

VACCINE DELIVERY RESEARCH DIGEST

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PRODUCED BY: NOLAN, S. & SHARMA, M.

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1. [Vaccine equity in Africa: a rapid review of policy, legal and governance frameworks to improve research and development.](#)

Ataguba J, Muriithi G, Achala D, Adote E, Nwosu C, Beshah S, et al.

Front Health Serv. 2026 Aug 19;6:1678143.

PubMed ID: 42614454

ABSTRACT

BACKGROUND: Vaccines are instrumental in promoting preventive health and improving health outcomes globally. However, stark inequities in vaccine production, distribution, and access disproportionately burden low and middle-income countries (LMICs), which suffer significantly from these disparities. The COVID-19 pandemic further reinforced these existing inequities, prompting renewed debates on scaling up Africa's research and development (R&D) capacity as a proactive approach to enhance very limited domestic vaccine production and counter persistent inequities. However, there has been no consolidated review of the policy, legal, and governance frameworks that shape this capacity and their implications for vaccine equity. This rapid review asked which policy, legal, governance, and investment frameworks influence vaccine R&D and manufacturing capacity in African countries, and how they affect the continent's ability to secure equitable access to vaccines.

METHODS: We conducted a PRISMA guided rapid review of peer-reviewed and grey literature. Searches were conducted in Academic Search Premier, Business Source Premier, CINAHL via EBSCOhost, EconLit, Embase, and Ovid Medline via OVID Platform, as well as Google Scholar databases. Eligible documents reported on African vaccine R&D, manufacturing, or related policy, legal, governance, or investment frameworks. Grey literature was identified from the WHO, the World Bank, the Africa CDC, government organizations, private institutions, and policy think tanks. Data was extracted using a structured template and synthesized narratively into thematic areas that aligned with the study objectives.

FINDINGS: From 18,038 records, 68 publications met the inclusion criteria. We identified twelve active vaccine manufacturers in Africa and eleven additional initiatives in development, with the majority focusing on fill-and-finish operations and relatively few investing in upstream R&D and drug substance manufacturing. Persistent under-investment in vaccine R&D, fragmented and weak regulatory systems, and dependence on external financing constrain sustainable local manufacturing. Global and regional instruments, including the TRIPS Agreement, the Doha Declaration, ACT-A/COVAX, and the Pandemic Influenza Preparedness (PIP) Framework, create

opportunities for technology transfer and impose intellectual property and supply-chain barriers that limit expansion of African vaccine R&D.

CONCLUSION: Africa has the capacity to produce vaccines and related health products. However, this potential is undermined by structural under-investment in R&D, constrained access to technologies and inputs, and weak coordination of policy and regulatory frameworks. Strengthening domestic R&D financing, enhancing regional regulatory and policy harmonization, and proactively engaging in IP and trade negotiations, alongside strategic public-private and product development partnerships, are critical to achieving vaccine equity for African populations.

WEB: [10.3389/frhs.2026.1678143](https://doi.org/10.3389/frhs.2026.1678143)

IMPACT FACTOR: 2.6

CITED HALF-LIFE: 2.7

START COMMENTARY

This rapid review examines the policy, legal, governance, and investment frameworks that shape vaccine research, development, and manufacturing capacity in Africa. A key finding was that expanding local vaccine production requires more than investment in manufacturing facilities; other vital factors include coordinated partnerships across governments, manufacturers, research institutions, regulators, international organizations, and private-sector actors.

The review identified several organizations that currently support multi-sector collaboration. The African Vaccine Manufacturing Initiative (AVMI) brings together manufacturers and other interested stakeholders around financing, technology, advocacy, and manufacturing capacity and sustainability. The African Network for Drugs and Diagnostics Innovation (ANDI) supports research partnerships, infrastructure development, R&D investment, and local expertise in intellectual property. Private-sector partnerships were also identified as important contributors across the vaccine value chain. For example, in Ghana, Zipline and the UPS Foundation worked with the national government to distribute COVID-19 vaccines and other medical supplies using drones. In South Africa, private manufacturers Biovac and Aspen have played prominent roles in vaccine production and public-private manufacturing partnerships, including agreements with multinational vaccine developers to expand local manufacturing capacity and support fill-and-finish production.

One limitation is that much of the review draws on reports, policy documents, and organizational websites which often lacked detailed methodological descriptions and may reflect institutional positions. The authors ultimately call for stronger coordination among public, private, academic, and civil-society actors so that investments in African vaccine R&D and manufacturing translate into sustainable production and equitable vaccine access.

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2. [Co-Administration of Novel Oral Polio Vaccine Type 2 and Bivalent Oral Polio Vaccine: Current Evidence, Challenges, and Implications for the Polio Eradication Endgame.](#)

Bateyi Mustafa S, Rodrigue T, Raoul R, Dominique B.

Infect Drug Resist. 2026 Aug 16;19:625567.

