

Private sector engagement for immunisation programmes: a pragmatic scoping review of 25 years of evidence on good practice in low-income and middle-income countries

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ABSTRACT

Introduction Many National Immunisation Programmes attempt to leverage the private sector; however, there is limited consolidated and synthesised documentation on good practices, gaps and lessons learnt. A 2017 WHO guidance document recommended best practices for private sector engagement (PSE) in immunisation. We conducted a pragmatic scoping review to identify gaps, update and consolidate evidence on promising practices in PSE for vaccination.

Methods Building on two previous reviews published in 2011 and 2017, we conducted a pragmatic scoping review of peer-reviewed publications from low-income and middle-income countries since September 2016 in PubMed that pertained to PSE and immunisation service delivery. We extracted and analysed findings using a new analytical framework covering motivations, enablers and barriers, risks and challenges, and engagement mechanisms.

Results We collated over 80 well-documented analyses of PSE for vaccination, derived from 54 peer-reviewed publications from 1998 to 2016 included in prior reviews, 21 new publications from 24 countries published since 2016 and 1 new systematic review. The level of PSE was mixed, ranging from 3%–4% to >60% of all childhood vaccinations. Promising practices for PSE included using governance and policy to leverage private providers' motivations and including them in programme efforts. Planning and monitoring efforts were effective when linked with regulatory requirements based on national standards for services, reporting and performance monitoring. Information systems were effective when they included private sector services in vaccine monitoring and surveillance. Challenges identified included ensuring compliance with national schedules and standards and minimising financial exclusion. Few studies documented successful public–private partnership models or other innovative financing models.

Conclusion The published evidence captures numerous strategies to facilitate stronger immunisation programme engagement with the private sector. Stronger PSE can potentially reach zero-dose and underimmunised populations in low-resource settings and build resilient

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Private sector facilities—including faith-based organisations, for-profit and not-for-profit facilities—now provide a significant proportion of immunisation services across Africa, Asia, Latin America and Caribbean countries and their contribution has been growing steadily over the past decade.
- ⇒ We updated two previous reviews to consolidate the evidence base over the past 25 years.

systems. Untapped opportunities exist for more structured testing of approaches to inform global guidance.

INTRODUCTION

The WHO defines the private sector as ‘comprising all healthcare providers who exist outside the public sector, whether their aim is for philanthropic or commercial purposes’.¹ In most settings, care-seeking and service provision occur in mixed health systems—across a range of public and private health facilities varying in governance, capacity and regulation.^{2–4} Private sector engagement (PSE) in health service delivery has grown significantly in scale and scope, driven by community demand, observed gaps in government service reach and quality, and the potential to generate revenue for providers.^{5,6}

For immunisation services, private sector providers include all those who provide vaccination services through private for-profit or not-for-profit hospitals, clinics or pharmacies, as well as NGOs and faith-based organisations (FBOs). FBOs are defined here as non-governmental entities affiliated with specific religious traditions. The scale of PSE in immunisation

WHAT THIS STUDY ADDS

- ⇒ We provide new insights into motivations of private providers in immunisation service delivery and summarise existing enablers and barriers for inclusion of private sector providers in provision of vaccination services.
- ⇒ We highlight risks and challenges to National Immunisation Programmes and outline successful processes and mechanisms of engagement between the public and private sectors.
- ⇒ We also summarise new evidence on the role of the private sector in fragile and conflict-affected settings, the role of pharmacists and successful examples of provision of immunisation as an entry point for provision of comprehensive primary healthcare services.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ This review identified emerging best practices that will be of interest to the wider immunisation community looking to engage more systematically with private sector providers to increase equitable immunisation coverage to improve health and well-being. Future research implications include evaluations and research related to better understanding the motivations of providers, expanding task-shifting models to pharmacies and community health workers, testing of innovative financing models such as targeted subsidies, vouchers for priority groups and results-based financing.
- ⇒ Programmatic implications include using existing geospatial and other data to understand the role, scope, location and scale of private sector facilities offering routine immunisation services and leveraging those assets to permanently expand the reach and resources for routine immunisation and life-course vaccination.
- ⇒ Future policy implications of this study include facilitation of policy dialogues with national stakeholders around private sector engagement (PSE) for immunisation service delivery and engaging with global immunisation partners and donors to update global guidance on PSE for immunisation.

has grown steadily for two decades, but private sector facilities in low-income and middle-income countries (LMICs), including for-profit and not-for-profit agencies (often FBOs), vary widely in their capacity and willingness to provide immunisation services.^{7 8} In some fragile and conflict-affected settings, private providers (NGOs/FBOs) are often responsible for the bulk of public sector services; in countries with more mature mixed health systems, such as India and Indonesia, public and private sectors often operate independently, performing different services and serving different market segments.⁸

Recent analyses of the challenge posed by ‘zero-dose’ children—those who have not yet received the first dose of the diphtheria-tetanus-pertussis vaccine—who often inhabit environments characterised by economic, social, gender and cultural disadvantages—highlight the likely importance of non-government providers in delivering immunisation where most zero-dose children reside: urban poor, remote, and/or fragile and conflict-affected settings.^{9 10} Leveraging the presence and capacities of the growing private sector in hard-to-reach areas of LMICs can improve the introduction of new vaccines and increase coverage of essential immunisation services.^{1 11–13}

