

Understanding interactions between service delivery and community engagement in polio eradication in Ethiopia: A qualitative study using the CFIR

Wakgari Deressa

deressaw@gmail.com

Department of Epidemiology and Biostatistics, School of Public Health, College of Health Sciences, Addis Ababa University

Selamawit Hirpa

Aklilu Lemma Institute of Health Research, Addis Ababa University

Svea Closser

Johns Hopkins Bloomberg School of Public Health

Anna Kalbarczyk

Johns Hopkins Bloomberg School of Public Health

Assefa Seme

Department of Reproductive, Family and Population Health, School of Public Health, College of Health Sciences, Addis Ababa University

Olakunle Alonge

Sparkman Center for Global Health, UAB School of Public Health, The University of Alabama at Birmingham

Research Article

Keywords: Service delivery, Community engagement, Polio eradication, CFIR, Ethiopia

Posted Date: September 28th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-10843464/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Background

Despite substantial progress toward global polio eradication, Ethiopia remains at risk of poliovirus outbreaks because of persistent implementation challenges in reaching underserved populations. Service delivery systems and community engagement are widely recognized as essential components of effective polio eradication programs. However, limited evidence exists on how these two components interact during polio eradication efforts. The aim of this study was to understand how interactions between service delivery systems and community engagement influenced polio eradication efforts in Ethiopia by identifying contextual facilitators, barriers, and adaptive strategies shaping these interactions across health system levels.

Methods

A qualitative study guided by the Consolidated Framework for Implementation Research (CFIR) was conducted. Data were collected through semi-structured interviews with 51 purposively selected participants who had at least 12 months of experience in polio service delivery and community engagement from 1996 to 2018. Interviews were conducted in December 2018 across five regions of Ethiopia (Addis Ababa, Oromia, Somali, Gambella, and Benishangul-Gumuz) with national and regional health officials, frontline health workers, and program managers from governmental institutions, non-governmental organizations, and Global Polio Eradication Initiative partners. Data were analyzed thematically using NVivo (v12), combining deductive CFIR-based coding with inductive identification of emerging themes.

Results

The findings suggest that interactions between service delivery and community engagement shaped polio eradication efforts, with frontline health workers and local actors playing key roles in linking these two components. These interactions were strengthened by committed frontline workers, supportive leadership, trusted community and religious leaders, and integration with local social structures, which enhanced trust and promoted service uptake. Conversely, weak accountability mechanisms, resource constraints, vaccine fatigue, geographical inaccessibility, and sociocultural norms undermined these interactions and eroded community trust. Adaptive strategies, including engagement of religious and clan leaders, flexible outreach approaches, and service integration through a One Health approach, helped address contextual challenges and strengthened interactions between service delivery and community engagement, particularly in remote and conflict-affected areas.

Conclusions

Successful polio eradication efforts depend on effective service delivery and meaningful community engagement to build trust and sustain service uptake. Strengthening trust, accountability, and context-specific implementation strategies may enhance program effectiveness and support the sustainability of polio eradication efforts, particularly in underserved settings.

Background

Polio eradication remains a global health priority under the Global Polio Eradication Initiative (GPEI), which has driven a dramatic reduction in cases worldwide [1, 2]. As a partner in this initiative since 1996; Ethiopia successfully interrupted indigenous wild poliovirus (WPV) transmission in 2001 [3, 4]. Since then, national surveillance indicators have progressively improved, with non-polio acute flaccid paralysis (AFP) rates reaching 3.1 per 100,000 children and stool adequacy rising to 92% [3]. Despite these gains, the country remains at risk of circulating vaccine-derived poliovirus (cVDPV) outbreaks and imported cases [3]. This vulnerability is concentrated in high-risk border areas characterized by political insecurity, cross-border mobile populations, geographic inaccessibility, and infrastructure gaps [4, 5]. These structural difficulties are further compounded by persistent community mistrust and campaign fatigue, which continue to hinder local vaccine acceptance [5, 6].

Strengthening health systems through improved cold chain management and human resources capacity not only increase vaccine uptake, but also builds a strong foundation for community trust [7–9]. Furthermore, resilient health systems depend on sustained community engagement, where primary care services are reliable and public trust is continually reinforced [6, 10]. This community engagement is associated with improved health outcomes, including wider service coverage, better access, and high quality of care, especially when driven by participatory approaches and local community ownership [11]. In contrast, weak delivery systems exacerbate vaccine hesitancy and demotivate frontline health workers overtime [12, 13]. In such contexts, vaccine refusals are rarely a result of a simple lack of awareness or cultural beliefs; rather, they often arise from the interaction between poor service delivery and community mistrust [6]. These situations make service delivery inefficient and undermine vaccination efforts [12].