PubMed ID: 42604350

ABSTRACT

Global polio eradication is challenged by persistent wild poliovirus type 1 (WPV1) transmission and outbreaks of circulating vaccine-derived poliovirus type 2 (cVDPV2). The 2016 global withdrawal of the type 2 component from trivalent oral poliovirus vaccine (tOPV) created population immunity gaps, facilitating cVDPV2 emergence in areas with low routine coverage. We conducted a narrative review synthesizing biological, immunological, clinical, epidemiological, and operational evidence on co-administration of novel oral poliovirus vaccine type 2 (nOPV2) with bivalent OPV (bOPV) as a strategy to rapidly expand population immunity during multi-serotype outbreaks. Co-administration provides potential logistical and equity advantages. Emerging randomized trial data, however, reveal significant immunological interference that can reduce type 2 immune responses. The effectiveness of this strategy is therefore context-dependent, with operational feasibility and coverage levels critically influencing outcomes. Co-administration of nOPV2 and bOPV should be applied as a context-specific tactical measure rather than a universal policy. Sustained high vaccination coverage and robust surveillance remain central to achieving global polio eradication.

WEB: [10.2147/IDR.S625567](https://doi.org/10.2147/IDR.S625567)

IMPACT FACTOR: 3.2

CITED HALF-LIFE: 4.2

START COMMENTARY

Since 2021, novel oral poliovirus vaccine type 2 (nOPV2) has become an important tool for addressing circulating vaccine-derived poliovirus type 2 (cVDPV2), while bivalent OPV (bOPV) remains important for protecting against poliovirus types 1 and 3. There is growing interest in co-administering nOPV2 and bOPV to address multiple immunity gaps within the same campaign round. This narrative review examines the biological mechanisms and operational considerations surrounding co-administration of these two vaccines.

Regarding immunogenicity, a 2023 trial in Bangladesh compared co-administration with separate administration of nOPV2 and bOPV. Type 2 seroconversion rates declined from 86% in the nOPV2-only group to 65% in the co-administration group. The authors note that this difference exceeded the predefined non-inferiority threshold and represented a clinically meaningful reduction in immune

response against the serotype currently responsible for most outbreaks. However, immune responses to poliovirus types 1 and 3 were preserved with co-administration which suggests that this interference primarily affected the nOPV2 component. Despite this reduction in type 2 immunogenicity, co-administration may still be preferable in areas experiencing simultaneous or sequential outbreaks involving multiple serotypes. In these settings, the ability to rapidly deliver broader immunity may outweigh the reduced type 2 immune response. Lower individual-level immunogenicity could potentially be offset if co-administration substantially increases the proportion of children reached. Preliminary modeling suggests that in high-risk, low-coverage settings, co-administration could outperform sequential campaigns.

Potential operational advantages of co-administration include improved campaign efficiency, fewer separate vaccination rounds, and greater opportunities to reach underserved populations. However, this evidence remains limited, and further research is needed to determine the effectiveness of co-administration under real-world conditions. Priority research areas include field effectiveness studies, transmission analyses, optimal dosing strategies, integration with IPV-based schedules, and operational research in low-resource and conflict-affected settings.

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3. [Implementation strategies to promote e-Tracker use in the childhood immunization program in Rwanda - a mixed methods study.](#)

Uwera T, Sandøy I, Frøen J, Papadopoulou E, Sibomana H, Muhire A, et al.

Front Health Serv. 2026 Aug 14;6:1816682.

PubMed ID: 42597521

ABSTRACT

BACKGROUND: In Rwanda, the introduction of a digital immunization registry based in the District Health Information Software 2 (DHIS2), the e-Tracker, has encountered several implementation challenges. This study aimed to design, implement, and evaluate targeted implementation strategies to enhance the adoption and sustained use of the e-Tracker within the National Immunization Program.

METHOD: We used an implementation research design with a mixed methods approach. We conducted focus group discussions with immunization nurses and co-designed facilitation-based implementation strategies with health workers and implemented them in 12 purposively selected intervention facilities from 48 health facilities that were under-performing on the e-Tracker. The remaining 36 under-performing facilities served as a control group. Evaluations were conducted three months post-implementation with one immunization nurse per facility as respondents, using a process evaluation questionnaire assessing three implementation outcomes: acceptability, appropriateness, and feasibility. We assessed data consistency for the BCG, Penta3 and MR1 vaccines with routine reports before and after implementation of the co-designed strategies.

RESULTS: The co-designed strategies included educational videos, establishment of a collaborative group of immunization health workers to facilitate regular learning, and provision of support from champion users. The intervention group indicated higher acceptability ((Mdn=23 vs. Mdn=20.5, $p = .026$) and feasibility (Mdn=18 vs. Mdn=15, $p = .002$) of using the e-Tracker than the control group. Intervention and control groups had similar scores on appropriateness (Mdn = 22 vs. Mdn=23, $p = .84$). Data consistency for all indicators was nearly 100% in both groups before and after the introduction of implementation strategies.

DISCUSSION: The co-designed strategies improved the acceptability and feasibility of the e-Tracker among immunization health workers, while there was no difference in data consistency. These findings suggest an association between participatory, facilitation-based approaches and nurses' commitment which in turn may support sustainable use of digital tools.

WEB: [10.3389/frhs.2026.1816682](https://doi.org/10.3389/frhs.2026.1816682)

IMPACT FACTOR: 2.6

CITED HALF-LIFE: 2.7

START COMMENTARY

This mixed-methods study evaluated implementation strategies that were co-designed with health workers to support effective use of Rwanda's national e-Tracker Immunization Information System. The authors conducted focus group discussions to identify barriers to e-Tracker use and assessed program feasibility and acceptability along with agreement between e-Tracker documentation and routine health management information system reports. Co-designed interventions were associated with higher acceptability and feasibility of the e-Tracker compared with control facilities, while data consistency remained high in both groups before and after implementation.