Stronger PSE has emerged as a key priority in several global guidance documents and policy frameworks, including USAID’s Maternal and Child Health and Nutrition Roadmap to 2030,¹⁴ the Immunization Agenda 2030,¹⁵ Gavi’s 5.0 Strategy¹⁶ and Global Routine Immunization Strategies and Practices.¹⁷ Aligning with these strategies, we use the term PSE to encompass those actions needed to ensure that, where appropriate, immunisation services can be obtained from non-government providers in a way that is safe, acceptable and covered by the same safeguards as through government providers and at no cost, as there is a broad-based consensus that essential vaccines are a public good that should be provided free of charge.^{18 19} Prioritising PSE broadens partnerships for sustainability and stronger societal engagement, which can help LMIC programmes respond to complex challenges and the increasing need to vaccinate throughout the life course.^{20 21} A WHO-commissioned unpublished evidence review by Mitrovich *et al* informed preparation of interim WHO guidance in 2017,⁸ leveraging findings from a 2011 systematic review by Levin and Kaddar.²² These reviews summarised good practices in PSE for vaccination service delivery, equitable coverage and interactions with the pharmaceutical industry. Given the increasing importance of PSE in vaccination, we aimed to update these reviews and consolidate the evidence, extracting and analysing information relevant to understanding how governments in LMICs can engage most usefully with private providers to extend programme reach and quality of service.

METHODS

Search strategy

Two prior reviews on PSE in vaccination catalogued the literature published from 1998 to August 2016.^{8 22} In November 2021, we added to these reviews with an additional pragmatic scoping literature review on immunisation service delivery through the private sector. We limited our search to one database due to time and budget constraints. Additionally, since the review was a pragmatic exercise rather than a formal one, its protocol was not registered. The scoping literature review methodology was adopted as a strategy to filter and integrate findings on private sector vaccination from diverse sources and methodologies and followed guidelines advanced by Anderson *et al* for scoping literature reviews.²³ We searched PubMed for English-language articles published between September 2016 and November 2021 on immunisation provided through for-profit and not-for-profit clinics, pharmacies, FBOs and NGOs using the following keywords: “private sector,” “non-governmental,” “immunization,” “vaccination,” “health service delivery,” “developing countries” and related MeSH terms. All search results were first screened by title for relevance by two reviewers. Abstracts of search results were evaluated and included for full-text review if they

focused on (1) LMICs, (2) PSE and (3) immunisation service delivery. Data were extracted and charted independently by two reviewers. To cross-check search results, we reviewed reference lists of earlier seminal papers and those retrieved in our search, along with citation tracking, to identify other key publications. We also contacted immunisation experts at WHO, Gavi and the MOMENTUM/USAID network, as well as experts and stakeholders in immunisation, family planning, and maternal, newborn, and child health to identify possible missed publications and relevant grey literature.

Data extraction

We created a template in Microsoft Excel for data extraction. Categories in the template reflected an analysis framework developed based on expert consultations in 2021 and 2022, including a webinar facilitated by USAID MOMENTUM Private Healthcare Delivery to specifically collect data to guide the development of a relevant PSE framework. This framework included categorisation by study characteristics; proportions of services by sector; types of vaccines provided; stakeholders involved; motivations driving private provider engagement; enablers and barriers; process/mechanism of engagement and risks and challenges.

Data analysis

We conducted a content analysis of extracted data and then consolidated findings from data extraction using narrative synthesis methods as described by Popay *et al.*²⁴ Each paper's findings were reviewed in detail and assigned to the relevant category of the framework above so that common or contrasting themes could be identified. We then combined the new publications from our search with a parallel synthesis of the findings of the two previous reviews, communicating with aforementioned experts to confirm that major contributions were not missing and our analytical framework was sound.

Patient and public involvement

Patients and the public were not involved in any aspect of this scoping review.

RESULTS

Scoping review results

Our literature search generated 1063 hits; restricting these results to 2016–2021 reduced the number of published articles to 393. Screening these titles and abstracts against our inclusion criteria yielded 56 titles for full-text review. Of these, 34 were excluded because they either focused on high-income countries, did not describe private-sector services or had no data on

