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Review

Strategies, interventions, and uptake of catch-up vaccination among adolescent and adult migrants, refugees, and internally displaced persons (IDPs) in low- and middle-income countries (LMICs): A systematic review

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ABSTRACT

Background: Catch-up vaccination helps close immunity gaps among migrants, refugees and internally displaced people (IDPs) in low- and middle-income countries (LMICs). Despite immunisation life-course policies and global guidelines promoting catch-up vaccination of arriving migrants, vaccination strategies for adolescent and adult populations are poorly described. We synthesised evidence on catch-up vaccination strategies and interventions, delivery platforms, uptake and coverage, and contextual barriers and enablers in LMICs.

Methods: We searched Embase, Medline, PsycINFO, Global Health, Web of Science and grey literature sources (including websites of international and national public health organisations and agencies) for primary studies and reports on catch-up vaccination strategies and interventions, delivery platforms, uptake and coverage, and contextual barriers and enablers targeting adolescents (9–18 years) and, or adults (≥19 years) in migrants (foreign-born, including refugees) and internally displaced people (IDPs; displaced within national borders) across 136 LMICs, (from January 1st 2000 to February 1st 2025; all languages). Study quality was accessed using ROBINS-I, CASP, AACODS and, AGREE II tools.

Results: Thirty-seven records met the inclusion criteria (13 peer-reviewed, 24 grey literature), reporting catch-up vaccination activities across 16 LMICs. Most studies were conducted in Uganda ($n = 6$), Bangladesh ($n = 4$), Lebanon ($n = 3$), and Kenya ($n = 3$). Interventions reached ≥48,000 migrants, refugees, and IDPs (primarily Rohingya refugees in Bangladesh during COVID-19 catch-up campaigns). Populations targeted included mostly refugees ($n = 16$ studies; 43.2%), general migrants ($n = 14$; 37.8%), and IDPs ($n = 5$; 13.5%), with a smaller number involving mixed or other migrant groups (n = 4; 10.8%). The most frequently delivered vaccines were measles-rubella ($n = 12$; 32.4%), COVID-19 primary-series catch-up ($n = 9$; 24.3%), HPV ($n = 6$; 16.2%), polio OPV/IPV ($n = 5$; 13.5%), and Hepatitis B (n = 3; 8.1%). Catch-up vaccine delivery most commonly occurred through primary care via opportunistic offers ($n = 11$) and mobile/outreach delivery (n = 11), with additional implementation in fixed posts in camps/settlements ($n = 7$), supplemental immunisation activities (SIAs) (n = 6), school-linked delivery (n = 5), and hospital/outpatient opportunistic vaccination ($n = 4$). High uptake (≥85%)

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was reported where access barriers were minimised (e.g., walk-in availability, extended hours) was paired with community or peer engagement and simple recall systems (SMS or e-booking). Reported barriers included documentation/entitlement checks, language barriers, and fragmented or non-interoperable vaccination records. *Conclusions:* Migrants remain at risk of under-immunisation, and greater emphasis must be placed on promotion of vaccination across the life-course for missed vaccines, doses, and boosters. Strengthening catch-up vaccination in adolescents and adults, and improving migration-disaggregated data and delivery systems, are urgently needed.

1. Introduction

The World Health Organization's Immunisation Agenda 2030 (IA2030) promotes equitable vaccine access across the life course, recognising immunisation as a critical public health intervention [1]. Essential immunisation programmes have averted an estimated 154 million deaths over the past 50 years, primarily through childhood vaccination [2]. However, achieving IA2030's broader goals require addressing missed vaccination opportunities beyond early childhood, particularly for adolescents and adults [3]. According to the World Health Organization (WHO), "Catch-up vaccination refers to the action of vaccinating an individual who, for whatever reason, is missing or has not received doses of vaccines for which they are eligible, per the national immunization schedule" [3], this plays a central role by ensuring those who missed routine doses, or have uncertain vaccination histories, receive protection against vaccine-preventable diseases (VPDs) [3].

Despite global guidance, implementation of catch-up strategies remains uneven, especially in low- and middle-income countries (LMICs) where immunisation systems may be disrupted by conflict, underfunding, or humanitarian crises [4]. Vulnerable populations such as migrants, refugees and internally displaced persons (IDPs) are frequently under-immunised, they may have missed vaccines, doses, and boosters as children and then face a range of barriers to accessing vaccine systems in their new country or location, missing vaccination due to mobility and barriers to vaccine systems [5]. Persistent barriers ranging from limited-service access and legal constraints to sociocultural and informational challenges exacerbate these gaps [5]. Migrants and refugees often arrive in host countries without verifiable vaccination records [6].

Although the WHO recommends catch-up vaccination for migrants and refugees across all age groups in accordance with a country's national schedule [3], it is unclear to what extent this happens in practice. LMICs face health system constraints, vaccine supply chain issues, and logistical challenges, further worsened by the COVID-19 pandemic, which reversed years of progress in routine immunisation [7]. The Big Catch-Up initiative, launched in response, aims to restore global coverage levels and reach "zero-dose" children (children who have received no routine vaccines, typically measured as no DTP-containing vaccine doses) [8]. Yet adolescents and adults may have been overlooked in these efforts, particularly in LMICs. Experience from high-income countries (HICs) shows that there are major gaps in service provision to older migrants and refugees groups arriving from LMICs [9]. Inequities persist even in well-resourced settings, with socioeconomic status, ethnicity, and geography influencing access and uptake [10]. These patterns underscore the need for inclusive and context-sensitive catch-up strategies in LMICs, where structural barriers are more pronounced.

Several High Income Countries (HICs), including EU/EEA countries, have developed guidelines recommending meningococcal serogroups A, C, W, and Y (MenACWY), measles–mumps–rubella (MMR), diphtheria–tetanus–pertussis (DTP), inactivated poliovirus (IPV) catch-up vaccinations for adolescents and adult migrants and refugees with uncertain immunisation histories on arrival [11]. In contrast, many LMICs [12] lack dedicated catch-up policies for adolescents and adults, especially for migrants and refugees [13]. While some LMICs have initiated campaigns targeting adolescents and adults, coverage and integration into routine services remain inconsistent and it is unclear to what extent they focus on migrant and refugee populations specifically. This review synthesise evidence on catch-up vaccination strategies or intervention, delivery platforms, uptake or coverage, and barriers and enablers influencing implementation among adolescent and adult migrants, refugees, and IDPs in LMICs.

2. Methods

This systematic review adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [14], and is registered with PROSPERO (CRD42025640626) [15].

2.1. Search strategy and data sources

We searched five databases Embase, Medline, PsycINFO, Global Health, and Web of Science for studies on catch-up vaccination strategies or interventions, delivery platforms, uptake and coverage, and barriers and enablers in low- and middle-income countries (LMICs) for adult and adolescent migrants and refugees, published from 1 January 2000 to 31 December 2024 in any language. Grey literature was identified using a structured approach: (i) targeted searches of a predefined list of government and ministry websites and key international and national partners and organisations involved in immunisation (e.g., WHO, Gavi, IOM, UNHCR, MSF, Médecins du Monde, IFRC, ReliefWeb), and (ii) site-specific searches and targeted web searches using predefined keyword combinations (e.g., "catch-up vaccination" OR "supplementary immunisation" AND migrant* OR refugee* OR "internally displaced"). Searches were documented (source, date, and terms used) to support reproducibility. Reference lists of included articles were also hand-searched. A structured Boolean search strategy was developed (see Supplementary Table S1 – Search strategy – PICO).