Notably, peer-to-peer support through WhatsApp emerged as the preferred platform for communication and learning. Participants described how exchanging questions and answers through WhatsApp enabled immediate support during immunization sessions. The co-designed intervention also included six educational videos addressing specific challenges identified by health workers, including creating newborn profiles, updating patient records, recording vaccinations for children registered through Rwanda's vital statistics system, identifying patients with upcoming or overdue vaccinations, correcting data entry errors, and analyzing routine immunization data. District-level WhatsApp groups brought together nurses, data managers, and supervisors where educational videos were shared every two weeks. Data managers were also trained to serve as facility-level champions and provide ongoing support to nurses.

A key strength of this study was its collaborative approach that involved stakeholders throughout the design and implementation process to help ensure interventions were aligned with health workers' needs and workflows. A limitation of this study was the small number of participating facilities. Out of the 46 included facilities, only 12 from two districts served as intervention sites, which led to an unequal distribution of facilities across study groups and a small number of intervention sites. The findings suggest that co-designed, low-cost approaches combining peer support, accessible digital training, and local champions may strengthen health workers' acceptance and sustained use of electronic immunization systems.

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4. [Barriers and facilitators to maternal, newborn, and child health service utilization among internally displaced populations in Somalia.](#)

Jimale A, Ali M, Osman N, Moallim A, Mohamud A, Ahmed I, et al.

Front Glob Womens Health. 2026 Aug 13;7:1880329.

PubMed ID: 42591396

ABSTRACT

BACKGROUND: Internally displaced populations (IDPs) in Somalia face a disproportionate burden of poor maternal, newborn, and child health (MNCH) outcomes due to conflict, recurrent displacement, poverty, and weak health systems. Evidence on the barriers and facilitators influencing MNCH service utilization in these settings remains fragmented.

OBJECTIVE: To synthesize the available evidence on barriers and facilitators affecting utilization of MNCH services among IDPs in Somalia, with a focus on antenatal care, skilled delivery, postnatal care, immunization, and care-seeking for childhood illnesses.

METHODS: This narrative review examined published literature, policy documents, and humanitarian reports on MNCH service utilization in Somalia and comparable fragile settings. The review focused primarily on sources published between 2015 and 2026, while older sources were retained only when they provided essential conceptual, contextual, or policy information. The review explored both demand-side factors, including socioeconomic hardship, gender norms, and decision-making autonomy, and supply-side factors, including distance, service quality, insecurity, and health system capacity.

RESULTS: The study found that MNCH service utilization among Somali IDPs is constrained by multiple, overlapping barriers. Major barriers include poverty and transport costs, geographic inaccessibility, insecurity, low female autonomy, cultural preferences, shortages of female and skilled health workers, weak referral systems, stock-outs, and limited service readiness. At the same time, important facilitators were identified, including community health workers, women's groups, mobile and outreach services, supportive NGO and government interventions, health system strengthening, and policy frameworks that increasingly recognize IDPs as a priority population. These factors influence service use across the continuum of care and are strongly interrelated.

CONCLUSION: Improving MNCH service utilization among Somali IDPs requires integrated, equity-focused strategies that combine community engagement, gender-sensitive care, strengthened frontline services, functional referral systems, and better coordination between humanitarian and government actors.

WEB: [10.3389/fgwh.2026.1880329](https://doi.org/10.3389/fgwh.2026.1880329)

IMPACT FACTOR: 2.5

CITED HALF-LIFE: 3.1

START COMMENTARY

This narrative review examines barriers and facilitators to maternal, newborn, and child health (MNCH) service utilization among internally displaced populations (IDPs) in Somalia to inform public health policy and humanitarian strategies in conflict- and displacement-affected settings.

Community-based interventions emerged as an important facilitator of MNCH service utilization. In fragile settings, facility-based services alone may not be sufficient to ensure continuity of care. Community health workers, particularly female health workers, can help connect households with formal health services by providing health education, identifying pregnant women and sick children, promoting antenatal care and vaccination, and facilitating referrals when necessary. For example, Somalia's Community Health Strategy (2025–2029) positions trained female health workers as the main link between households and primary care facilities. This strategy reflects the Somali government's increasing recognition of community-based models as an important approach for reaching underserved and displaced populations.

Supportive community networks may also strengthen demand for care. A previous trial in Somali IDP camps found that a participatory learning intervention delivered through indigenous women's groups improved caregiver knowledge and increased measles vaccination uptake and pentavalent vaccine-series completion. Similarly, prior qualitative studies suggest that trusted community participation and leveraging existing local social structures can help address misinformation, build confidence in health services, and provide social support for care-seeking.

The review emphasizes that improving MNCH utilization will require addressing affordability, geographic access, trust, and service quality together. For health care providers and managers in particular, the authors suggest continuity of care should therefore be the primary goal. Antenatal care, skilled birth attendance, postnatal care, immunization, nutrition, and childhood illness services should be integrated through effective referral systems, routine follow-up, and outreach by trusted health care workers, particularly female providers.

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5. [From policy to practice: Systemic solutions to strengthen maternal immunization in sub-Saharan Africa.](#)

Nazareth A, Purandare C, Kihara A, Sekharan S, Al-Qedra A, Abdosh A, et al.

Int J Gynaecol Obstet. 2026 Aug 05.