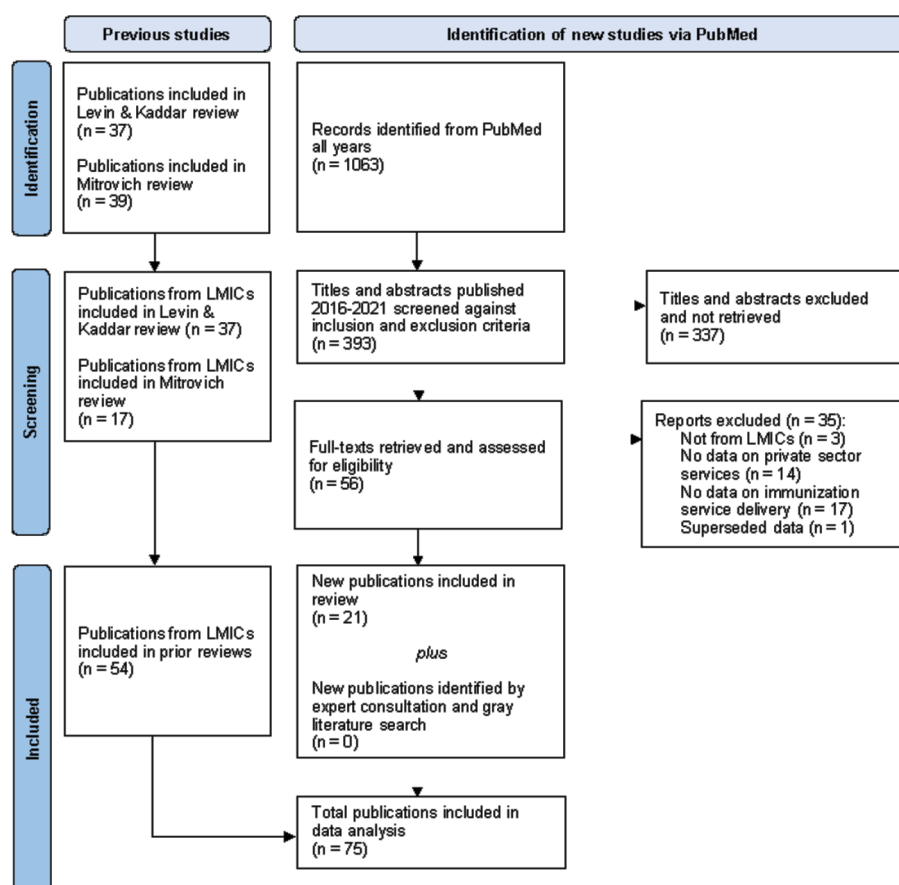


Figure 1 Publications identified and selected from earlier reviews and new literature search. LMICs, low-income and middle-income countries.

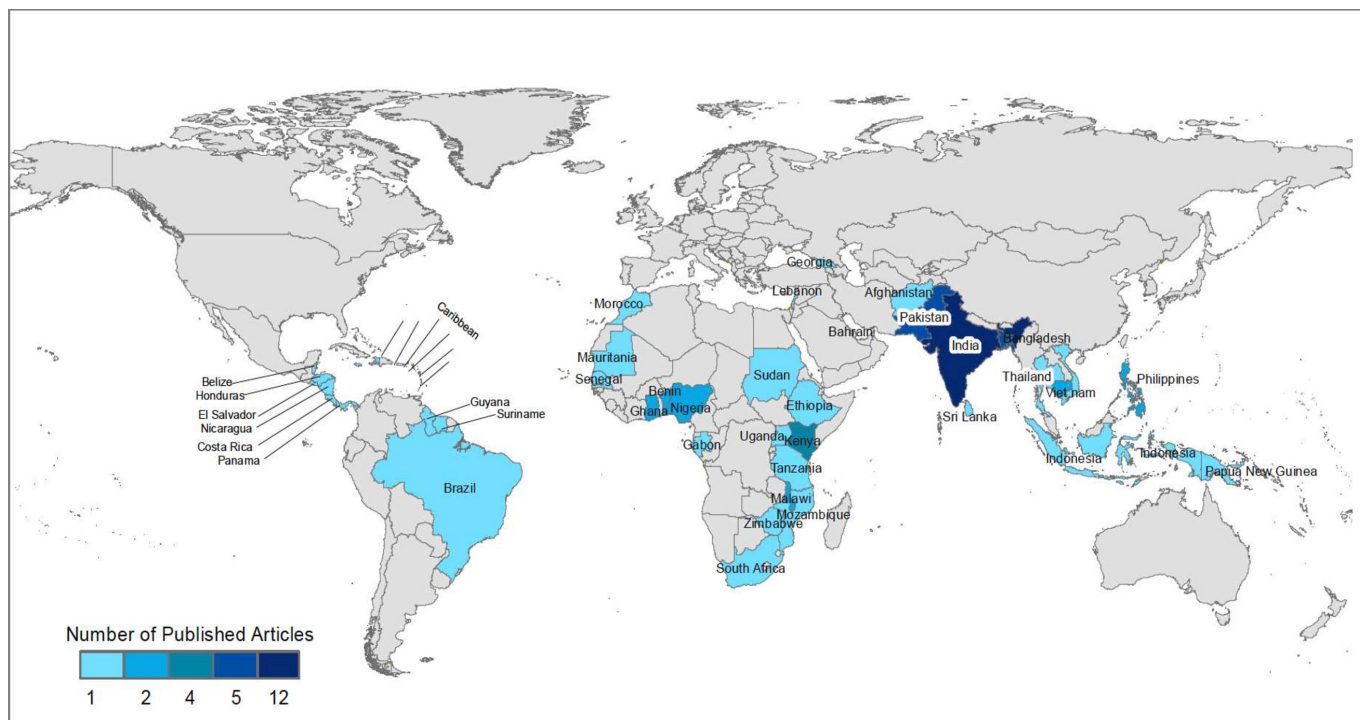


Figure 2 Global map of published studies on PSE in immunisation. PSE, private sector engagement.

immunisation delivery, resulting in 21 new included, peer-reviewed articles. [Figure 1](#) shows the search strategy for this pragmatic scoping review. We excluded an additional relevant paper from India by Sharma *et al* because a more recent paper we included by Farooqui and Zodpey presented a newer analysis of the same data.^{25 26} Experts and stakeholders identified formative assessments and authoritative commentary about the context for PSE in vaccination, but this stage did not identify any additional publications that met the inclusion criteria.

