage. Improvements require that dynamic and multi-faceted barriers and risks be addressed. These include workforce availability, quality data systems and use, leadership and management that is innovative, flexible, data driven and responsive to local needs. Concurrently, improvements in procurement, supply chain, logistics and delivery systems, and integrated monitoring of vaccine coverage and epidemiological disease surveillance with laboratory systems, and vaccine safety will be needed to support community engagement and drive prioritized actions and communication. Finally, political will and sustained resource commitment with transparent accountability mechanisms are required. The experience of the impact of COVID-19 pandemic on essential PHC services and the challenges of vaccine roll-out affords an opportunity to apply lessons learned in order to enhance vaccine services integrated with strong primary health care services and universal health coverage across the life course.

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1. Introduction

Since the 1970's dramatic gains have been achieved in child survival globally [1]. Deaths from vaccine preventable diseases have declined with widespread universal access to immunization programs, with a halving of infection associated deaths in the past 20 years in low and middle income countries [2,3]. In addition, improved access to and the provision of quality primary health care (PHC) services¹ has ensured that death from acute infection is

now far less common than it was half a century ago. Despite resultant increases in life expectancy and economic growth from vaccination, utilization of immunization services has flatlined since around 2010 [4–6]. Substantial equity gaps in coverage remain for vaccination and for PHC availability [7]. These gaps remain obstinate sources for epidemic infectious disease, such as measles and polio, as occurred most recently with large measles and cVDPV outbreaks in 2018–2019, and threaten global setbacks. In 2020, the COVID-19 pandemic further disrupted immunization and broader essential health services. Many vaccination campaigns were postponed or cancelled due to the perceived risk of transmission, immunity gaps widened with increased risk of outbreaks of measles, polio and yellow fever [8]. Furthermore, in 2021, the massive roll out of COVID-19 vaccines are increasingly putting pressure on already stretched domestic resources; financial and human resources.

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¹ PHC-SP differentiates between PHC approach (or strategy) and primary care services (or delivery) following up the consensus definitions of the Astana Declaration and its accompanying vision document (which includes a useful glossary of terms) <https://www.who.int/docs/default-source/primary-health/vision.pdf>.

Vaccination coverage gaps often reflect a convergence of risk [9]. Individuals within communities, and communities within districts and districts within states who have suboptimal access to immunization services, will often have less access also to primary healthcare and social services, may have food insecurity, and are consequently at greater risk for outbreaks of epidemic disease. This nexus of risks may reflect social, economic, educational or gender disparities. There are joint synergistic gains to be made by aligning various efforts under the Immunization Agenda 2030 (IA2030) to strengthen primary healthcare and support universal health coverage. The first Strategic Priority of the IA2030 is to ensure that “effective, efficient and resilient immunization services are accessible to all people as an essential part of PHC, and thereby contribute to universal health coverage” [10]. This Strategic Priority aims not only to increase and sustain vaccination coverage, but to do so in a way that aligns with and embeds within a primary healthcare agenda, achieving universal health coverage (UHC), while facilitating and enabling specific disease elimination programs. As current achievements in immunization coverage stagnate, as the global community aims to close remaining gaps and as the world’s attention is focused rightfully on vaccination’s achievements, the timing for synergistic alignment is opportune [11]. How can immunization and PHC policies and strategies be aligned in countries to accelerate attainment of UHC? In what way might program complementarity identify and address remaining gaps? Can the needs of immunization systems promote PHC and support UHC? The IA2030 articulates as its first strategic priority the role of immunization programs as supporting and integrating with PHC and UHC through six objectives:

1. Reinforcing and sustaining strong leadership, management, and coordination for immunization programs at all levels.
2. Ensuring the availability of an adequate, effective and sustainable skilled and motivated health workforce.
3. Building and strengthening comprehensive vaccine-preventable disease surveillance as a component of national public health surveillance systems, supported by strong and reliable laboratory networks.
4. Securing high-quality supply chains for vaccines and related commodities, and assure effective vaccine management, within the PHC supply chain system.
5. Strengthening immunization information systems within a robust health information system, and promote use of high quality, and fit-for-purpose data for action at all levels.
6. Establishing and maintaining a well-functioning vaccine safety system involving all stakeholders.