PubMed ID: 42555152

ABSTRACT

Maternal immunization confers dual protection on pregnant women and their newborns through transplacental antibody transfer, yet vaccination coverage across sub-Saharan Africa remains critically inadequate. Two intersecting crises drive this gap: vaccine hesitancy, rooted in historical distrust and pervasive misinformation, and vaccine scarcity, driven by supply chain fragility and infrastructural deficits. Sub-Saharan Africa bears approximately 70% of global maternal deaths and 57% of neonatal deaths worldwide, with an estimated 200 000 vaccine-preventable neonatal deaths annually. This narrative review examines the causes and impacts of both crises and reviews the evidence base for key maternal vaccines including tetanus toxoid, Anti-D immunoglobulin, influenza, Tdap (tetanus, diphtheria, and pertussis), and respiratory syncytial virus. Drawing on a conceptual pathway model, we present a six-pillar framework addressing structural determinants, prenatal care integration, workforce capacity, supply chain modernization, community engagement, and equity-focused monitoring. We conclude with a call to action for concerted, multi-stakeholder intervention to build a resilient and equitable maternal immunization ecosystem across the region.

WEB: [10.1002/ijgo.71286](https://doi.org/10.1002/ijgo.71286)

IMPACT FACTOR: 2.7

CITED HALF-LIFE: 6.2

START COMMENTARY

This narrative review addresses vaccine hesitancy and scarcity to improve maternal vaccine uptake and availability in sub-Saharan Africa. The authors discuss key maternal vaccines, including tetanus toxoid and Tdap, influenza, and RSV, and highlight unique challenges affecting delivery across the region. For example, many national immunization programs use tetanus toxoid rather than Tdap because of cost and procurement constraints, while limited pertussis surveillance makes it difficult to characterize the burden of disease and the potential need for maternal Tdap vaccination. For influenza vaccination, the authors note that vaccine selection may not always align well with local epidemiology since influenza circulation in sub-Saharan Africa differs from patterns in the northern hemisphere that are used to inform vaccine formulation.

To address these barriers, the authors propose five strategies for strengthening maternal immunization programs. 1) Integrating maternal immunization into prenatal care emerged as the most actionable to improve uptake. 2) Prior studies from the region show that bundling vaccination with prenatal consultations can reduce missed vaccination opportunities by 40%. 3) Incorporating digital health and mobile health platforms with cultural tailored messaging to shift vaccine attitudes among vaccine-hesitant communities. 3) Community health worker engagement strategies such as Ethiopia's Health Worker Extension Worker program have been associated with gains in coverage in rural communities through investment in training, supervision, and fair pay for community health workers. 4) Cold chain strengthening and supply chain optimization strategies like solar-powered refrigeration at rural facilities has been associated with wastage reductions of up to 50% in African settings. 5) Provider training to address gaps in prenatal providers' knowledge of maternal vaccine schedules, safety, and benefits.

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6. [Artificial intelligence in vaccine development: applications, implementation, and future directions.](#)

Kumar S, Gondane R, Mahindrakar S, Vyawahare S, Krishna R, Subramaniam S, et al.

Front Cell Infect Microbiol. 2026 Jul 30;16:1870890.

PubMed ID: 42528707

ABSTRACT

Vaccination stands as one of the most transformative interventions in the history of human civilization. In medicine, vaccination stands as a cornerstone that has saved countless lives across generations. Nevertheless, conventional vaccine development remains encumbered by prolonged timelines, substantial financial investment, and high attrition rates particularly during late-stage clinical trials underscoring the urgent need for more efficient and systematic approaches. In recent years, artificial intelligence (AI) has emerged as a transformative force across the biomedical sciences, offering unprecedented computational capacity to process and interpret complex biological datasets. The convergence of AI with vaccinology represents a significant methodological advancement which has the potential to fundamentally redefine the vaccine development paradigm. AI integrates advances in machine learning, multi-omics data analysis, and high-performance computing to accelerate antigen discovery, epitope prediction, immunogen design, and clinical evaluation. This development represents a paradigm shift toward faster, more precise, and scalable strategies for vaccine development. This review critically examines the current landscape of AI applications in vaccine development, with particular emphasis on recent advancements, translational challenges, and the prospective role of AI in shaping the future of immunization science.

WEB: [10.3389/fcimb.2026.1870890](https://doi.org/10.3389/fcimb.2026.1870890)

IMPACT FACTOR: 5.5

CITED HALF-LIFE: 4.0

START COMMENTARY

This narrative review examines the potential of artificial intelligence (AI) to improve vaccine development and production. Authors highlight the use of AI for vaccine manufacturing and process optimization. Traditional process optimization has largely relied on iterative experimentation and retrospective quality control, whereas AI technologies may enable more predictive and real-time monitoring of manufacturing processes.

Modern bioreactors generate continuous data on parameters including temperature, pH, oxygen levels, and nutrient supply, which can all influence vaccine yield and quality. Machine learning models can use these manufacturing data to detect patterns that may signal changes in vaccine

quality and help identify where adjustments to the production process are needed. For example, optimizing nutrient supply during the cell-culture phase can increase antigen expression while maintaining the stability and purity of the final product. More broadly, this type of real-time monitoring could help manufacturers detect manufacturing issues early and make corrective adjustments before a vaccine batch is compromised or lost.