The 75 included publications encompassed discrete national or subnational analyses from 16 countries, multicountry studies from 9 countries, 2 regional reviews from South Asia and the Western Pacific region,^{3 12} and 1 systematic review from 25 countries on the role of pharmacies in LMICs.²⁷

Online supplemental table 1 presents availability of new evidence published since the previous reviews on PSE for immunisation.

Synthesis with prior reviews

The 2017 Mitrovich review included 17 relevant studies from LMICs, and the 2011 Levin and Kaddar review included 37 studies. Taken together, these prior reviews plus the 21 publications (covering more than 30 country analyses) included in our update encompass more than 80 well-documented analyses of PSE for immunisation in LMICs. [Figure 2](#) maps the evidence base by indicating the number of publications by country. (Please see online supplemental table 1 for a more detailed table with an overview of the updated evidence base mapped according to WHO regions including number of publications by country.)

The role of the private sector was widely seen as extending the reach and coverage of immunisation services to unreached communities, without differentiating between true zero-dose individuals (unvaccinated) and those who received late or incomplete vaccinations (undervaccination). In a report from India, the private sector was perceived as a preferable alternative to the public sector,²⁸ a finding echoed by the Levin and Kaddar review.²² In reports from Kenya¹¹ and the Western Pacific region,¹² the private sector played a role in introducing new vaccines, a function also reported in the Levin and Kaddar review.²²

[Table 1](#) summarises the quantitative data on overall proportions of childhood vaccines provided by the private sector. The variability is large, dictated by government policy as well as the degree of public/private mix in the broader health system. In some settings (Uganda, urban Bangladesh and urban Thailand), the private sector (both non-profit and for-profit) provided more than 30% of vaccinations. In fragile or conflict-affected settings, non-profit providers, usually NGOs, provided a significant proportion of childhood vaccinations: 47% in Afghanistan and 17% in Sudan.

Motivations for private providers to engage in immunisation services

Understanding motivations of private providers to engage in immunisation services is central to expanding the private sector's role in universal health coverage (UHC).^{4 29} We extracted information about reported underlying motivations, including perceived benefits, for private sector providers to participate in immunisation service delivery. These included personal beliefs, ethics,

Table 1 National proportion of vaccinations administered by private providers (where recorded)

Country	National proportion (%)	Vaccine type	Source
Africa:			
Benin	8%	NIP and non-NIP Vaccines	Levin <i>et al</i> , 2019 ²¹
Malawi	27%	NIP	Levin <i>et al</i> , 2019 ²¹
Nigeria	21%	All immunisations	Mitrovich <i>et al</i> , 2017 ⁸
Sudan	16%	Government supply of Penta-3 vaccines	Ahmed <i>et al</i> , 2019 ³⁰
Uganda	30%	Routine immunisations (30% were in for-profit)	Mitrovich <i>et al</i> , 2017 ⁸
Asia:			
Afghanistan	47%	Polio, DTP and measles	Vink <i>et al</i> , 2021 ³¹
Bangladesh	22% (non-profit, urban) 3%–4% (non-profit rural) 1%–2% (for-profit) 62% (non-profit NGO, Dhaka region)	Not specified	Levin and Kaddar, 2011 ²²
Cambodia	30%–40% (non-profit, overall)	Not specified	Levin and Kaddar, 2011 ²²
India	10%–36% (for-profit) 45%–65% (new vaccines) for-profit, urban	Not specified Hib or HepB	Levin and Kaddar, 2011 ²²
India	9%	All immunisations	Mitrovich <i>et al</i> , 2017 ⁸
Pakistan	3%–4% (for-profit)	Not specified	Levin and Kaddar, 2011 ²²
Pakistan	3% (general) 25% (Karachi)	Not specified	Mitrovich <i>et al</i> , 2017 ⁸
Philippines	10%	All immunisations	Mitrovich <i>et al</i> , 2017 ⁸
Sri Lanka	15%	Not specified	Levin and Kaddar, 2011 ²²
Thailand	10% (general) 33% (urban)	Not specified	Levin and Kaddar, 2011 ²²
Other countries:			
Caribbean	10%–20%	Infant vaccination	Mitrovich <i>et al</i> , 2017 ⁸
Lebanon	40% (non-profit) 60% (for-profit)	All immunisations	Mitrovich <i>et al</i> , 2017 ⁸
Papua New Guinea	30% for Penta3, 26% for MCV1	Penta3 and MCV1	Field <i>et al</i> , 2018 ³⁹
Mexico	5%	Not EPI vaccines—HepA and varicella	Mitrovich <i>et al</i> , 2017 ⁸

DTP, diphtheria-tetanus-pertussis vaccine; EPI, Essential Programme on Immunization; NGO, Non-Governmental Organisation; NIP, National Immunisation Programme.

financial incentives (profits, increased client volumes), non-financial rewards (awards, recognition) and opportunities to improve service quality or collaborate with the government on improvement efforts.

Even if fees were not charged for vaccines, profit motivations influenced many private providers, who sought potential increases in revenue by serving more clients and potential for cross-promotion of services and charging administration or service fees for vaccination and registration cards. In urban Bangladesh, where the private sector provides up to 95% of vaccinations, providers reported revenue from service charges as a key reason for their participation.³⁰ In Uganda, clients who received free immunisation services were also informed about other available in-house paediatric and primary healthcare (PHC) services.²⁹ In retail medicine outlets

in western Kenya, demand for new typhoid vaccines was unexpectedly high, attributed to study subsidies that lowered their price at medicine outlets compared with hospitals; increased demand and expanded market motivated providers to provide these services.¹¹ In Sudan, private (for-profit and non-profit) providers in formal partnerships with the government received free vaccines, equipment and/or placement of government vaccinators, and subsequently reported an increase in their client volumes.³⁰ We did not find mention of profit margins as an important motivation.