Community engagement plays a key role in linking service delivery systems with communities, helping to ensure that health services are responsive to the community needs and promote vaccine uptake. As a collaborative strategy, it fosters community trust and strengthens the intersectoral cooperation required to achieve desired health targets [14, 15]. Trained community volunteers and local influencers help connect health services with communities, legitimize health messages, and directly address vaccine hesitancy [16–18]. Ultimately, this participatory approach strengthens local ownership and sustainability, particularly when disease eradication efforts actively engage trusted local actors [19–21].

Integrated approaches that combine service delivery with community engagement have been shown to improve vaccination coverage and access to essential health services in settings at risk of polio transmission [22]. Evidence from diverse settings suggests that engaging frontline health workers,

community volunteers (CVs), and other local actors can improve healthcare access, build trust, and drive service uptake [20, 23, 24]. These approaches highlight the importance of connecting service delivery with communities, where frontline health workers and local actors can help adapt services to local needs and socio-cultural contexts [23, 25]. Such strategies may be particularly important in underserved settings where limited access to services and deep-seated mistrust pose persistent challenges to healthcare and vaccine delivery [25, 26].

Although service delivery and community engagement are widely recognized as essential pillars of polio eradication, existing studies have largely examined these domains in isolation rather than exploring how they interact during polio eradication activities [23, 24]. In practice, program implementation occurs at the interface between health systems and communities, where frontline health workers, community mobilizers, volunteers, and local leaders facilitate access, communication, trust, and service uptake [20, 27, 28]. Understanding this interface is therefore important for addressing persistent eradication barriers, as program success depends not only on the availability of health services or community participation in isolation, but also on how these components interact to reinforce or constrain one another within complex implementation settings [23, 27].

In Ethiopia, the link between service delivery and community is facilitated through a primary healthcare (PHC) framework that is supported by female Health Extension Workers (HEWs) and volunteer networks such as Health Development Armies (HDAs), also known as Women Development Armies (WDAs) [25, 29]. HEWs serve as the formal point of contact at community health post level, while the HDAs facilitate household mobilization and health awareness under their supervision [30]. These frontline workers work in close collaboration with local administrators, community leaders, and religious figures, and have significantly improved maternal and child health outcomes and communicable disease control across rural areas [30]. In pastoralist and semi-pastoralist areas, where routine PHC structures are poor, these networks are complemented by project-trained CVs who are selected through participatory community-led processes [5, 16].

While service delivery and community engagement are recognized as fundamental pillars of polio eradication, their real-world effectiveness depend on how these components work together during implementation [31, 32]. However, there remains a gap in our understanding of how health service systems and community structures interact during polio eradication activities, particularly in high-risk areas vulnerable to cVDPV outbreaks or polio importation [4, 31, 33]. Therefore, using the Consolidated Framework for Implementation Research (CFIR) [34], this qualitative study examined how facilitators, barriers, and adaptive strategies in polio service delivery interact with community engagement across multiple levels of the health system. It aimed to understand these interactions and identify context-specific strategies that may strengthen polio eradication efforts in Ethiopia.

Methods

Study setting

This study is part of the ‘Synthesis and Translation of Research and Innovations from Polio Eradication’ (STRIPE) project [4, 27]. The study was conducted in Ethiopia across five regions: Addis Ababa, Oromia, Somali, Gambella, and Benishangul-Gumuz (BG). These regions were purposively selected to capture diverse geographic, socio-economic, and health system contexts, including remote and hard-to-reach areas, pastoralist and semi-pastoralist settings, particularly those at high risk for cVDPV outbreaks and WPV importation.

Study design

We conducted a qualitative study guided by the CFIR framework [35]. The study explored participants’ perspectives and experiences of polio service delivery and community engagement, with particular attention to factors that facilitated or constrained their implementation and to strategies used to adapt program activities to local contexts. CFIR provided the analytic framework for examining how organizational, individual, implementation, and external factors influenced interaction between service delivery systems and community engagement across different levels of the health system.

Study respondents and sampling

Participants were purposively sampled using the STRIPE global mapping approach [35]. Eligible participants with at least 12 months of experience in polio eradication service delivery and community engagement between 1996 and 2018 were included. The sample included participants with direct involvement in polio eradication activities at different levels of the health system, including the Ethiopian Ministry of Health (MoH) officials, regional health bureau officials, zonal and woreda (or district) health office personnel, program managers, and frontline health workers from government, and non-governmental implementing partners. Participants were selected to capture perspectives from different administrative levels, professional roles, organizational affiliations, and geographic contexts. A total of 51 participants were included; 23 participants addressed strengthening service delivery and 28 addressed community engagement.