These data-informed approaches may reduce waste, improve consistency and reproducibility, and support more efficient scale-up. However, incorporating AI into vaccine development and manufacturing also creates new regulatory considerations. Regulatory acceptance will depend on demonstrating that AI-assisted approaches are reliable, reproducible, and transparent. The authors emphasize the importance of independent benchmarking, external validation, and testing models across different populations, pathogens, and contexts to ensure that their predictions are generalizable and do not compromise vaccine quality or safety.

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7. [The institutional roots of vaccine uptake and hesitancy: evidence from Africa.](#)

Barasa L, Onyango G.

Vaccine. 2026 Aug 11;88:128980.

PubMed ID: 42508328

ABSTRACT

Africa recorded some of the lowest COVID-19 vaccination rates in the world, with only 32% of the population having completed a primary vaccination series by the end of 2023, despite widespread vaccine availability. Differences in supply and access offer only a partial explanation, pointing to the role of institutional factors-particularly corruption perceptions and distrust in government-as demand-side barriers. This study provides causally identified estimates of the effect of institutional quality on COVID-19 vaccine uptake and hesitancy across 34 African countries. Using data from the Afrobarometer Round 8 survey, which covers 37,876 respondents, corruption perceptions and institutional trust are treated as endogenous and instrumented with leave-one-out regional means. Instrumental variable probit models are estimated, and average marginal effects are reported. General corruption perceptions reduce the probability of vaccine uptake by 2.7 percentage points and increase the probability of hesitancy by 6.3 percentage points. General institutional trust raises uptake by 9.0 percentage points and reduces hesitancy by 10.6 percentage points. COVID-19-specific corruption perceptions have no significant independent effect on either outcome once trust in the government's handling of vaccine safety is controlled for. Vaccine-specific trust raises uptake by 16.9 percentage points and reduces hesitancy by 24.9 percentage points, suggesting that corruption operates indirectly by eroding vaccine-specific confidence rather than through an independent direct channel. These findings indicate that sustained investment in governance and credible vaccine communication are both required to improve vaccination rates in Africa, and that the two constitute complementary rather than substitutable public health interventions.

WEB: [10.1016/j.vaccine.2026.128980](https://doi.org/10.1016/j.vaccine.2026.128980)

IMPACT FACTOR: 3.4

CITED HALF-LIFE: 8.4

START COMMENTARY

This study examined how institutional quality influences COVID-19 vaccine uptake and hesitancy across 34 African countries using nationally representative survey data. Institutional quality was assessed through perceptions of corruption and public trust, including both general institutional trust and trust in the government's handling of COVID-19 vaccine safety.

Trust in the government's handling of COVID-19 vaccine safety had a mean of 1.51 on a scale of 0-3, placing the average respondent between a little and somewhat trusting. However, responses varied substantially across individuals and views on vaccine-specific trust were more dispersed than broader assessments of institutional trust. The authors suggest perceptions of the government's handling of the COVID-19 vaccine specifically may reflect the politicization of vaccine rollout in shaping individual attitudes. Vaccine-specific trust also emerged the strongest predictor of vaccination behavior. A one-unit increase in trust in the government's handling of vaccine safety was associated with a 16.9% increase in vaccine uptake and a 24.9% decrease in hesitancy which represents the largest effects observed across the study's models. The findings suggest that institutional quality affects vaccine behavior through both trust in state-led health programs and vaccine specific trust, which shapes how individuals interpret official health information and make vaccination decisions.

The authors also place these findings within a broader historical context and note that current levels of institutional trust and state capacity in Africa may partially reflect institutional structures and patterns of social trust shaped over time. They point to prior evidence that historical colonial institutions have had persistent effects on governance and trust, which may continue to influence how communities respond to state-led public health programs today. While short-term communication and confidence-building interventions are important, the authors emphasize that sustained improvements in public health compliance may also require longer-term investments in governance quality, institutional credibility, and state legitimacy rather than crisis-specific responses alone.

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8. [Impact of Enhanced Outreach Activities on Immunization Coverage in Pakistan: Evidence from Secondary Data Analysis \(2011-2021\).](#)

Jiskani S, Khan M, Mere M, Xia W, Rehman A.

Vaccines (Basel). 2026 Jul 27;14(7).

PubMed ID: 42506673

ABSTRACT

BACKGROUND: Despite noteworthy progress in the Expanded Program on Immunization (EPI) for improving vaccination coverage worldwide, inequalities in vaccine uptake and accessibility persist in several middle- and low-income states. Pakistan's routine vaccination uptake varies greatly between federal geographical regions and continues to fall below the standard threshold needed to attain optimal herd immunity. The Federal Directorate of Immunization (FDI) in collaboration with the provincial Expanded Program on Immunizations implemented Enhanced Outreach Activities (EOAs) to boost immunization delivery in selected districts in order to address immunization coverage gaps in marginalized and difficult-to-reach communities. The purpose of this secondary data research was to evaluate whether EOAs improved immunization coverage in the country.

METHODS: The Federal Directorate of Immunization's longitudinal panel analysis of district-month administrative data for the years 2011-2021 have been analyzed. The research investigation reviewed 158 districts' monthly vaccination records for multiple antigens, covering regions where EOAs were successfully carried out in particular months. National and subnational analyses were carried out to measure geographical variations in the impact of Enhanced Outreach Activities (EOAs). The average vaccination coverage during EOAs and non-EOAs months was compared using the paired t-test.