Beyond profit, PSE can also tap into private providers' desires to offer essential services to serve their local communities. In Bangladesh, clinicians reported being motivated by concern for the poor and vulnerable, improved institutional reputation and increased social

standing in the community.⁵ In Uganda, free immunisation services were seen as social entrepreneurship, demonstrating institutional concern for disadvantaged communities.²⁹ In Kenya, retail medicine outlets that provided typhoid vaccines gained credibility, especially as clients were referred from local hospitals.¹¹ In Sudan, providing immunisations helped ensure that providers were more integrated in government decision-making and advisory processes,³⁰ a motivator also reported in two of nine LMICs in the Western Pacific review.¹² The Government of Sudan also explored non-monetary incentives like awards or public recognition.³⁰ In Afghanistan, private providers trained and incentivised to administer childhood vaccinations reported that being recognised as serious partners in the health system, as they could reach populations the government could not reach, incentivised their participation in immunisation service provision.³¹ Institutional recognition and inclusion in policy were clearly underused motivators, given the paucity of examples in recent publications and recognised as major gaps in the Mitrovich and Levin and Kaddar reviews.

There is some evidence that private healthcare providers are interested in participating in immunisation programmes as a vehicle to improve the quality of their clinical services. In Afghanistan and Sudan, involvement in immunisation opened avenues to extra government support, including training, facility renovations, equipment and supplies, as well as supervision with the potential link to quality improvement programmes.^{30 31} Examples in the Mitrovich review from India⁸ and in six of nine LMICs in the Western Pacific¹² highlight the importance of involvement in quality standards and monitoring programmes.

Enablers of and barriers to PSE

Under this theme, enablers include recognition of the private sector by governments or development of processes, policies or actions to systematically engage the private sector in service delivery by the Ministry of Health (MOH) and provision of direct support. Barriers included lack of commodities and supplies, the absence of the private sector in policy, programmes, service delivery and training efforts.

Specifically, we found three key enablers for PSE in immunisation: systematic and intentional support by the government to build private sector capacity for immunisation, leveraging the presence and acceptance of private providers in their local communities and including private providers within broader system strengthening.

Several country examples attributed their ability to provide immunisation services to their government's systematic support for private healthcare providers in the form of supplies, training and inclusion in formal agreements and requirements. In Afghanistan, Benin, Malawi, Sudan and Uganda, for-profit and non-profit providers received government support in the form of vaccines and equipment to provide free immunisation services.^{21 29 30 32} In Afghanistan and Sudan, national

governments provided training and supportive supervisory visits that enhanced private facilities' credibility in service provision.^{30 31} In Afghanistan, the public-private partnership (PPP) programme in Uruzgan province provided training for private providers working in remote and insecure parts of the province who were selected for the programme based on a training needs survey.³¹ In the Mitrovich review, training for private providers was a key feature in Bangladesh (especially on schedules and adverse events following immunisation (AEFIs)) and in Nigeria.⁸ In the Bangladesh study in the Mitrovich review, adding a screening tool to clinic practices improved verification of vaccination records during child health visits.⁸

When countries systematically included private providers in formal agreements (seen in Benin, Malawi and Sudan), formal assessments or licensing and accreditation requirements, they expanded immunisation networks while also promulgating quality standards in private facilities.^{21 30} These types of support were also reported as important in LMICs in the Western Pacific and in the Mitrovich and Levin and Kaddar reviews.^{8 12 22}

Both the Levin and Kaddar and Mitrovich reviews, as well as additional examples from our updated scoping review, indicate that community and client preferences may provide an important enabler to private provision. Examples described preferences relating to perceptions of easier access, shorter wait times or higher-quality services compared with public providers.^{21 28} Both access and trust were critical in conflict-affected Afghanistan, where clients trusted private providers more than the government to provide vaccination services.³¹ The systematic review of the role of pharmacists in immunisation in LMICs included in our update noted that pharmacists are often more trusted and more accessible than public sources, giving them an advantage in advocacy and promotion, and in 8 of 25 countries, in provision of vaccination services as well.²⁷ A study of retail medicine outlets in western Kenya also emphasised the easy accessibility of local private chemists and pharmacies.¹¹ Long wait times and vaccine stock-outs suppress demand for vaccination in most settings. Experiences from India and Mauritania captured in the Levin and Kaddar review, as well as examples in this update from India, Benin, Tanzania, Kenya and Malawi, illustrate how private facilities' shorter wait times and more flexible hours help make vaccination more available.^{21 33 34}

Government support functioned as an enabler to involve private providers in broader system strengthening. The obligation to provide their own cold chain equipment was a barrier noted in Sudan, Benin, Georgia and Malawi,^{21 30} but where governments provided additional cold chain equipment, private providers saw the provision of this benefit as a strong motivation for engaging in immunisation programmes. Previous reviews and the Sudan study in this scoping review have also suggested that important barriers to PSE for immunisation are the lack of inclusion of Non-Governmental Organization (NGO)/for-profit facilities in policy processes, training

efforts and/or in information systems, lack of access to commodities and ancillary supplies.^{8 22 30}