These six objectives are consistent with the WHO operational framework for PHC which emphasizes effective multisectoral policy and action, empowered people and communities, and integrated health services [12,13]. Post-pandemic, the possible gain in efficiencies by integrated services will be all the more needed. IA2030 implementation will require multisectoral cross-government prioritization, sufficient financing, adequate resource allocation, clear accountabilities across the health system, the involvement of civil society organizations (CSOs) and the private sector [14]. Informed, empowered users generate demand for high quality care provision and program management which can provide impetus for sustained financing, demand accountability and set an expectation of increased equitable access. The harmonization of disease surveillance systems, logistics management, information and regulatory systems, disease control initiatives, and health outreach and communication, mutually enhance immunization and PHC services.

2. What are the challenges to alignment and what are its risks and opportunities?

The IA2030 vision will remain idealized and unimplemented if current known barriers are not overcome. Fragmented health services are less able to respond to the needs of communities and provide universal, equitable, high-quality and financially sustainable care. Research and country experiences have provided powerful examples of how alignment and greater sustainable impact can be achieved safely without impacting negatively on the activities of immunization programs and of PHC systems and with enhanced community ownership and efficient use of required resources [7]. Each of the six objectives that underpin the IA2030’s first Strategic Priority is addressed here in turn.

1) Leadership, management & coordination

Managerial skill development should focus on performance management, including clear goal setting, clarity in roles and responsibilities and accountability, a commitment to use of data and empowerment of staff. Program managers must be nimble, locally responsive and innovative with requisite problem-solving skills. To develop independence, programs should appoint leaders who are resourced and empowered to foster organizational changes and evolution, thereby creating an environment for effective coordination, financial management and performance monitoring at every level of the immunization program [15]. Achieving this requires funding and forward planning, incentivizing attainment of equitable access to quality health services, with mechanisms of accountability balanced with independence in locally relevant decision-making.

2) Skilled and motivated workforce

Globally, the shortage of health care workers is projected to exceed 14 million by 2030 [16,17]. Lack of career development pathways, low or unreliable salaries, high turnover, poor working conditions and inadequate numbers of health workers reduce health worker motivation as they are burdened to provide basic services. The COVID-19 pandemic response, the need to restore and maintain PHC services and the COVID-19 vaccine roll-out will further deepen this workforce gap [18]. Provision of adequate numbers and skill mix of health care workers, creation of career development paths, promotion of living wages for health workers, assurance of well-resourced and enabling environments are fundamental to sustaining an engaged workforce [16]. Sufficient workforce is a key priority for achieving IA2030 vision and goals and is fundamental for providing universal access to PHC [19]. Achieving a skilled, capable and adequate health workforce requires clear political commitment, prioritisation and advocacy to ensure long term sustained and sufficient investment in financing of health system operations and providing enabling environments, training and remuneration of present and future workforce. Addressing this is largely outside the remit of ministries of health and will need the leadership of other ministries such as those of labor, of planning and of civil services.

3) Disease control and surveillance

As of 2021, wild poliovirus has not been eradicated and vaccine-derived polio virus outbreaks have occurred in multiple countries. Measles cases surged globally in 2019 [20]. In order to achieve elimination and eradication, dedicated focus is required. A systems approach looking for synergies and efficiencies that are feasible and practical in a given context can promote cross-programmatic

efficiencies. For example, timely ascertainment of immunization coverage gaps, with better outreach and strengthened surveillance may reduce disease-specific outbreaks. Identified gaps in vaccine coverage and vaccine-preventable disease outbreaks likely reveals gaps in other vaccine and PHC service provision, since the causal pathways leading to poor coverage are common to both [21–24]. Efforts to strengthen national health systems and initiatives for disease control, elimination and eradication can be mutually reinforcing. Since measles-containing vaccine is highly effective while the disease is highly contagious, measles is considered a tracer for identifying places where immunization and PHC services need to be strengthened. Polio and measles surveillance have provided the laboratory infrastructure for communicable disease surveillance which in many countries have been critical for supporting COVID-19 surveillance. As vaccination campaigns and broader health services including outreach services restart following the COVID-19 pandemic it is important for efficient use of limited resources to plan for reaching communities with multiple antigens and services wherever that is feasible. By enhancing the efficiency, responsiveness and comprehensiveness of epidemiologic disease surveillance and laboratory capacity, immunization programs can be optimized, vaccine impact can be measured, monitoring of disease control, elimination and eradication can be undertaken, and outbreaks can be detected, investigated and promptly respond to. Estimation of the burden of disease can also support the introduction of new vaccines [22,25].