2.2. Inclusion and exclusion criteria

Studies were eligible if they focused on adolescents (9–18 years) or adults (≥19 years) residing in any of the 136 LMICs as classified by the World Bank as low-income and lower-middle-income countries for the 2024–2025 fiscal year [12], (see supplemental S2 - LMICs included by region), and targeted international migrants (foreign-born persons, including refugees) and/or internally displaced persons (IDPs). Migrants were defined as foreign-born individuals residing in an LMIC [16]; studies explicitly identifying refugees were coded as a distinct subgroup within international migrants (categories non-exclusive). IDPs were defined (IOM Glossary) as people forced or obliged to leave their homes who remain within their country of origin [16]. Included studies reported catch-up vaccination strategies, delivery platforms and interventions, uptake and coverage, and barriers and enablers influencing implementation. Studies covering mixed age groups (children and adolescents and/or adults) were eligible only if results for adolescents (9–18 years) and/or adults (≥19 years) were explicitly reported or if the catch-up activity clearly targeted these age groups. Studies focused primarily on childhood vaccination that did not report adolescent or adult-specific outcomes were excluded.

We followed the WHO definition of catch-up vaccination as the administration of missed childhood or adolescent vaccines, including in

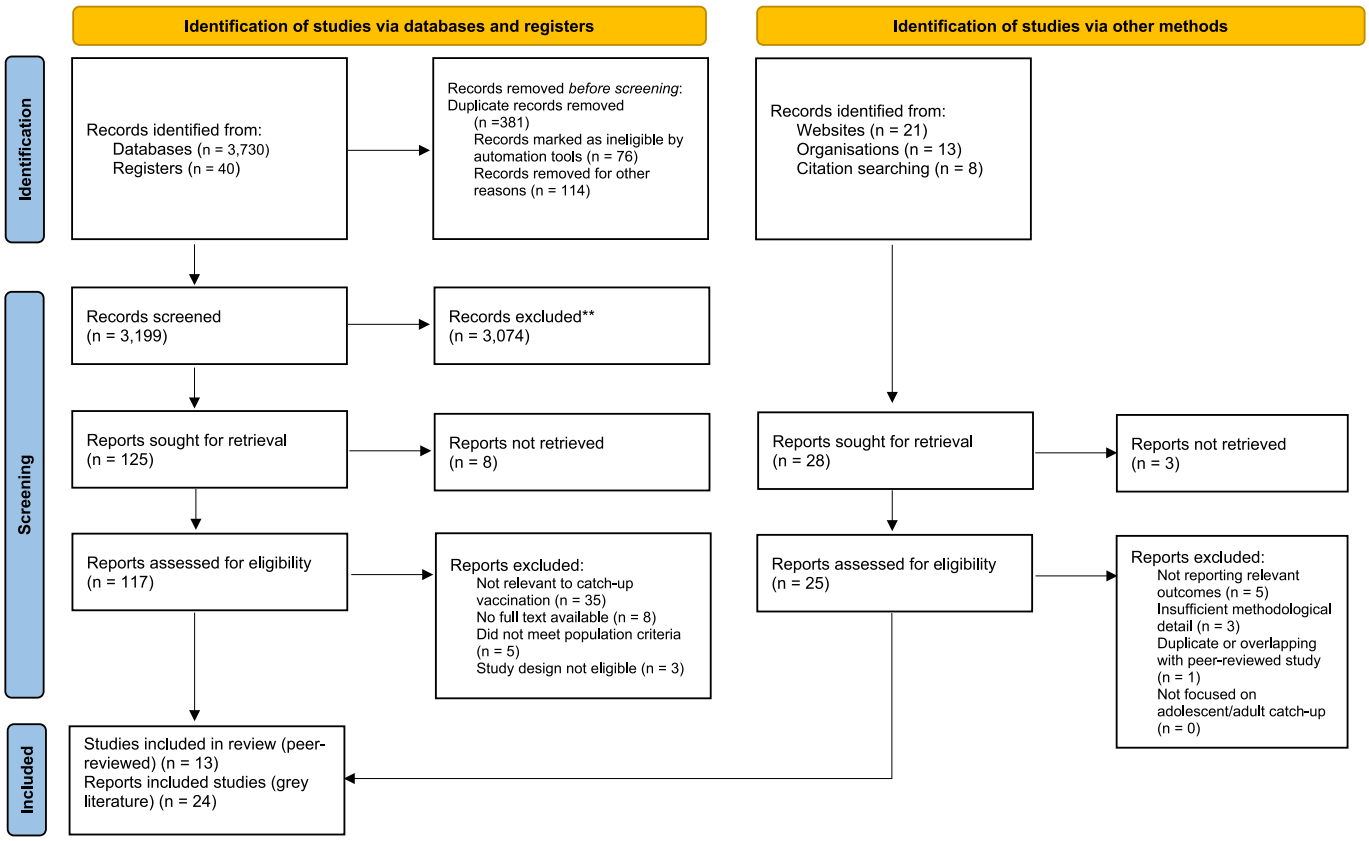

Fig. 1. PRISMA Chart.

individuals with uncertain vaccination status [3]. Accordingly, COVID-19 was treated as catch-up only when primary-series doses were overdue or vaccination history was uncertain; booster or seasonal doses were excluded. Eligible study designs included cross-sectional, cohort, case-control, RCTs, qualitative, mixed-methods, literature reviews, and relevant grey literature. Editorials and policy documents were included if they reported outcomes related to catch-up efforts. Studies were excluded if conducted outside LMICs, focused only on childhood vaccination, or lacked direct relevance to catch-up strategies for migrants, refugees and IDPs. Search results were screened using Rayyan. Two independent reviewers (OB, KM) screened titles and abstracts, followed by full-text assessment. Disagreements were resolved through discussion or third-party arbitration (SH).

2.3. Data extraction and synthesis

Data were extracted using a standardised Excel form, including publication year, study design, population type (e.g. migrants, refugees, IDPs), vaccine(s) targeted (e.g., HPV, measles), type of catch-up intervention, and setting (e.g., primary care, mobile clinics, refugee camps). Interventions, delivery strategies and uptake/coverage were summarised in tables and narrative form. Barriers and enablers influencing implementation were analysed thematically and mapped to the WHO Behavioural and Social Drivers (BeSD) framework (Brewer et al. [17,18]), which covers thinking and feeling, social processes, motivation, and practical issues. The BeSD framework was selected to analyse barriers and enablers because it integrates demand-side factors with service delivery and access constraints. This framework also captures not only perceptions and motivation, but also social processes and practical issues that shape whether vaccination strategies are implemented, accessed, and completed. Delivery strategies were categorised into supplementary immunisation activities (time-limited campaigns delivered in addition to routine services), mass campaigns (population-wide vaccination regardless of prior status), mop-up efforts (targeted follow-up of individuals missed by previous delivery), and routine integration (delivery through existing routine health services).