Risks and challenges of PSE

The risks and challenges theme includes compliance and reporting lapses on vaccination schedules, non-adherence to accreditation standards, missed opportunities for vaccinations, lack of awareness, limited training or systematic engagement opportunities and additional administrative or service charges. Important risks and challenges with PSE documented in the Mitrovich and Levin and Kaddar reviews include poor adherence to national schedules and standards, inequitable exclusion of populations by fees or other means, lapses in quality and safety monitoring, and failures to ensure 'every opportunity' vaccination.^{8 22}

The Mitrovich review and some examples from this update found compliance lapses to be persistent challenges.^{8 12 28 35} In many settings, non-profit providers were more adherent to policy and regulation than for-profit providers.^{12 22} Formal agreements with clear requirements, with or without strict licensing, were seen as important responses in Afghanistan, Sudan, Benin and Malawi.^{21 30 31} In 2019, supervisory visits across Benin, Malawi and Georgia found that although most facilities were appropriately accredited for immunisation, some private facilities had non-compliant cold chain equipment or poor-quality vaccine management.²¹ Such lapses were also seen in Gujarat, India, retail outlets in western Kenya and private institutions in Indonesia.^{11 35 36} A Nigeria example in the Mitrovich review required compliance with government reporting and evaluation standards in exchange for practical support.⁸ One critical element to ensure service quality is the promotion of 'every opportunity' vaccination. In a study undertaken in four African countries (Kenya, Malawi, Senegal and Tanzania) of missed opportunities for vaccination, disaggregated by facility governance, for-profit private providers in Tanzania and Malawi were less likely than public facilities to review vaccination records, while in Malawi, non-profit private providers were more likely than public facilities to review these records.³⁴ In all four countries, many missed opportunities for immunisation services during sick child visits were noted, with deficiencies in both public and private facilities. In Gujarat, India, a high prevalence of missed opportunities in private immunisation facilities was linked to healthcare providers overestimating parental concern over multiple injections.³⁶ Lack of awareness, training and systematic engagement on existing policies and regulations for private providers was also noted in countries in the Western Pacific, where most countries had policies regulating the private sector, but only 50% of private sector respondents were aware of them. In countries like Indonesia and India, a stronger role for professional societies (such as paediatric associations) has been proposed to address this issue.^{35 36}

Many documented public-private collaborations support the distribution of free vaccines; however,

private facilities often require that patients pay additional administrative fees. In Sudan, despite government oversight described above, clients were often required to pay additional service fees.³⁰ In Kenya, Benin, Malawi and Georgia, fees were associated with vaccination cards, services and registration.^{21 34} In the Benin, Malawi and Georgia study, most clients found the fees acceptable, given that vaccination represented a very small proportion of private health expenditures, but fees could deter low-income clients from being vaccinated.²¹ Examples from Afghanistan, Sudan, the Western Pacific and the Mitrovich review recognised this risk of financial exclusion.^{8 11 30 31} Although some examples noted regulations to ensure that vaccinations were being provided for free, there were frequent charges for ancillary services.^{8 29 32 34 36}

Poor capture of information in public health information systems, especially for vaccination coverage, AEFIs and notifiable diseases, poses challenges to effective PSE. The Mitrovich and Levin and Kaddar reviews identified few examples of good regulatory practices for data reporting, despite many countries having a standing requirement for regular reporting of vaccination activities by private providers, especially non-profits (NGOs or FBOs) filling gaps in government services.^{8 22} Many countries, like Benin and Georgia, report only standard National Immunisation Programme (NIP) vaccines.²¹ In the Western Pacific, six of nine LMICs shared data on immunisation activities and AEFIs.¹² Lack of visibility of private facilities in health facility listings and reporting systems, reduces their inclusion in microplanning, renders immunisation performance measures incomplete and fails to monitor safety signals for the significant proportion of vaccines given in the private sector. In successful examples of inclusive regulation above, such as in Afghanistan, Benin, Malawi and Sudan, involving private facilities in all aspects of programme monitoring mitigated this risk. In Vietnam, a project led by PATH supported development of formalised government agreements with fee-charging immunisation facilities in two provinces to ensure direct entry of service delivery information into the national immunisation information system.³⁷

Mechanisms of engagement between the public and private sectors

The mechanisms of engagement theme covered processes where partners strategise, align and implement activities with the private sector for greater reach, effectiveness and sustainable immunisation outcomes. The limited examples of mechanisms of engagement in the published literature fell under three categories: formal public-private agreements or partnerships, contracting engagement with non-profit NGOs or FBOs and engagement through professional associations and networks.