Data collection

Data were collected in December 2018 using semi-structured, open-ended interviews. The interview guide for both strengthening service delivery and community engagement was developed in English and informed by CFIR constructs (S1 File). The guide began with a demographic section on participants’ sex, specific roles, organization, levels of involvement, primary areas of engagement, and duration of experience in polio eradication, followed by a question asking participants to identify up to three GPEI activity goals most relevant to their role.

The interview guides explored participants’ experiences in two related areas: strengthening polio service delivery and community engagement. The service delivery guide examined factors influencing

implementation at the individual, organizational, program, and implementation process, and external factors (social, political, economic, technological, and geographic) that facilitated implementation, followed by implementation challenges across those same domains, and adaptive strategies used to address them. These questions provided contextual information for interpreting participants' accounts of service delivery and community engagement across different levels of the health system.

The guides were translated into Amharic and back-translated into English to assess consistency of meaning and were piloted before data collection to improve clarity and appropriateness. Six public health professionals conducted face-to-face interviews with participants in Amharic, with each interview lasting approximately 30–60 minutes. All six interviewers received standardized training and orientation before data collection, covering participant eligibility and purposive sampling procedures, administration of the semi-structured interview guides and use of probing techniques, ethical considerations, confidentiality, and procedures for obtaining informed consent. Interviewers documented participants' responses in handwritten notes during the interviews and expanded and refined these notes immediately after each interview. Field notes were also maintained to capture relevant contextual observations and non-verbal cues. Given logistical and contextual constraints, interviews were not audio-recorded.

Data management and analysis

Quantitative data were analyzed using SPSS version 23.0 (SPSS Inc., IBM, USA). Descriptive statistics were used to characterize the study sample and to contextualize the qualitative findings. Interviews documented in Amharic were reviewed for completeness along with accompanying field notes and were translated into English. The interviews were subsequently organized for analysis by participant and programmatic domain (strengthening service delivery or community engagement) and entered into NVivo (v.12) for data management and coding. Data were analyzed thematically using a hybrid approach that combined deductive coding informed by CFIR constructs with inductive coding to capture concepts and patterns that emerged directly from participants' accounts. A structured codebook was developed from the CFIR, organized around four internal domains (organizational, polio program, individual, and implementation process), and five external factors (social, political, economic, technological, and geographic environment). Coded data were initially synthesized into thematic categories reflecting facilitators and barriers to strengthening service delivery or community engagement, as well as the adaptive strategies, independently.

To examine the interaction between service delivery and community engagement in polio eradication activities, a cross-domain thematic synthesis was undertaken to examine how findings from the two domains influenced, reinforced, constrained, or shaped one another. For this study, interaction was defined as the directional processes through which conditions, actions, or strategies within one domain influenced, facilitated, or shaped processes in the other during polio eradication activities. Although the interview guides did not include questions explicitly framed around the interaction between the two domains, the analysis focused on participants' accounts in which service delivery conditions influenced community engagement, community engagement facilitated or constrained service delivery, or frontline

workers and local actors linked the two processes. We examined how these interactions varied across organizational levels and contextual settings and how participants described adapting service delivery or community engagement in response to polio eradication challenges. This synthesis allowed us to identify patterns through which service delivery and community engagement reinforced, constrained, or shaped one another during polio eradication efforts.

The final themes were organized around the study objectives and interpreted using the CFIR domains. To ensure analytic rigor and representativeness, illustrative quotations were selected from the interview to reflect diversity across geographic areas, administrative levels, and stakeholder perspectives.

Results

Characteristics of respondents

Of the 101 survey respondents, 51(50.5%) had worked in either strengthening delivery systems or community engagement (Table 1). Only five participants reported experience in both delivery systems and community engagement. Most respondents worked at the zonal level (58.8%), and 86.3% were from government institutions. One-third (33.3%) were supervisors, while 29.4% each were Expanded Program on Immunization (EPI) program managers or frontline health workers.