4) Supply chain and logistics

Integration of supply chain management, procurement data and distribution networks for vaccine and other health commodities may improve coverage provision and achieve efficient resource utilization. It allows for monitoring of availability gaps and improve accountability, to ensure that vaccines are always available in the right quantity and condition, at the right time and in the right place. Integrated supply chain management can lead to more efficient and more effective delivery of PHC. Such systems may also encourage private investment partnerships, since reliable systems provide economic incentives for support services like transport and other logistics. The prospect of reliable economic incentives for investment, if transparent, may in turn drive competition and thus lower prices. Accountability and transparency as well as rigorous public oversight will be critical to assure the public that corrupt practices do not take advantage of resources at the expense of improved universal public access. Technological developments and electronic automated auditing systems together with spot checks, stocktaking and so on, may assist with ensuring transparency in reporting and accountability. A strong supply chain is the backbone of any health program and can extend reach, synergies from common elements improve efficiencies to achieve the goals of IA2030 [26–28].

5) Data use and information systems

Measuring progress, stagnation or setbacks in immunization and primary healthcare provision requires reliable and integrated health and surveillance information systems that can provide timely, robust and valid data on disease burden, vaccination coverage, and completeness and quality of services to communities. Electronic records, if able to communicate across sectors, may provide long-term system-wide information – spanning individuals, facilities and government systems. The introduction of technology needs to consider practitioner and system readiness, to determine where new digital solutions are feasible, timely and appropriate. Inherent uncertainties (e.g. imprecise denominators)

must also be considered, requiring thoughtful analysis of the level of accuracy required to support decision-making. Local relevance of data, and end-user needs should be part of planning of data systems. Locally informative data, uncertainty bounds notwithstanding, can provide guidance on coverage and program performance, gaps in coverage and success of investments in effort and of directed local interventions. With the prerequisite skills for critical thinking, and use of multiple, sometimes ambiguous data sources through triangulation, decisions at every level of management can be based on locally relevant data [29,30].

6) Vaccine safety and vaccine confidence

Community engagement and public trust are a direct outcome of service availability and transparent two-way communication. Vaccine safety monitoring and ensuring public confidence in vaccination is essential, and to this end nationwide monitoring and reporting systems for adverse events are required, as are open communications practices [31]. National immunization programs should actively listen and be responsive to potential concerns about vaccine safety through continuous monitoring and coordination among relevant stakeholders. As middle-income countries transition from internationally funded procurement mechanisms, they will require the regulatory capacity to ensure that vaccines are of assured quality, safety and efficacy [32,33]. The introduction of COVID-19 vaccines has sparked new attention to the national and global regulatory and safety monitoring systems, and their close interaction with immunization programs potentially leading to improved capacity to detect and interpret safety signals and evaluate vaccine effectiveness.

3. Lessons from the COVID-19 pandemic

The pandemic has accelerated the need for strong national regulatory mechanisms and for syndromic and laboratory disease surveillance capacity. Public concerns about speed or safety are affecting vaccine confidence, requiring reliable pharmacovigilance systems. Strong PHC has been critical for sustaining routine health services through pandemic lockdowns, and together with grassroots community involvement can sustain community demand for vaccination. COVID-19 vaccines are primarily targeted at groups outside the traditional infant focus of immunization programmes, which highlights the need for a life course approach. The magnitude of global COVID-19 vaccine delivery on a scale not previously been witnessed has demanded collaboration between countries and much closer alignment and coordination of health service provision, preventive services, transport services, local community involvement and cross-sectoral funding and oversight. The collective national and global responses to the pandemic has driven innovation in vaccine delivery in an attempt to tackle the substantial challenge of universal access to vaccination.

The IA2030 planned for and promotes the importance of epidemic and pandemic preparedness and recovery to ensure strengthened and integrated vaccination systems well beyond current pandemic priorities. The leveraging of national response systems that has been implemented to achieve high coverage, can also be used to rebuild routine immunization systems damaged by the pandemic. It can also be used to sustain vaccine access through a life course approach, based on community engagement, strong usable data systems and engaged health systems. The multisectoral integrated approach to restore and sustain services is evidence of the ways in which immunization and PHC and universal coverage synergize successfully.

4. Operationalizing the integrated and horizontal approach of IA2030

Integration can be operationalized through four main approaches, according to each country's context [34].