Examples from Nigeria (in the Mitrovich review), Sudan and Afghanistan detailed PPP, or formal agreements documenting mutual obligations, where the government provided training, vaccines and other commodities

(and in some cases, equipment), while private providers committed to service delivery and participation in reporting, supervision and safety monitoring.^{8 30 31} In Ghana, a growing share of immunisation service delivery has been covered through National Health Insurance Scheme payments to private providers.³⁸ Ghana's immunisation programme has a rich history of PSE captured in the Mitrovich and Levin and Kaddar reviews, characterised by a mixed service delivery system that combines public sector services funded by the MOH with private non-profit and for-profit providers.^{8 22}

PPPs promoted a significant share of vaccinations being offered through the non-government sector: 21% in one state in Nigeria, 16% in Sudan (up to 47% in some areas) and 47% in Uruzgan province in Afghanistan. In Afghan villages where PPPs were active, infant vaccination coverage was more than double that in comparison sites. Afghanistan and Sudan offer examples of where formal agreements were used in fragile, conflict-affected settings that often rely on NGOs to access vulnerable communities. In Darfur, Sudan, 49 NGOs provided immunisation services to 15.5% of the target population in 2017 under memorandums of understanding with government authorities, as well as registration and regulation through the Humanitarian Aid Commission.³⁰

The Mitrovich and Levin and Kaddar reviews both found that not-for-profit facilities run by NGOs or FBOs tend to be situated either in remote rural areas or densely populated urban and periurban areas where zero-dose children are often clustered. Not-for-profits are also often better coordinated with NIPs, especially if they have a history of filling service delivery gaps in defined areas. In a study from Kenya in the Mitrovich review, children were more likely to receive immunisation in settings served mainly by non-profit entities compared with those served by for-profit institutions.⁸ In Georgia and Bangladesh, governments directly contracted private not-for-profit healthcare providers to provide immunisation services in line with national standards and integrated with national systems.^{21 22} The Mitrovich and Levin and Kaddar reviews reported similar government contracting with NGOs for high-need settings in Afghanistan, Cambodia, Pakistan and Rwanda.^{8 22} Contracting improved immunisation programme reach with satisfactory quality. In Papua New Guinea, an NGO contracted out health services including vaccination to private organisations on behalf of the community it served in compliance with national policies and systems, documenting increased immunisation coverage (26% for measles and 31% for pentavalent vaccines).³⁹

Multiple studies highlighted potential roles for new partners. A study from southern Indonesia profiled the activities of the Indonesia Pediatric Society in vaccine promotion as one of nine LMICs involved in a global project to demonstrate potential roles for paediatric societies in vaccination efforts, including coordinating clinicians, advisors, educators and advocates.³⁵ Similarly, a study in Gujarat, India, recommended that professional

societies can facilitate adoption of standards of practice and recordkeeping and provide feedback directly to providers to improve quality of care.³⁶ For FBOs, umbrella agencies that provide oversight and systems support to multiple facilities offer another potential means of engagement. In Malawi, 88% of FBOs provided vaccinations (compared with 56% of for-profit and 60% of not-for-profit). Most FBOs in Malawi are managed through the Christian Health Association of Malawi, which is the largest non-governmental healthcare provider, with a large network of facilities and training colleges.²¹ Umbrella networks may also facilitate or oversee formal assessments that national governments may require for facilities to become qualified to provide vaccination services.²¹

DISCUSSION

Our findings add a synthesis of motivations, enablers and barriers, risks and challenges, and mechanisms of engagement to the increasing recognition of the importance of the private sector in immunisation service delivery, especially in settings where the private sector provides most vaccinations. Understanding how these factors shape PSE helps identify potentially replicable examples of successful PSE and assess their applicability to different contexts. This review updates the evidence on PSE for immunisation in LMICs, consolidating a significant body of evidence from the past 25 years. Despite the large number of publications on PSE in immunisation, and proliferation of PSE efforts in response to the COVID-19 pandemic, the evidence base for PSE in immunisation varies in robustness and prominent gaps remain. We elaborate on these gaps below, considering how health systems could improve PSE for immunisation.

Successful experiences in multiple contexts noted that policy commitment to practical support, quality monitoring and formal regulations facilitated governance that supports PSE. Improved mapping of the current scale and scope of private sector activities and their potential capacity for immunisation service delivery is an urgent priority for many countries. Postpandemic, mapping can restore and strengthen NIPs and identify potential new partners for immunisation, especially those already serving infants, adolescents, pregnant women and adults. We did not find published examples of the use of existing or new geographic information systems data (including WHO/UNICEF joint reporting form data) to map locations where the private sector could do more to reach unvaccinated populations and zero-dose children, particularly in fragile or conflict settings.⁴⁰ We propose mapping exercises as an important prerequisite to making policy commitments to support private sector vaccination.

Policy and planning may also benefit from deeper consideration of the factors that motivate private providers. We found evidence of monetary motivators (eg, fees, revenue, increased client flow and access to expensive equipment), as well as non-monetary motivators such

as recognition and legitimacy, involvement in national decision-making, potential to improve quality of care and a mandate to serve their community. Design of PSE activities should consider how incorporating monetary and non-monetary incentives offered through formal agreements for accreditation, regulation and practical support can enhance motivation of private providers particularly underused motivators like institutional recognition and inclusion in policy. Efforts to include private providers in formal agreements are critical to overcoming barriers to accessing commodities and quality immunisation services. For instance, in Western Kenya, low prices for typhoid vaccines in pharmacies made possible by government subsidies generated high vaccine demand.¹¹ We found few reports of financial incentives like subsidies per vaccinated client. However, in Afghanistan, the government pays private providers a monthly incentive to compensate them for free vaccination services.³¹ An important regional assessment by UNICEF's Middle East and North Africa Region published after the literature search for this manuscript was completed produced a helpful regional guide for private sector partnerships with useful context and policy case studies for Jordan, Sudan and Tunisia.⁴¹ These findings align with the general evidence on contracting NGOs for PHC.⁴²