Table 1
Characteristics of respondents

Variable	Delivery systems, n (%)	Community engagement, n (%)	Total, n (%)
Gender			
Male	21 (91.3)	23 (82.1)	44 (86.3)
Female	2 (8.7)	5 (17.9)	7 (13.7)
Years served in polio program*			
<5 years	1 (4.3)	2 (7.1)	3 (5.9)
5–10 years	12 (52.2)	19 (67.9)	31 (60.8)
11–15 years	5 (21.7)	5 (17.9)	10 (19.6)
>15 years	5 (21.7)	2 (7.1)	7 (13.7)
Levels worked in polio program*			
National	2 (8.7)	5 (17.9)	7 (13.7)
Regional state	10 (43.5)	9 (32.1)	19 (37.3)
Zonal	12 (52.2)	18 (64.3)	30 (58.8)
Woreda (or Woreda)	10 (43.5)	10 (35.7)	20 (39.2)
Health facility	8 (34.8)	8 (28.6)	16 (31.4)
Organizational representation*			
Government	21 (91.3)	23 (82.1)	44 (86.3)
GPEI Core Partner	4 (17.4)	7 (25.0)	11 (21.6)
NGO implementing partner	2 (8.7)	9 (32.1)	11 (21.6)
Primary roles in polio program*			
Supervisor	7 (30.4)	10 (35.7)	17 (33.3)
EPI manager	12 (52.2)	3 (10.7)	15 (29.4)
Frontline health worker	6 (26.1)	9 (32.1)	15 (29.4)
Surveillance officer	6 (26.1)	8 (28.6)	14 (27.5)
Program officer	5 (21.7)	7 (25.0)	12 (23.5)
Program manager	3 (13.0)	4 (14.3)	7 (13.7)

Position at the time of survey			
Program manager/officer	7 (30.4)	20 (71.4)	27 (52.9)
EPI manager	12 (52.2)	5 (17.9)	17 (33.4)
Frontline health worker	4 (17.4)	0	4 (7.8)
Other	0	3 (10.7)	3 (5.9)
Total	23	28	51

*Many respondents served multiple roles in polio eradication activities at different times

Domains of key internal facilitators and barriers

The main internal facilitators and barriers affecting delivery systems and community engagement across different system levels are presented in Table 2. Facilitators and barriers related to individual and organizational characteristics were common, while those linked to polio program characteristics were the least.

Table 2
Key internal facilitators and barriers to delivery systems and community engagement

Facilitators*	Definitions	Delivery systems, n (%)	Community engagement, n (%)
Individual	Positive attitudes, strong beliefs, relevant training, and skills of health workers and organizational staff facilitated effective vaccination delivery and community engagement	10 (43.5)	9 (32.1)
Organizational	Supportive structures, leadership, resources, and coordination within the organization facilitated effective polio vaccination delivery and community engagement	3 (13.0)	8 (28.6)
Implementation process	Well-planned, executed, monitored, and adapted activities facilitated the effective delivery of polio vaccination delivery and community engagement activities	8 (34.8)	7 (25.0)
Polio program	Adoption and use of effective activities, strategies, and technologies facilitated the implementation of polio vaccination and community engagement initiatives	2 (8.7)	3 (10.7)
Barriers*			
Individual	Attitudes, beliefs, training, or skills that hinder health workers' and organizations' ability to implement polio vaccination and community engagement activities effectively	4 (17.4)	6 (21.4)
Organizational	Structural, resource, or procedural limitations within the organization that obstruct support for the polio eradication program and delivery of vaccination services	2 (8.7)	5 (17.9)
Implementation process	Gaps or inefficiencies in planning, execution, monitoring, reflection, or adaptation of activities that impede the effective implementation of polio vaccination and community engagement activities	3 (13.0)	4 (14.3)
Polio program	Inadequate, inappropriate, or poorly adopted program activities, strategies, or technologies that limit the effectiveness of vaccination delivery and community engagement efforts	4 (17.4)	1 (3.6)
Total		23	28

**Respondents could select few or multiple domains as facilitators or barriers to delivery systems or community engagement; therefore, percentages may not be 100%.*

The following sections present the key facilitators, barriers, and adaptive strategies used during the implementation across the program's internal characteristics.

Individual characteristics

The success of the program was strongly linked to the commitment and technical competence of frontline health workers, particularly HEWs, who served as a critical bridge between health services and communities. Their proactive engagement through house-to-house visits helped improve caregiver awareness and vaccine uptake.

"The HEWs are highly committed. They conduct house-to-house visits, talk to mothers, and explain the importance of vaccination. Because of their efforts, many mothers bring their children for vaccination." (District EPI Coordinator, Somali).

However, this link between service delivery and community engagement was weakened in some settings by declining motivation, weak professional ownership, and poor accountability. This resulted in missed vaccination opportunities and inadequate follow-up, even for newborns delivered in health facilities or at home. In some cases, health posts are reported to be closed without community response, reflecting weak social accountability.