2.4. Quality assessment

Two reviewers (DDF, ENC) independently appraised methodological quality. We used CASP for qualitative studies [19], ROBINS-I for non-randomised quantitative designs [20], AACODS for grey literature [20], and AGREE II for guidance documents [21]. For cross-tool synthesis, domain judgements were mapped to a 3-point scale (Yes = 1, Unclear = 0.5, No = 0) and converted to study-level percentages; studies were classified as high (≥70%), moderate (50–69%), or low (<50%) quality. Disagreements were resolved by consensus (with a third reviewer SH if needed). Item-level judgements were aggregated across studies and displayed as a domain-by-domain stacked bar chart (Supplemental Figure SF1: Critical Appraisal of the 37 Included Studies, showing Yes/No/Unclear/Not applicable per item).

3. Results

From 3812 records identified (3770 from databases/registers and 42 from other sources), 37 LMIC evidence records met inclusion (peer-reviewed, $n = 13$; grey literature, $n = 24$), (see Fig. 1: PRISMA Chart), covering at least ≥48,000 adolescents and adults who were migrants, refugees or IDPs. Of these, country-specific ($n = 32$) across 16 countries and regional/global/ multi-LMICs focused ($n = 5$). Study designs comprised quantitative ($n = 2$), qualitative (n = 2), mixed-methods primary studies ($n = 2$), peer-reviewed ($n = 7$) including reviews/ commentaries, and guidance/legal/government/agency reports ($n = 24$). Most records were from the WHO African Region (n = 13) and Eastern Mediterranean Region ($n = 9$), with additional representation from South-East Asia ($n = 4$), the Americas (n = 4), and the Western

Table 1
Summary characteristics of included LMIC evidence studies/reports (n = 37): study design, geography, target populations (migrants, refugees, IDPs), and quality appraisal.

Category	Details
Evidence composition	Peer-reviewed studies (n = 13); Grey literature (policy/guidance/legal/reports) (n = 24)
Study Design	Quantitative (n = 2); Qualitative (n = 2); Mixed-methods (n = 2); Cohort (n = 0); RCT (n = 0); Guidance/Legal/Government ministries/Agency reports (n = 24); Peer-reviewed reviews/commentaries (n = 7)
Year of Publication	2009 (n = 0), 2010 (n = 0), 2012 (n = 0), 2013 (n = 0), 2014 (n = 0), 2015 (n = 0), 2016 (n = 0), 2017 (n = 0), 2018 (n = 2), 2019 (n = 1), 2020 (n = 6), 2021 (n = 7), 2022 (n = 2), 2023 (n = 6), 2024 (n = 10), 2025 (n = 3)
Countries represented (country-specific, n = 16 LMICs; studies/Reports n = 32)	Uganda (n = 6), Bangladesh (n = 4), Lebanon (n = 3), Kenya (n = 3), Ecuador (n = 2), Jordan (n = 2), Morocco (n = 2), Philippines (n = 2), Brazil (n = 1), Peru (n = 1), Rwanda (n = 1), Ethiopia (n = 1), Tanzania (n = 1), Iran (n = 1), Nigeria (n = 1), and Pakistan (n = 1).
Country scope	Country-specific items (n = 32); Regional/Global items/multi-countries (n = 5)
WHO Region	AFR (n = 13) — Uganda (6), Kenya (3), Ethiopia (1), Rwanda (1), Tanzania (1), Nigeria (1); EMR (n = 9) — Lebanon (3), Jordan (2), Morocco (2), Iran (1), Pakistan (1); SEAR (n = 4) — Bangladesh (4); AMR (n = 4) — Ecuador (2), Brazil (1), Peru (1); WPR (n = 2) — Philippines (2); EUR (n = 0) — none; The regional/multi-country/global items (n = 5) are: Latin America regional (1), SEARO regional (1), multi-country LMIC syntheses (2), and global LMIC context (1) — these are not assigned to a single WHO region.
Country Classification by Income Level	Low income (n = 8) — Uganda (n = 6), Ethiopia (n = 1), Rwanda (n = 1); Lower-middle (n = 14) — Kenya (n = 3), Morocco (n = 2), Bangladesh (n = 4), Philippines (n = 2), Tanzania (n = 1), Nigeria (n = 1), Pakistan (n = 1); Upper-middle (n = 10) — Jordan (n = 2), Lebanon (n = 3), Brazil (n = 1), Peru (n = 1), Ecuador (n = 2), Iran (n = 1). *Income groups per World Bank country classifications 2024–25.
Vaccines/antigens being delivered (n = values)	Measles–rubella (MR) (n = 12); COVID-19 (n = 9); Human papillomavirus (HPV) (n = 6); Polio (OPV/IPV) (n = 5); Hepatitis B (HepB) (n = 3); Tetanus-containing (TT/Td/Tdap) (n = 2); Pneumococcal (PCV/PPSV) (n = 1); Typhoid conjugate (TCV) (n = 1); Meningococcal (e.g., MenC) (n = 1). *Counts reflect included LMIC items; multi-antigen campaigns are counted in each relevant antigen category where reported.
Uptake (where reported)	(n = 6 with % data; +2 with non-% outcomes): High (≥85%) (n = 4) — Pakistan (TCV) 98%; Morocco (multi-vaccine) 94%; Brazil (MenC) 87%; MR/Polio SIAs in Kenya/Uganda ~85–90%. Moderate (70–84%) (n = 2) — Bangladesh (LCV: Td/DTaP/HepB) 79%; Iran (HepB first dose) 75.7% (with drop-out). Additional outcomes (n = 2) — Lebanon pneumococcal +25% relative increase. *Pattern: single-dose/campaign models ≥85%; multi-dose schedules show attrition.
Absolute numbers vaccinated/reached (reported subset)	(n = ~48,000) – in Bangladesh, older Rohingya refugees received COVID-19 vaccine during catch-up operations. Absolute counts were rarely reported for migrant/refugees/IDP subgroups; where national SIAs/campaigns were described (e.g., Uganda, Pakistan), totals (often >100,000) were population-wide and not disaggregated by migration status, so they are not included here.
Summary of barriers	(n = 14 studies with explicit barrier data; categories non-exclusive): **Barrier theme** — **Description & illustrative factors** **Practical Issues** (access) (n = 6) — Lack of ID/documentation, language barriers, transport and indirect costs, distance to clinics, inflexible hours, limited outreach posts. **Continuity & follow-up** (practical issues) (n = 4) — Weak registries or defaulter tracing, limited SMS recall, high mobility, loss to follow-up, multi-dose drop-out (HepB, HPV, COVID-19). **System capacity** *(practical issues / service delivery)* (n = 4) — Over-burdened staff; limited provider training for adolescent and adult catch-up; inadequate supervision; few provider incentives; supply or cold-chain imbalances. **Thinking and feeling** (confidence and risk perception) (n = 4) — Distrust of authorities or health systems; concerns about data-sharing or deportation; fear of side effects; low confidence in vaccine safety or benefits. **Motivation (intention, willingness, hesitancy)** (n = 5) — Vaccine hesitancy; misinformation or rumours influencing willingness; low perceived need among healthy adolescents or adults; belief that vaccination is unnecessary after childhood. **Policy and entitlement** *(practical issues / system-level)* (n = 3) — Exclusion or ambiguity in national policies; eligibility linked to formal residency, documentation, or legal status. Mapped to BeSD domains: thinking and feeling; social processes; motivation; practical issues (including service/system constraints).
Summary of enablers	(n = 15 studies with explicit enabler data; counts are non-exclusive and map primarily to BeSD "social processes" and "practical issues," with system-level enablers noted separately): **Enabler theme** — **Description & illustrative strategies** Mobile/outreach delivery (n = 8) — Roving teams, settlement rounds, pop-up or workplace sessions, flexible mobile posts. Flexible/low-friction access (n = 5) — Walk-in and open-vial policies, extended hours, same-day co-administration, minimal paperwork. Community/peer-led engagement (n = 6) — Local leaders, peer advocates, refugee/religious figures, community volunteers. Policy inclusion & entitlement (n = 4) — No-ID access, fee waivers, inclusion in national plans/refugee PHC frameworks. Integrated PHC & hospital offers (n = 3) — PHC-based catch-up, opportunistic outpatient/discharge offers, links to defaulter lists. Provider support (n = 3) — Staff training, coordination mechanisms, job aids, peer learning/incentives. Digital recall & registries (n = 2) — SMS reminders, cross-site tracking, early e-registry/e-booking systems. Multilingual/culturally adapted communication (n = 2) — Materials and messaging in migrants'/refugees' languages and contexts.