Financing strategies can be used to increase efficiency; an example is designing incentives that encourage the delivery of preventive and PHC services such as provision of the full immunisation schedule for children over expensive curative care. We found multiple examples of contracting with private health facilities using public funds to increase zero-dose communities' access to free immunisation services. Immunisation must be prioritised within the overall national UHC benefits package to ensure that people have guaranteed access to essential immunisation services, irrespective of employment status, income or health insurance coverage. As countries graduate from Gavi support and transition into the middle-income category, funding for immunisation is increasingly uncertain, prompting calls for engagement of additional partners from the private sector like foundations and trusts.^{13 15 20} Urgent needs post-transition include securing access to affordable vaccines and helping countries plan for fully funded and sustainable immunisation programmes.^{16 20}

In urban settings, for-profit entities usually play more substantive roles in health workforce and service delivery for immunisation programmes than non-profits, though we note an exception in urban Bangladesh.⁴³ Non-government providers, including NGOs, FBOs and even for-profit providers, are critically important in remote, fragile and conflict-affected settings to reach places without government services or where trust in government is low. Private providers also help extend reach of new vaccines, often through the for-profit sector for a fee. In Kenya, stocking retail medicine outlets with typhoid vaccine for adults extended reach to a broader range of income groups.¹¹ Including these organisations

in microplanning can increase inclusion of communities that the public sector cannot reach, or that prefer private sector providers.

A broad array of partners is needed to build—and in the wake of COVID-19, rebuild—confidence in immunisation. Backsliding vaccination coverage during the COVID-19 pandemic resulted in 5 million additional zero-dose children.^{9 44} In high-income countries, pharmacies play a prominent role in immunisation service delivery and were instrumental in vaccination efforts during COVID-19. However, in LMICs pharmacies, chemists and medicine outlets are relatively underused for vaccination and their roles poorly documented. The systematic review by Yemeke *et al* and work of Ho *et al* in Kenya demonstrate that while pharmacy providers have limited roles in service delivery, they are engaged in vaccine promotion and education in many countries, suggesting they are a relatively untapped resource to expand vaccination access.^{11 27} Additionally, professional societies and FBO umbrella agencies may be appropriately positioned to support coordination, training, quality monitoring, recognition and some system elements like supplies distribution. An estimated 23 of 54 countries in Africa have umbrella organisations that oversee or support networks of FBOs.⁴⁵ Umbrella agencies may provide a systems-oriented mechanism for engagement with the government on immunisation programming elements that require centralised planning or coordination.^{7 13 46}

Further evidence is needed on incorporating private providers into information systems for planning, monitoring and reporting, particularly safety monitoring systems. The COVID-19 pandemic revealed the advantages of investing in electronic health systems to monitor vaccination activities, ensure surveillance of adverse events, link vaccination history to disease reporting, provide real-time supply chain monitoring and strengthen digital immunisation architecture more broadly. Although there are anecdotal examples of involving private providers in national effective vaccine management updates and cold chain equipment optimisation mapping, none were documented in this update or the Mitrovich or Levin and Kaddar reviews. While our review did not capture any examples of digital vaccine management platforms, COVID-era solutions like CoWIN in India that capture all vaccine-related data and include public and private providers can support universal vaccination coverage.⁴⁷

Methodologically, our review was limited due to budget and time constraints, having been conducted in the context of an ongoing immunisation programme and without a formally registered scoping review. We relied on previous reviews to catalogue evidence published prior to September 2016 and searched only one database. Although we conceptually expanded our search to include grey literature, our results drew almost exclusively from the published literature, which may have missed some rich case studies. However, we believe that because expert consultations did not identify any additional

relevant documents, our update is representative of the experiences of LMICs in PSE for vaccination.

Building on two seminal reviews of PSE in vaccination in LMICs, our update identifies emerging practices. Future research priorities include efforts to understand and quantify provider motivations and effective PSE mechanisms in varied contexts. We found no well-documented examples of social franchising, testing monetary and non-monetary mechanisms to support immunisation like targeted subsidies for equipment or expansion of service offerings, vouchers for priority groups,⁴⁸ results-based performance systems⁴⁹ or health insurance-based models for service expansion where payments can be linked to improved immunisation uptake and equitable coverage. Well-designed task-shifting studies could identify safe and feasible roles for pharmacists, community health workers and other new partners in expanding immunisation reach. Additionally, other than government provision of cold chain equipment, there were few innovative responses to address supply chain and logistics issues in the literature.

Many countries continue to struggle with integration of private sector providers into their government-regulated PHC systems. PSE approaches offer a means to increase access to immunisation services and reach underserved communities.⁵⁰ The COVID-19 pandemic taught us that a broad array of partners is needed to rebuild confidence in immunisation.⁵¹ Achieving this goal will require ministries of health and professional societies to work more closely with private sector partners on service delivery, monitoring and surveillance, national committees on immunisation practices, and information, education, and health promotion efforts. Reaching adult and priority populations such as those with comorbidities and first responders will also require working across multiple sectors. Non-state actors like faith-based groups often have better access to or are preferred by vulnerable populations including the urban poor, rural populations and those living in fragile and conflict-affected settings. To test effective PSE models, countries will need tailored immunisation technical support and implementation research to document the impact of private engagement on vaccination coverage and reach. Our multisectoral analytical framework offers country decision-makers a useful tool for evaluating the present and future roles of private sector actors to reduce missed opportunities for vaccination and improve vaccine equity.

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