1. Engaging and empowering people and communities to promote community input into planning and design of service delivery models that best meet their needs.
2. Tailoring the model of care towards a more community-engaged, people-centred and aligned service delivery approach. This will be enabled through provision of immunization services within a comprehensive package of PHC services, which will be brought closer to communities through use of family health and community-based strategies, e-health and closer monitoring of population health.
3. Improving coordination of care across settings and sectors, facilitated by integration of vertical programs into national health systems, expansion of intersectoral partnerships and development of sub-national service delivery networks.
4. Creating an enabling environment for embedding provision of immunization within PHC strategies, through change management and workforce training. This will help to broaden the service delivery platform, align regulatory and scope of practice frameworks, and provide integrated quality assurance and safety and information systems.

5. Near term realistic targets and monitoring progress

Availability and adequacy of PHC and immunization workforce is a major barrier demanding urgent attention. Adequate financing to support frontline workforce operations and maintain enabling environment and supply infrastructure will be critical for success of the IA2030 and for making PHC universally available. Mobilizing political commitment to address both the workforce shortage and the financial commitment to address it are immediate priorities.

Global actors and development partners need to align thinking and link IA2030 to the UHC Agenda and mobilize support for PHC through the World Health Assembly.

Regional Immunization Technical Advisory Groups and national immunization program managers and policy makers will need to conduct cross-sectoral, cross-ministerial planning of human resource planning, national financing systems and UHC monitoring systems [35,36].

Progress on IA2030 and on PHC/UHC should use similar metrics and define realistic achievable and incremental targets aligned across programs. Targets should include interim milestones, and progress should be linked to public accountability. Vaccine coverage and equity measures are useful metrics of UHC also, and vaccine program planners will need to review how they are contributing to improvements to UHC service coverage indices [36,37].

6. Conclusion

The purpose of IA2030 is not to paint aspirational ideals that remain theoretical, but to achieve realistic gains through pragmatic local focus. Public health has made major gains in human health and wellbeing both through immunization and through PHC programs across the life course. Nevertheless, improvements have stagnated and gaps persist. The COVID-19 pandemic has exposed weaknesses in health security and health systems and has had a profound impact on immunization programs. Risks for poor outcomes often reflect lack of access to or uptake of both vaccination and of PHC. By identifying root causes of weak health systems and

articulating overlapping but also unique needs, the global community can promote alignment to achieve efficiency, sustainability, and equitable availability of immunization and PHC services to all. Strengths should be celebrated and propagated in order not to lose ground, but areas that require improvement should become the focus of investment and target-based committed effort.

CRedit authorship contribution statement

Diana Chang Blanc: Conceptualized, methodology, Data curation, Analysis, Investigation, Project management, Resources, Software, Writing first draft, Writing review and edit. **John Grundy:** Conceptualized, methodology, Data curation, Analysis, Investigation, Writing first draft, Writing review and edit. **Samir V.Sodha:** Conceptualized, methodology, Data curation, Analysis, Investigation, Writing review and edit. **Thomas S.O'Connell:** Conceptualized, methodology, Data curation, Analysis, Investigation, Writing review and edit. **Hernan Julio Montenegrovon Mühlenbrock:** Conceptualized, methodology, Data curation, Analysis, Investigation, Writing review and edit. **Jan Grevendonk:** Conceptualized, methodology, Data curation, Analysis, Investigation, Writing review and edit. **Tove Ryman:** Conceptualized, methodology, Data curation, Analysis, Investigation, Writing review and edit. **Minal Patel:** Conceptualized, methodology, Data curation, Analysis, Investigation, Writing review and edit. **Folake Olayinka:** Conceptualized, methodology, Data curation, Analysis, Investigation, Writing review and edit. **Alan Brooks:** Conceptualized, methodology, Data curation, Analysis, Investigation, Writing review and edit. **Brian Wahl:** Conceptualized, methodology, Data curation, Analysis, Investigation, Writing review and edit. **Naor Bar-Zeev:** Conceptualized, methodology, Data curation, Analysis, Investigation, Writing review and edit. **Robin Nandy:** Conceptualized, methodology, Funding acquisition, supervision, Writing review and edit. **Ann Lindstrand:** Conceptualized, methodology, Funding acquisition, supervision.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: 'NBZ reports investigator-initiated research grants from Merck and the Serum Institute of India outside the scope of this work. All other authors declare no competing financial interest or personal relationship.'

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