RESULTS: An aggregate of 2430 months with EOAs were included in the analysis of 19,068 monthly district observations. National level analysis revealed higher average vaccinations during the EOA months for all antigens, but a statistically significant increase was observed for IPV and measles second dose ($p < 0.05$) only. Provincial-level results indicate that the impact was more evident in underserved regions. Khyber Pakhtunkhwa, Balochistan, Punjab, and Sindh demonstrated statistically significant increases in vaccination counts for most antigens. Due to variations in baseline population coverage, as well as health care sector capability, the extent of improvements differed throughout regions.

CONCLUSIONS: In Pakistan, routine immunization counts has been improved via enhanced outreach initiatives, especially in provinces with lower initial vaccination rates and restricted accessibility to services. Strengthening outreach strategies, together with consistent fixed-site

immunization services, is likely to accelerate progress toward equitable immunization coverage and contribute to achieving the Immunization Agenda 2030 goals.

WEB: [10.3390/vaccines14070636](https://doi.org/10.3390/vaccines14070636)

IMPACT FACTOR: 3.5

CITED HALF-LIFE: 3.3

START COMMENTARY

This study evaluated how Enhanced Outreach Activities (EOAs) impact vaccination coverage in Pakistan to inform strategies for improving equitable vaccine delivery. EOAs included intensified interventions intended to extend immunization services beyond facility-based delivery through extra provision of operational resources and increased supervision and monitoring. The authors found substantial heterogeneity in EOA effectiveness across regions and suggested that differences in baseline coverage, geographic accessibility, implementation intensity, and local health system capacity may explain this variation. For example, in Balochistan, EOAs were associated with significant coverage increases across all antigens, which is notable given the province's historically low vaccination coverage, dispersed populations, geographic barriers, and limited health infrastructure. Similar improvements were observed in Khyber Pakhtunkhwa and former tribal districts, where difficult terrain, security challenges, and populations with longstanding gaps in access to health services may make outreach particularly valuable. EOAs were also associated with significant increases across all antigens in Islamabad. However, Azad Jammu and Kashmir regions showed no significant improvement which could potentially reflect higher baseline coverage and fewer outreach rounds. Punjab and Sindh also showed improvements across most antigens, but the magnitude of change varied by district which suggests that the effectiveness of outreach depends on local context, including baseline access, microplanning, community mobilization, and health system capacity. A strength of the study was its use of a large national dataset covering 148 districts which allowed for comparison across diverse geographic and health system settings. However, the analysis relied on observational administrative data, which may be affected by reporting errors or incomplete records. Overall, the findings suggest that enhanced outreach can be a useful strategy for improving equitable immunization access, particularly in underserved and hard-to-reach populations, while highlighting the need for locally tailored implementation.

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9. [From trial site to research emerging research hub: mapping Ghana's vaccine research ecosystem, 1977-2025.](#)

Arthur S, Turkson G, Quarcoo J, Cudjoe M, Trotter C.

Health Res Policy Syst. 2026 Jul 21.

PubMed ID: 42482056

ABSTRACT

BACKGROUND: Ghana's vaccine research ecosystem has evolved substantially alongside national and global immunisation efforts. However, the extent and distribution of research activity across the full vaccine development continuum have not been systematically synthesised. This review maps peer-reviewed publications and institutional reports across a nine-stage vaccine development framework from 1977 to 2025, comparing patterns between the pre-pandemic (2000-2020) and post-pandemic (2021-2025) periods.

MAIN BODY: Before 2020, vaccine-related research in Ghana was concentrated predominantly in downstream domains, including disease surveillance, programme implementation, and Phase II-III clinical trials, with notable contributions to malaria and pneumococcal vaccine development. Following the COVID-19 pandemic, publication output increased more than fivefold and diversified into emerging areas such as genomic surveillance, regulatory science, behavioural research, and digital health systems, accompanied by stronger leadership from domestic institutions. Despite this expansion, engagement in upstream domains, including discovery science, preclinical development, Phase I clinical trials, and local vaccine manufacturing, remains limited, reflecting persistent structural and infrastructure constraints.

CONCLUSIONS: Ghana has transitioned from a primarily implementation-focused setting to an increasingly active contributor to multidisciplinary vaccine evidence. Sustained investment in upstream research infrastructure, early-phase clinical trial capacity, sustainable financing mechanisms and behavioural intervention research will be essential to strengthen national vaccine sovereignty. The Ghanaian experience offers transferable lessons for other low- and middle-income countries seeking to build resilient and locally driven vaccine research ecosystems.

WEB: [10.1186/s12961-026-01516-y](#)

IMPACT FACTOR: 3.8

CITED HALF-LIFE: 5.4

START COMMENTARY

This narrative review compares thematic patterns in Ghana's vaccine research between the pre-pandemic (2000–2020) and post-pandemic (2021–2025). The post-pandemic period was marked by substantial expansion and diversification of vaccine-related research. Research extended beyond routine childhood immunization to include COVID-19, HPV, and malaria vaccines, alongside growing research in behavioral science, regulatory systems, and health systems research. Institutional participation in research also increased substantially with more contributions from national Ghanaian universities, the Ghana Health Service, the Food and Drugs Authority, and the new Ghanaian National Vaccine Institute. The authors suggest this growth in research output and multi-sectoral collaboration reflects greater domestic ownership and a shift from primarily supporting vaccine deployment and monitoring toward producing a broader range of vaccine evidence.