(*continued on next page*)

Table 1 (*continued*)

Category	Details	
	School-linked platforms (n = 1)	School-based adolescent catch-up where enrolment is high.
Study Setting	Refugee/IDP camps or settlements (=8–10) (e.g., Cox's Bazar; Uganda settlements; N. Ethiopia IDP); PHC/ system integration (= 5–6) (e.g., Lebanon, Uganda); Community/mobile/outreach (= 4–5) (e.g., Somali mobile populations; Boa Vista shelters); Hospital-based (=1–2); Not applicable / Not reported for some grey literatures/ reports (=12–14)	
Summary of Delivery strategies/ interventions (reported)	Strategies / interventions (reported) (*n* = 24 items with delivery detail; categories non-exclusive): PHC integration & opportunistic primary care (*n* = 11); Mobile/outreach (roving teams, pop-ups) (n = 11); Camp fixed-post + roving rounds (n = 7); Mass campaigns/SIAs/mop-ups (n = 6); School-linked adolescent delivery (n = 5); Community/shelter sessions (n = 5); Hospital opportunistic offers (OPD/ED/ discharge) (n = 4); Digital recall/registries (SMS, e-booking) (n = 2); CHW-led engagement & defaulter tracing (n = 3). Notes: Categories overlap by design; counts reflect explicit reporting in included LMIC items.	
Participants- residence	Not applicable / not consistently reported across the full evidence set. For primary peer-reviewed studies only (n = 6): Mixed (n = 3); Urban (n = 2); Rural (n = 1).	
Participants – age range	Adolescents-only (n = 4); Adults-only (n = 2); Combined adolescents + adults (*n* = 31).	
Gender	Not applicable / not consistently reported across the full evidence set.	
Migrant Type (where specified)	Refugees =16; Migrants/foreign-born (unspecified detail) = 14; IDPs/displaced = 5; Refugees/Stateless = 1; Mixed/other = 4 * Counts are non-exclusive and reflect overlap across categories.	
Risk of bias tools	Primary peer-reviewed studies (n = 6): ROBINS-I (quant, n = 2), CASP (qual, n = 2), both for mixed-methods (n = 2). Guideline-type items: AGREE II (= 1). Grey literature (*n* = 24): AACODS.	
Risk of bias scores	Low (n = 24); Moderate (n = 12); High (n = 1).	

Table 1. Summary reflects ***N* = 37 included LMIC items** (32 country-specific +5 regional/global/ multi-countries LMIC-focused). Vaccine counts are per-antigen and non-exclusive (multi-antigen campaigns are tallied in each relevant antigen). Uptake summary includes only items reporting percentage coverage for adolescent/adult migrant/refugee/IDP subgroups; qualitative statements and national totals without migration disaggregation are excluded. Absolute numbers were rarely reported for these subgroups; one item reported ≈**48,000** older refugees vaccinated during COVID-19 catch-up in Bangladesh; other national totals were population-wide and not migration-disaggregated. Barriers/enablers and delivery-strategy categories are non-exclusive and were mapped to WHO BeSD domains (thinking/feeling; social processes; motivation; practical issues). Quality appraisal tools: ROBINS-I (non-randomised), CASP (qualitative), AACODS (grey literature), AGREE II (guidance). Overall risk-of-bias distribution: **Low (n = 24), Moderate (n = 12), High (n = 1)**. Symbols: "≈" indicates an approximate count due to incomplete reporting. Abbreviations: LMIC, low- and middle-income country; IDP, internally displaced person; PHC, primary health care; BeSD, Behavioural and Social Drivers of Vaccination; SIA, supplementary immunisation activity; MR, measles–rubella; HPV, human papillomavirus; OPV/IPV, oral/inactivated poliovirus vaccine; HepB, hepatitis B; TT/Td/Tdap, tetanus-containing vaccines; PCV/PPSV, pneumococcal conjugate/polysaccharide vaccine; TCV, typhoid conjugate vaccine; MenC, meningococcal C; CHW, community health worker; OPD/ED, outpatient/emergency department. Per-study details (vaccine, age, delivery platform, uptake/ coverage, barriers/enablers, and quality ratings) are provided in Table 1 and Supplemental Table S3; item-level risk-of-bias summaries appear in Supplementary Figure SF1, with overall quality ratings in Supplementary Figure SF2 and SF3; and uptake in Fig. 3.

Pacific (n = 2).

Geographically, the 37 included records were conducted across 16 LMICs: country-specific records (*n* = 32) spanned Uganda (*n* = 6; [22,23,24,25,26,27]; Bangladesh (n = 4; [28,29,30,31]; Lebanon (n = 3; [32,33,34]; Kenya (n = 3; [35,36,37]; Ecuador (n = 2; [38,39]; Jordan (n = 2; [40,41]; Morocco (n = 2; [42,43]; Philippines (n = 2; [44,45]; and one each from Brazil [46], Peru [47], Rwanda [48], Ethiopia [49], Tanzania [50], Iran [51], Nigeria [52], and Pakistan [53], see supplemental Figure SF4 (Country distribution of included LMIC study/reports; n = 32). The remaining regional/global LMIC-focused records (*n* = 5) were multi-country syntheses or guidance [54,55,56,57,58]. Specific population focus varied: most records included both adolescents and adults (*n* = 31: [46,40,32,29,33,38,24,36,37,48] [25,42,43,34,26,30,41,54,47,44] [31,55,39,56,51,52,49,27,45,57] [58]; four focused solely on adolescents [35,23,53,50]; and two on adults [22,28].

Delivery settings were diverse as Primary Health Care (PHC) platforms (including routine PHC posts and opportunistic offers within primary care) were most frequent (=12: [32,29,24,25,42,34,26,30,41,47]; [51,52]. Mobile/outreach delivery (roving teams, pop-ups, later community outreach) was also common (*n* = 11: [40,35,28,29,38,24,42,47,50,52]; [49]. Community-based approaches (e.g., shelters, community days, Non-Governmental Organization (NGO)/community clinics, workplace/market pop-ups) appeared in =5 records [46,35,38,25,53]. Camp or settlement platforms were reported in *n* = 7 [46,40,28,48,25,55,49]. Hospital-based offers (Out Patients Department (OPD)/ Emergency Department (ED)/discharge or hospital posts) were described in *n* = 4 [32,33,34,41]. Educational settings (school/college-linked) featured in n = 4 [35,23,53,51]. Explicitly named antigens were measles–rubella/measles (*n* = 6: [46,35,32,23,50,49], COVID-19 (*n* = 9: [40,28,33,38,30,47,31,55,39], HPV (*n* = 2: [46,52], polio OPV/IPV (n = 2: [35,49], hepatitis B (n = 2: [28,51], tetanus-containing (*n* = 1: [28], pneumococcal (n = 1: [32], typhoid conjugate (n = 1: [53], and meningococcal C (n = 1: [46]; catch-up delivery strategies were described in 24 records [46,40,35,32,28,29,33,38,23,24]; [48,25,42,43,34,26,30,47,55,53]; [50,51,52,49]. Barriers were explicitly reported in 14 records [46,40,35,32,22,28,29,38,23,24] [42,53,50,51], and enablers in 15 [46,40,35,32,22,28,29,33,38,23]; [24,42,34,50,49], see Table 1: Summary characteristics of included LMIC evidence studies and reports (*n* = 37) for full reporting.

Risk of bias was assessed using AACODS for grey literature (*n* = 24); ROBINS-I for non-randomised quantitative primary studies (n = 2); CASP for qualitative primary studies (n = 2); ROBINS-I + CASP in combination for mixed-methods primary studies (n = 2); AGREE II for a guideline-type item (*n* = 1); and peer-reviewed non-primary items (reviews/commentaries) were appraised narratively (*n* = 6). Overall, 24 records were judged low risk of bias, 12 moderate, and 1 high. The overall distribution is shown in Supplementary Figure SF2; Overall Quality Ratings of 37 Included Studies.

3.1. Populations and settings

Across the 37 records, target populations included foreign-born migrants (including refugees) and internally displaced persons (IDPs). Most records focused on migrants and refugees (*n* = 32; (n = 32 of 37; [46,40,35,32,28,33,38,23,24,36]; [37,48,25,42,43,34,26,30,41,54]; [47,44,39,53,56,50,51,52,27,45]; [57,58]), while a smaller number primarily addressed IDPs (*n* = 5:: [44,55,52,49,45]). Population categories were non-exclusive, reflecting overlap across migrant, refugee, stateless, and mixed groups (Table 1: Summary Characteristics of included LMICs studies/reports). Interventions targeting these populations were delivered across a range of settings, most commonly through community or shelter-based locations, organised camps or settlements [46,28,24,48,42,47,49], primary health care platforms (often involving migrant or refugee integration into PHC)

Box 1. COVID-19 catch-up vaccination in LMIC migrants, refugees, and IDPs: delivery models and policy inclusion (*n* 9 records)

- **Bangladesh — camps (targeted mobile outreach and age-expanded eligibility).** Sector-by-sector sessions vaccinated ≈48,000 Rohingya aged ≥55 during catch-up phases; documentation/mobility barriers addressed via on-site support [28,55].
- **Jordan — camps and host-community sites (policy inclusion + mixed fixed/mobile delivery).** Refugees formally included in the national campaign; camp health posts (fixed) plus rotating mobile vans integrated with national e-booking/registry [40,41].
- **Latin America (regional) — shelters and temporary sites.** Displaced people accessed COVID-19 vaccination through fixed posts in shelters and coordinated outreach [31].
- **Lebanon, Peru, Ecuador — policy inclusion with mainly passive access (limited dedicated catch-up).**Eligibility later extended to migrants/refugees, largely via routine PHC/hospital points and periodic mobile offers in dense urban areas [33,47,38,39].

COVID-19 counted as catch-up only for overdue/uncertain primary-series doses; booster/seasonal doses excluded." *Uptake reporting:* quantitative migrant-specific coverage was rare; one record reported absolute reach (≈48,000 in Bangladesh) [28], while others described inclusion and delivery models without percentage coverage [40,28,33,38,41,47,31,39,55]. *Abbreviations:* PHC = primary health care.

[32,33,24,26,30,41], and mobile or outreach services reaching informal or high-density sites [35,28,24,52,49]. Opportunistic hospital-based delivery was less frequently reported [32,34,41].

3.2. Range of vaccine, interventions and delivery strategies

Catch-up delivery for adolescents and adults was implemented via school-linked campaigns/SIAs, PHC-based offers (including opportunistic outpatient/discharge encounters), fixed posts in camps/shelters, and mobile/outreach teams. For adolescents, the most commonly reported antigens were measles–rubella / measles (*n* = 6: [46,35,32,23,50,49], polio (OPV/IPV) (*n* = 2: [32,49], typhoid conjugate vaccine (TCV) (*n* = 1: [53], and HPV (n = 2: [46,52]. These were typically delivered through school-based or SIA platforms, especially in Uganda and Pakistan which was often with market/school-linked outreach for mobile groups [35,23,53,49]. For adults, frequently reported catch-up antigens included hepatitis B (*n* = 3: [28,30,51], and tetanus-containing vaccines (n = 2: [28,30], commonly delivered through PHC (and during hospital encounters) in Bangladesh and related service adaptations [28,30]; pneumococcal vaccination was described in Lebanon as part of a catch-up programme delivered through primary care services targeting adults with incomplete vaccination histories.[32]. One meningococcal C campaign formed part of a multi-vaccine offer in Brazilian shelters that included both adolescents and adults [46]. Cross-cutting delivery strategies featured mobile/outreach to reach informal settlements, shelters and high-density/IDP settings (*n* = 7: [46,35,28,42,47,52,49]; camp/fixed-post-delivery with roving rounds [40,28,48]; and PHC integration/opportunistic primary care offers [32,24,26,30,41], (see Table 1 for per-record mapping).

Mobile and outreach clinics were among the most common strategies in camps and high-density settlements, especially in Bangladesh, Lebanon, and Uganda; these were often used to reach both adolescents and adults [28,32,33,24,25]. Community-based outreach in local shelters and settlements was also reported, including Brazil shelters, Jordan camps, Rwanda camps, and Bangladesh camps [46,40,28,48]. Fixed-site services in primary health care centres and hospitals complemented outreach in Jordan, Lebanon, and Morocco, supporting continuity of care and integration of catch-up doses within routine services [41,32,33,42,34]. In several contexts, school-based delivery was used to reach adolescents most clearly for measles-rubella (MR) SIAs/mop-ups in Uganda, TCV in Pakistan, adolescent HepB in Iran, and school-linked outreach in Kenya [23,53,51,35]. Uptake figures are reported in the uptake; reach and coverage in Migrants, Refugees, and IDPs subsection, and in *Fig. F3 and* Table 1.