Behavioral research was one area that expanded post-pandemic, particularly regarding vaccine hesitancy and public trust. The authors identified misinformation, safety concerns, political distrust, religious beliefs, and social media narratives as important drivers of COVID-19 and HPV vaccine resistance. At the same time, increasing engagement from healthcare workers, community leaders, and trusted institutions during this time period suggests that increased communication and culturally appropriate outreach can help rebuild vaccine confidence.

A strength of the review is its use of evidence from both peer-reviewed literature and institutional reports. However, the study was limited to English-language sources which may have resulted in underrepresentation of locally published studies. The authors highlight continued gaps in upstream research, including antigen discovery, preclinical development, Phase I trials, and domestic manufacturing, and call for greater investment in research infrastructure, early-phase trial capacity, and locally led vaccine development.

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10. [IMPACT: A Structured Human-Centered Design Process for Integrating Community Health Worker Insights Into Program Policy in Pakistan.](#)

Closser S, Sultan M, Finley E, Gerber S, Shafique M, Ahmed S, et al.

Glob Health Sci Pract. 2026 Aug 10;14(1).

PubMed ID: 42331614

ABSTRACT

BACKGROUND: Community health workers (CHWs), most of whom are women, are the bedrock of primary health care provision in much of the world. CHWs are often employed at the bottom of health hierarchies where they have little voice; in state programs and vertical initiatives, accountability has generally flowed downwards. Yet many programs might function better if CHWs' needs and ideas were considered in program design.

METHODS: From 2020-2022, we implemented a human-centered design process called IMPACT with CHWs working on polio vaccination in one district of Pakistan. The name IMPACT draws from the steps in the process: Identify problems and brainstorm innovations; Make and refine ideas; Present and evaluate ideas; and ACT to disseminate and implement. We held a facilitated competition for teams of CHWs, all of whom were women, to propose policy improvements to polio vaccination. In total, 417 CHWs participated in the design process facilitated by our team, and more than 500 additional CHWs participated in sessions facilitated by local supervisors. We worked with local policymakers to short-list the best ideas. Teams of CHWs presented the short-listed ideas to a panel of provincial and national-level policymakers, who selected ideas for implementation. We conducted interviews with CHWs and policymakers throughout the process to understand their experiences (n=82).

RESULTS: We received 181 idea submissions over two rounds of the process; 9 ideas were chosen for implementation. CHWs valued the process enormously; most said it was the first time their insights had been considered, and they wanted more opportunities for such input. The second round of the process was more effective than the first, with workers generating more complex ideas and program staff running workshops themselves. We heard, across management levels, that the process had positively impacted CHW motivation and confidence. Overall, the innovations selected for implementation were in the form of adjustments rather than major programmatic changes. Yet CHWs reported that the changes made were helpful and that it was very meaningful to have contributed to program policy.

CONCLUSION: IMPACT facilitated substantive engagement and collaboration from both male supervisors and frontline female workers in a highly gender-stratified setting. Structured processes

can allow the least powerful actors in global health interventions to draw on their frontline experience to suggest policy innovations.

WEB: [10.9745/GHSP-D-24-00050](https://doi.org/10.9745/GHSP-D-24-00050)

IMPACT FACTOR: 2.8

CITED HALF-LIFE: 5.0

START COMMENTARY

Community health workers (CHWs) are central to primary care delivery but often have limited opportunities to influence the policies and programs they are responsible for implementing. This study examined whether a human-centered design process could establish a meaningful role for CHWs in program improvement within Pakistan's polio eradication program.

Through the IMPACT process, CHWs worked in teams to identify challenges they encountered in their work, developed potential solutions, and submitted their ideas for consideration. Finalists developed pitch proposals for their ideas and presented them to health policymakers. The winning solutions largely fell into themes representing reduction of community fatigue, strengthening primary health care, improving community engagement, and improving the workplace for CHWs. Across all proposed ideas, CHWs consistently emphasized that stronger primary health services could improve community acceptance of frequent vaccination campaigns, while better workplace support was important for sustaining CHW engagement.

The IMPACT team worked with program leadership to develop and support implementation plans for selected ideas. The level of implementation varied. Some proposals, such as limiting routine data requests outside working hours, were fully adopted and strongly supported by district polio eradication officials, while others led to only partial changes, such as modifications to training practices. Some proposed changes were not implemented at all. Despite this, CHWs reported that they valued having a formal opportunity to contribute their perspectives and expressed interest in continuing to provide ideas for programmatic improvement. Managers also viewed the process positively and suggested that similar sessions should be repeated regularly.

The study also highlights the limitations of participatory design approaches. IMPACT did not meaningfully alter the top-down structure of the polio eradication program, and decision-making authority ultimately remained with program leadership. However, the process created a channel for frontline workers to raise operational concerns, share experiences that supervisors may not otherwise hear, and contribute to decisions affecting their work. These findings suggest that structured mechanisms for CHW input may strengthen both program design and frontline engagement.