3.3. Identified strategies to improve uptake

Targeted adaptations were employed to meet the unique needs of migrants, refugees and internally displaced groups in LMICs, these adaptations included digital tools such as SMS recall lists in Bangladesh [30], and national e-booking/registry systems in Jordan via camp rollout and, Lebanon through their inclusive national health systems [40,41,33]. Community engagement leveraged trusted figures (community health workers (CHWs), community/religious leaders, local organisations) in Bangladesh, Lebanon, and Uganda to build trust and counter misinformation [29,32,25]. Flexible, low-friction access was achieved via walk-in/open-vial policies (allowing vaccination without waiting to accumulate full session sizes) in Brazil and Kenya, extended/flexible hours and "settlement/community days" in Bangladesh and Uganda [46,35,30,24,25]. Performance-based provider incentives were described in Bangladesh to strengthen outreach to informal migrant workers, including small financial incentives linked to vaccination delivery or follow-up activities [30]. Recent examples from the included studies show promising life-course strategies tailored for migrant and IDPs. In Uganda and Lebanon, HPV and measles–rubella catch-up campaigns in refugee settlements achieved high uptake when delivered through school-based and mobile outreach models [32,22]. In Bangladesh, community-led initiatives in Rohingya refugee camps extended vaccination to older adolescents and adults' refugees, including COVID-19, cholera, and typhoid [28,29]. In Kenya, targeted polio and measles campaigns for Somali refugees' populations used mobile units and culturally adapted engagement to overcome access barriers [35].

3.4. Uptake and coverage

Few records reported percentage uptake and where available, catch-up strategies often achieved high coverage via school- or community-based measles-rubella (MR)/polio rounds in Kenya and Uganda reported ~85–90% coverage [35,23]; a shelter-based MenC campaign in Brazil achieved 87% [46]; a multi-vaccine catch-up in Morocco reached 94% [42]; and a typhoid conjugate vaccine (TCV) catch-up in Pakistan reported 98% coverage [53]. In contrast, adult and young-adult programmes showed lower uptake where multi-dose completion was required; for example, hepatitis B catch-up in Iran achieved ~75.7% coverage for the first dose, with attrition between subsequent doses linked to mobility, documentation or ID checks, and weak follow-up systems [51] [35,32,29,54]. Similarly, Bangladesh life-course catch-up round reported 79% coverage for the first dose of tetanus/diphtheria/DTaP/HepB, with lower completion for later doses [28]. In Lebanon, adding mobile outreach and CHW support was associated with a 25% relative increase in pneumococcal uptake among Syrian refugees [32].

3.5. COVID-19 catch-up campaigns

To ensure conceptual consistency, we operationalised COVID-19

Fig. 2. Behavioural and social drivers influencing catch-up vaccination among adolescent and adult migrants (including refugees) and internally displaced persons (IDPs) in LMICs, mapped to the four domains of the WHO Behavioural and Social Drivers (BeSD) framework based on Brewer et al [17,18]. Thinking and feeling reflects perceived disease risk and vaccine confidence; social processes reflect social norms and community or provider influence; motivation includes intention, willingness, acceptability, and hesitancy; and practical issues reflect access-related constraints (n = number of studies)

catch-up as overdue or uncertain primary-series doses and excluded booster/seasonal doses; this may have led to the exclusion of studies using broader 'catch-up' terminology. Nine records addressed COVID-19 catch-up vaccination among migrants, refugees, and/or IDPs in LMICs (delivery-focused and policy/context items combined) [40,28,33,38,41,47,31,39,55]. Targeted interventions included mobile teams in camps (Bangladesh; ≈48,000 older Rohingya vaccinated during catch-up phases) [28], and mixed mobile and fixed clinics formally open to migrants including refugees in Jordan [40,41]. Policy inclusion without dedicated catch-up outreach was later reported in Lebanon, Peru, and Ecuador; this supported access through routine services but was also linked to uneven reach where proactive outreach and follow-up were limited[33,47,38,39]. Quantitative uptake for migrant subgroups was sparse as only one record reported absolute reach (≈48,000 in Bangladesh) [28], while the others primarily described inclusion and delivery approaches without percentage coverage [40,33,38,41,47,31,55,39]. Collectively, these emergency-phase adaptations suggest that formal policy inclusion paired with mobile and fixed delivery can narrow coverage gaps in underserved migrant populations, aligning with our broader findings on platform matching and community-supported outreach. Box 1. COVID-19 catch-up vaccination in LMIC migrants, refugees, and IDPs: case studies.

3.6. Barriers and enablers of catch-up vaccination uptake

Data on barriers and enablers were synthesised and mapped to the WHO BeSD domains, including thinking and feeling, social processes, motivation to vaccinate, and practical issues shaping access [17], based on the model by Brewer et al. [18], Fig. 2). Across the 37 records, barriers were explicitly reported in (n = 14) and enablers in (n = 15), (Table 1 and supplemental Table S3). In this review, thinking and feeling covered perceived disease risk and vaccine confidence (including safety and trust); social processes covered social norms, networks, and community or provider influence; motivation covered intention, willingness, acceptability, and hesitancy; and practical issues covered access-related constraints.

Under thinking and feeling, safety concerns and distrust were described in three records from migrant or refugee settings including Lebanon and Bangladesh with tailored counselling used to counter rumours and safety worries [32,29,54]. Under social processes, community- and peer-led engagement (including religious leaders, elders, CHWs, local influencers) was reported as an enabler in five records across Lebanon, Bangladesh, Kenya, and Brazil [32,29,35,46,54]. Under motivation to vaccinate, message framing that linked vaccination to protecting family or sustaining work or mobility, and references to hesitancy or willingness, were reported to influence intent or uptake in two records in Bangladesh [29,54].