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Additional Articles of Interest

- 1 Measles and Rubella Elimination Trends in the WHO Eastern Mediterranean Region, 2023-2024: Progress and Recent Epidemiological Shifts [{Full Article}](#)
- 2 Building Physician Capacity for HPV Vaccine Uptake in India: Mixed-Methods Implementation Outcomes of a Train-the-Trainer Model Using RE-AIM. [{Full Article}](#)
- 3 Determinants of diphtheria vaccination uptake during a mass immunization campaign in Mogadishu, Somalia: a cross-sectional study. [{Full Article}](#)
- 4 From reactive trials to regional vaccine sovereignty: a pan-ebolavirus vaccine-readiness framework for East Africa's Sudan virus and Bundibugyo virus threats. [{Full Article}](#)
- 5 Perception about child vaccination and its determinants among caregivers in rural Northeastern Ethiopia. [{Full Article}](#)
- 6 Perceptions and practices among students, parents, and teachers of the Human Papillomavirus (HPV) Vaccination: A pilot feasibility study from Rural Kerala. [{Full Article}](#)
- 7 Strategies and lessons learned from a type 1 circulating vaccine-derived poliovirus (cVDPV) outbreak affecting adult population: Madagascar, 2020-2023. [{Full Article}](#)
- 8 Magnitude of human papillomavirus vaccination uptake and its determinants among adolescent girls in Lesotho: a cross-sectional study. [{Full Article}](#)
- 9 Integrated service delivery to improve adolescent health and human papillomavirus (HPV) vaccination in Lao PDR: a quasi-experimental mixed-methods study - study protocol. [{Full Article}](#)
- 10 Addressing HPV vaccine hesitancy and misinformation in India through public health communication strategies. [{Full Article}](#)
- 11 Global spatiotemporal analysis in hepatitis B third dose vaccine coverage from 1980-2023 across 204 countries and territories. [{Full Article}](#)
- 12 'When you hear such rumours, you get scared': A comparison of vaccine-related concerns between the oral polio vaccine and Covid-19 vaccines among communities in Cameroon and Ethiopia. [{Full Article}](#)
- 13 Identifying the optimal schedule for a multi-pathogen combination vaccine for diarrheal disease [{Full Article}](#)
- 14 Beyond coverage: Timeliness of routine childhood vaccination and its determinants in rural northern Ghana. [{Full Article}](#)
- 15 Vaccine hesitancy in Brazil: post-pandemic challenges and the use of artificial intelligence. [{Full Article}](#)
- 16 Impact of health education intervention on knowledge and attitude towards HPV vaccination in Africa: A systematic review. [{Full Article}](#)

- 17 Prevalence of zero-dose vaccination and its associated factors in urban areas of Somali region, Ethiopia: a mixed-methods approach. [{Full Article}](#)
- 18 Cholera vaccination readiness in six African countries: A psychological and ecological study. [{Full Article}](#)
- 19 Describing a National Chatbot Deployed by the Ministry of Health in Malawi During the COVID-19 Pandemic: Retrospective Data Analysis. [{Full Article}](#)
- 20 Measles outbreaks as signals of governance failure: Lessons from Bangladesh's 2026 immunisation collapse. [{Full Article}](#)
- 21 Perceptions of acceptability and preferences surrounding a hypothetical syphilis vaccine in Lima, Peru. [{Full Article}](#)
- 22 Social Marketing to Enhance Community Empowerment and Ownership for a Successful Implementation of the "Big Catch-Up" in Togo in 2025: A Mixed-Methods Study. [{Full Article}](#)
- 23 When coverage is high: rethinking the role of caregiver perceptions in childhood vaccination uptake in Uganda. [{Full Article}](#)

Appendix

The literature search for the August 2026 Vaccine Delivery Research Digest was conducted on September 1, 2026. We searched English language articles indexed by the US National Library of Medicine and published between July 15, 2026 and August 14, 2026. The search resulted in 607 items.

SEARCH TERMS

(((((“vaccine”[tiab] OR “vaccines”[tiab] OR “vaccination”[tiab] OR “immunization”[tiab] OR “immunisation”[tiab] OR “vaccines”[MeSH Terms] OR (“vaccination”[MeSH Terms] OR “immunization”[MeSH Terms])) AND (“logistics”[tiab] OR “supply”[tiab] OR “supply chain”[tiab] OR “implementation”[tiab] OR “expenditures”[tiab] OR “financing”[tiab] OR “economics”[tiab] OR “Cost effectiveness”[tiab] OR “coverage”[tiab] OR “attitudes”[tiab] OR “belief”[tiab] OR “beliefs”[tiab] OR “refusal”[tiab] OR “Procurement”[tiab] OR “timeliness”[tiab] OR “systems”[tiab])) OR “vaccine delivery”[tiab] OR “vaccination refusal”[MeSH Terms] OR “immunization programs”[MeSH Terms] OR “zero dose”[tiab] OR “unvaccinated children”[tiab] OR “gavi”[tiab]) NOT (“in vitro”[tiab] OR “immune response”[tiab] OR “gene”[tiab] OR “chemistry”[tiab] OR “genotox”[tiab] OR “sequencing”[tiab] OR “nanoparticle”[tiab] OR “bacteriophage”[tiab] OR “exome”[tiab] OR “exogenous”[tiab] OR “electropor”[tiab] OR “systems biology”[tiab] OR “animal model”[tiab] OR “cattle”[tiab] OR “sheep”[tiab] OR “goat”[tiab] OR “rat”[tiab] OR “pig”[tiab] OR “mice”[tiab] OR “mouse”[tiab] OR “murine”[tiab] OR “porcine”[tiab] OR “ovine”[tiab] OR “rodent”[tiab] OR “fish”[tiab])) AND “English”[Language] AND 2026/07/15:2026/08/14[Date - Publication]