Under practical issues, commonly reported barriers included ID or

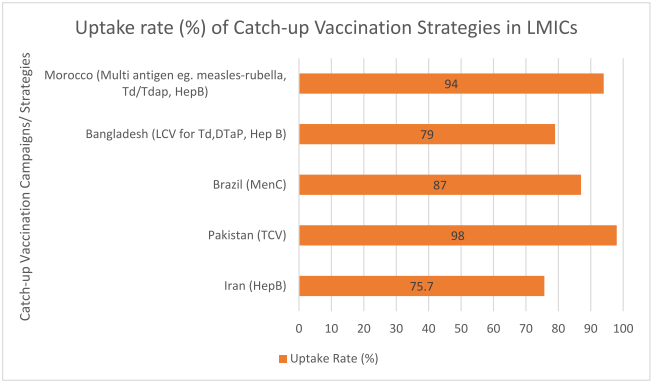

Fig. 3. Uptake rate (%) of Catch-up Vaccination in LMICs. Uptake rate (%) of catch-up vaccination strategies among migrants, refugees, and IDPs in LMICs (n = 5 records reporting percentage coverage). Bars show study-level point estimates (not pooled). **Morocco — multi-antigen catch-up (e.g., measles–rubella, tetanus-containing [Td/Tdap], hepatitis B)** delivered via municipal PHC posts with NGO outreach; population: migrants/refugees; age: adolescents & adults; uptake: 94% (37). **Bangladesh — life-course vaccines (Td/DTaP, HepB)** delivered in Cox's Bazar camps with mobile teams, sector calendars, and priority time-slots; population: Rohingya refugees; age: mainly adults (≥55 for COVID phase) with adolescent/adult catch-up in LCV; uptake (LCV subset): 79% (27). **Brazil — MenC** delivered in shelters with walk-in/open-vial and referral to PHC for series completion; population: refugees/migrants; age: adolescents & adults; uptake: 87% (22). **Pakistan — TCV** delivered via school and community campaign with mop-ups; population: general population including migrants/refugees/IDPs; age: adolescents; uptake: 98% (49). **Iran — HepB (dose-1)** via schools with PHC follow-up; population: migrants/refugees/IDPs; age: adolescents/young adults; uptake: 75.7% (series drop-off reported) (52). **Notes.** MenC = meningococcal C; TCV = typhoid conjugate vaccine; HepB = hepatitis B; Td = tetanus–diphtheria; DTaP = diphtheria–tetanus–acellular pertussis. Only 5 of 37 records (13.5%) reported percentage uptake. Other records either gave non-percentage outcomes—e.g., ≈48,000 older Rohingya vaccinated during COVID-19 catch-up in Bangladesh (27) —or described delivery models without coverage estimates. Age groups: adolescents; adults.

documentation checks, language obstacles, transport or indirect costs, distance, inflexible hours, and over-burdened providers in seven records spanning Brazil, Kenya, Lebanon, Morocco, Uganda, and Bangladesh [46,35,32,29,24,42,30]. Early booking or ID hurdles were reported during scale-up in Jordan in two records [40,41]. SMS recall to reduce missed appointments and drop-out was reported in one record in Bangladesh [30], and integration with national e-booking or registries was documented in two records in Jordan and Lebanon [40,33]. Performance-based provider incentives were described in one record in Bangladesh [30].

Mobile or outreach delivery paired with walk-in and open-vial policies (allowing vaccination without waiting to accumulate full session sizes) was highlighted as effective in three records in Kenya, Brazil, Lebanon [35,46,32]. Combinations most consistently linked to better uptake included trusted community intermediaries, clear safety or risk communication, reduced access barriers (e.g. mobile delivery, walk-in or open-vial policies, extended hours), digital booking or recall where available, and modest provider supports (e.g. brief training, supervision, or small transport or communication allowances) [46,40,35,32,29,33,24,30,41,54].

4. Discussion

We synthesised evidence on catch-up vaccination strategies or intervention, delivery platforms, uptake or coverage, and barriers and enablers for adolescent and adult migrants, refugees and IDPs in LMICs. Across 37 records spanning 16 LMICs, reported delivery counts documented ≥48,000 individuals reached (primarily Rohingya refugees in Bangladesh during COVID-19 catch-up), representing a conservative minimum given the inconsistent denominator. Findings have immediate relevance for strengthening catch-up and life-course vaccination in LMICs, particularly for aligning catch-up doses to national schedules and ensuring continuity of care for mobile groups. Across LMIC settings, effective strategies tended to align migrants, refugees and IDPs with the national immunisation schedule and then deliver catch-up through platform-matched approaches including primary care/opportunistic offers, mobile/outreach services for IDPs and, and fixed posts in camps/settlements for refugees, alongside school-linked delivery. Similar emphasis on national schedule alignment and opportunistic primary-care catch-up is seen in European guidance from the UK, Germany, Italy and Spain (e.g., UK NHS Green Book; Germany STIKO; Italy PNPV; Spain national adult schedule - MMR, MenACWY, Td/IPV) [11,5,9] and in reviews from High Income countries (HICs) including Canada and Australia, highlighting primary-care integration as a key delivery route for adults and out-of-school adolescents [5,9,10]. Our LMICs synthesis adds that co-administration, walk-in/open-vial policies, and extended hours were often bundled with outreach to reduce missed opportunities, reflecting the same "low-friction" principles reported in HICs equity studies in the UK, Canada and Australia [9,10], but applied here in camp, transit and informal-settlement contexts.

However, across settings, national frameworks rarely include provisions for adolescent and adult migrants and refugees, and catch-up vaccination is often implemented through stand-alone campaigns rather than integrated into routine immunisation systems [5,11,40]. At the same time, declining adult migrants and refugees' vaccination coverage in some regions raises concerns about widening immunity gaps and heightened outbreak risk [58]. Several LMICs models also reported good uptake and fewer missed opportunities, Jordan and Lebanon reported improved follow-up when PHC delivery was linked to national immunisation registries or e-booking systems, while camp-based outreach in Bangladesh used simple SMS recall to support completion. In Iran, Pakistan, Kenya and Brazil, PHC–hospital opportunistic offers reduced missed opportunities for adults and out-of-school adolescents; however, uneven denominator data and incomplete series-completion reporting limited comparability, a pattern also observed in high-income settings such as the UK, Canada and Australia, where migrant vaccination records are often fragmented across services and not consistently migration-disaggregated [5]. This convergence suggests that improved migration-disaggregated registries are a shared prerequisite across regions and settings. Such data should, however, be collected and used ethically to avoid stigma, discrimination, or deterrence from accessing care.

Beyond delivery-level adaptations, several included records highlighted the influence of broader structural and system-level factors on catch-up vaccination. These included the presence or absence of national and subnational policy inclusion for migrants, refugees and IDPs, constraints related to financing and programme sustainability, vaccine supply and procurement challenges, and limited health-system capacity for adult and adolescent catch-up. Where catch-up was embedded within national immunisation strategies and supported by routine financing and supply systems, implementation appeared more consistent, whereas reliance on time-limited or emergency funding often resulted in fragmented or stand-alone delivery.

We also found recurrent access frictions (documentation/entitlement checks, direct/indirect costs, language/communication barriers, limited/resourced services for adult/adolescent catch-up) and service-level constraints (guidance, provider preparedness). These themes are also documented in HICs, pandemic-era syntheses from the UK, Canada and Australia report similar trust deficits, exposure to misinformation, language/administrative barriers and fragmented care pathways for migrants, refugees and IDPs [59,60,61]. Conversely, community-led engagement (faith leaders, elders, CHWs, peer advocates) reliably supported confidence and navigation [46,32,29,54], and digital enablers should be pragmatic: national e-booking/registry links where available

Policy

- Align national vaccination strategies with the Immunization Agenda 2030 (IA2030) and Sustainable Development Goal 3, ensuring migrants, refugees and IDPs are not left behind.
- Prioritise legal inclusion of migrant, refugees and IDPs groups of all ages in national vaccination frameworks, including both routine and occupational immunisations.
- Develop clear, funded national policies for catch-up vaccination especially for adolescents and adults' migrants, refugees and IDPs, and integrate these into existing primary healthcare systems.
- Integrate migrants, refugees and IDPs into routine health information systems to improve tracking of vaccination uptake, missed doses, and follow-up needs.
- Strengthen collaboration with civil society, humanitarian actors, and migrant/refugees or IDPs-ed organisations to overcome administrative barriers.
- Collect and publish disaggregated data (by age, migration status, and gender) to support equitable service planning and accountability.
- Apply lessons from COVID-19 catch-up campaigns such as mobile delivery in refugee camps and dual fixed-mobile strategies (e.g., Jordan, Bangladesh) to strengthen national frameworks for adult and adolescent migrants, refugees and IDPs inclusion.

Practice

- Provide training to health workers on adult/adolescent vaccination and migrant/ refugees and IDPs inclusion, as gaps in provider awareness were noted in several contexts (e.g., Uganda).
- Expand flexible delivery models, including mobile outreach, workplace-based campaigns, and camp-based clinics, to reach underserved groups such as migrants, refugees and IDPs.
- Partner with communities to co-design delivery strategies that reflect trust, cultural preferences, and lived experience.
- Link vaccination services with other touchpoints such as health screenings, shelters, or legal aid services to increase reach and continuity.
- Build on successful COVID-19 outreach efforts that demonstrated feasibility of reaching migrants, refugees and IDPs under emergency settings.

Research

- Support national surveys and monitoring systems that capture migrant, refugees and IDPs populations, with disaggregated reporting.
- Explore barriers specific to hard-to-reach groups, including migrants, refugees and the IDPs
- Examine how trust, communication, and misinformation influence vaccine uptake across diverse migrant communities.
- Evaluate the long-term impact of COVID-19 catch-up campaigns on vaccination equity, especially among adolescents and adults in displaced settings.

Panel 1. Policy, Practice and Research Implications.

(Jordan, Lebanon) and simple SMS lists/recall in lower-infrastructure contexts (Bangladesh) [40,33,30]. PHC–hospital integration also functioned as an enabler across LMICs, paralleling enablers highlighted in HICs guidance including the ECDC migrant vaccination guidance [11], the UK NHS Green Book [5], and reviews from Canada and Australia that emphasise primary-care–led catch-up with outreach for mobile and undocumented groups [9,10].

Providers supports from job aids and coordination mechanisms to modest incentives for migrants/refugees, IDPs and healthcare providers can help sustain outreach to mobile groups [30] and, aligning humanitarian and PHC systems ("convergence") offers a practical route to scale and sustainability in protracted displacement [50], a pattern similarly described in Canada, Australia and the UK [5,4,10], where refugee and migrant catch-up programmes are embedded within primary-care systems and supported through outreach and community-led engagement. Taken together, the case for inclusionary policy plus proactive, platform-matched delivery is consistent across income settings and central to IA 2030's equity ambitions [1,3], and achieving the United Nations Sustainable Development Goal −3 Good Health and Wellbeing [62].

4.1. Lessons from COVID-19 catch-up campaigns

Across the COVID-19 subset, two design lessons stand out rather than individual programme details. First, codified eligibility linked to simple data systems, e-booking/registries and basic recall enabled rapid inclusion once policies shifted as reported in Jordan [40,41], and Lebanon [33] [47]. Second, mixed, low-friction delivery, combining fixed points with mobile/outreach and opportunistic offers in routine care reduced missed opportunities in Jordan: fixed posts plus rotating mobile vans [40] [41]; in Bangladesh: targeted camp outreach during catch-up phases [28]; Peru and Ecuador in which delivery was done largely via routine PHC/hospital points [38] [55] [39]. These patterns are consistent with HICs guidance and syntheses that emphasised opportunistic primary-care vaccination, flexible access (walk-in/open-vial), and light digital supports to improve equity for migrants and other underserved groups [9,10,11,59,60,61]. They also echo wider COVID-19 lessons on reaching marginalised populations: take vaccines to the settings people already use; leverage trusted community intermediaries; minimise transaction costs (documentation, scheduling, travel time); and capture doses in interoperable systems so follow-up and series completion are feasible [9,10,11,59,60,61].

4.2. Evidence gaps and limitations

While the included records offer workable LMIC catch-up models for migrants, refugees and IDPs, the evidence base is heterogeneous, with inconsistent reporting of denominators and outcome definitions that

limits comparability across settings. Percentage uptake for migrant, refugee and, IDP subgroups was infrequently reported, series-completion for multi-dose schedules (HepB/HPV/COVID-19) was rarely quantified, and migration-disaggregated data (by displacement status, age/sex, or legal/registration category) were sparse, constraining equity analyses [46,35,32,28,30,53,51]. Included sources were varied in type and largely grey literature rather than peer-reviewed publications; using tool-appropriate appraisal we rated 24 low, 12 moderate, and 1 high risk of bias, and many descriptive designs precluded effect-size synthesis [19,20,21]. The evidence is also concentrated geographically and temporally (=12 LMICs, predominantly 2020–2025), which may reflect pandemic-era priorities and limits generalisability to under-represented regions. Reporting on costs, sustainability, process fidelity, reach to undocumented or highly mobile groups, and adverse event/safety monitoring was limited, and while structural barriers were described, they were seldom quantified. Evaluations of digital tools (SMS/e-booking) and provider supports or incentives were small and used non-standardised metrics [46,40,28,33,30,41]. Together, these gaps underscore the need for routine, migration-disaggregated immunisation data systems and common outcome metrics aligned with IA2030 and SDG-3, alongside prospective evaluations that include cost and safety outcomes [1,35].

Future research should prioritise prospective evaluations of catch-up vaccination strategies with standardised outcome definitions, including migration-disaggregated denominators, dose-by-dose completion, and equity-relevant indicators. Mixed-methods implementation studies and pragmatic programme evaluations embedded within routine services would also strengthen understanding of what works across migration contexts, alongside economic evaluations to assess costs and sustainability. Greater use of interoperable immunisation registries and routine data linkage would also support longitudinal follow-up and comparative analyses across settings. Priority actions for policy, practice, and research are also outlined in Panel 1.

5. Conclusion

Catch-up vaccination for adolescent and adult migrants, refugees, and IDPs in LMICs is feasible but remains inconsistently implemented and rarely sustained. Effective efforts combine flexible delivery (mobile/outreach, walk-in/open-vial, extended hours) with policy inclusion, primary-care integration, and basic data systems to identify, recall, and complete missed doses. Trusted community partnerships, culturally adapted messaging, and simple digital tools (e-booking/SMS) help to reduce access barriers and hesitancy; however, few models are embedded or financed for long-term routine use. To close immunity gaps and advance Immunisation Agenda 2030, countries should adopt a life-course approach that explicitly includes adolescents and adults regardless of migration status, strengthen primary health care platforms, invest in mobile and digital infrastructure, and co-design services with affected communities. These steps can shift ad-hoc campaigns toward inclusive, resilient immunisation systems.

CRediT authorship contribution statement

Darlington David Faijue: Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Oumnia Bouaddi:** Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Conceptualization. **Kathryn Mackey:** Writing – review & editing, Writing – original draft, Validation, Investigation. **Anna Deal:** Writing – review & editing, Supervision. **Erva Nur Cinar:** Writing – review & editing, Writing – original draft, Validation, Investigation. **Beatriz Morais:** Writing – review & editing, Writing – original draft, Formal analysis, Data curation. **Sainabou Bojang:** Writing – review & editing. **Isra Al Sharabi:** Writing – review & editing. **Holly Seale:** Writing – review & editing, Writing – original draft, Supervision, Methodology. **Agnes Ssali:** Writing – review & editing, Supervision. **Kirsty Le Doare:** Writing – review & editing, Supervision. **Sally Hargreaves:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Funding acquisition, Conceptualization.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.vaccine.2026.128249.

Data availability

Data will be made available on request.

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