"Even for children born at health facilities, some health workers do not provide the polio 0 dose or BCG vaccines, and some HEWs do not follow up with those children born at home to administer the birth doses within the recommended time." (Frontline Health Worker, Oromia).

"Due to poor social accountability, health facilities [health posts] are closed, some health workers are absent, and communities don't ask why?" (Zonal Cold Chain Officer, BG).

To address these challenges, supportive supervision and performance monitoring were used to reinforce professional responsibility and accountability. In some situations, the program moved beyond simple motivation toward corrective actions and professional ethics.

Organizational characteristics

Organizational leadership and structure played a central role in both strengthening service delivery and influencing community engagement. Leadership at various levels demonstrated strong commitment through technical support, supervision, and monitoring activities. During polio vaccination campaigns, political leaders at all levels, from top administrator to kebele levels, actively supported community mobilization efforts.

"Leaders at different levels of our organization are highly committed. They provide technical assistance to staff, conduct regular supportive supervision and M&E activities. During polio campaigns, political leaders from the top to the lower administrative levels, actively support and mobilize the community." (Regional EPI Officer, Addis Ababa).

However, polio eradication activities were constrained by a top-down management style. Some decisions regarding budgets and campaign scheduling were usually made at higher levels, with little or no engagement of the local implementers in the planning processes. This created a disconnect whereby local actors responsible for reaching households were unaware of the activity schedules until they were informed by the higher authorities, limiting their ability to effectively mobilize the community.

“Decisions are made at higher levels, and there is little feedback to the lower levels to know budget information or set activity schedules. Unless the budget and timeline are communicated from higher authorities, local teams do not know when campaigns will be conducted.” (District EPI Officer, Oromia).

To overcome these gaps, some partner organizations introduced participatory mechanisms to strengthen local ownership, including community forums where vaccination needs and mobilization strategies were discussed. Furthermore, inter-organizational collaboration was used to address operational constraints, such as borrowing motorcycles to ensure the delivery system reaches community in hard-to-reach areas.

“A forum is organized and participants from the community will be invited to discuss about the needs of vaccination, who should be vaccinated and how it can be mobilized.” (GPEI Partner, National)

Implementation process

The implementation of polio activities followed a structured cascading approach, where planning information flowed from higher levels to frontline health workers and communities. This process was most effective when it involved local leaders and religious figures during early planning stages, ensuring culturally aligned community mobilization and more effective household outreach.

“Before a campaign, we prepare together with the kebele and religious leaders. We plan house-to-house visits, community conversations, and even use local events to reach more people. Because of this organized way of working, mothers became more aware and came forward to get their children vaccinated.” (Zonal Social Worker, Oromia).

Trained community volunteers played a critical role in bridging the gap between health workers and households, supporting both vaccine delivery and community engagement. However, reliance on them also created challenges, as competing livelihood demands led to inconsistent participation and delays in mobilization activities.

“Community volunteers in some kebeles are less motivated and often unable to dedicate adequate time to their roles. They work during their free time, so the planned mobilization activities are frequently delayed or inconsistently carried out.” (CGPP Partner, BG).

To address workforce and access challenges, the program adopted adaptive strategies, including mobilizing additional health workers from neighboring districts and collaborating with partner

organizations. In some hard-to-reach areas, however, resource constraints and pressure to meet targets contributed to compromised reporting practices.

“Health workers assigned to deliver vaccination to those hard-to-reach areas send a false report where unvaccinated communities were reported as if they received the vaccination by discarding some of the vaccines to match it with the report.” (Regional Cold Chain Officer, BG).

In response, local teams implemented flexible and context-specific solutions, such as adjusting vaccination schedules to reach households outside regular working hours and using digital tools to improve reporting and case tracking.

“Assigning vaccinators out of the regular working time, in early morning and late in the evening, to visit households they didn't get during their house-to-house visit during day time.” (Regional EPI Officer, Addis Ababa)

Polio program characteristics

The design of the polio program facilitated strong community participation. The oral mode of polio vaccine delivery increased acceptability, while the program's community-oriented approach promoted active local involvement.

“As the vaccine [polio] is given orally, it has high acceptance and good participation from the community.” [Frontline Health Worker, Addis Ababa].

In addition, the program's continuous presence and recognizable features contributed to high community awareness, allowing households to anticipate and engage with vaccination campaigns.

“The community is now well-informed about the program through continuous mop-up campaigns. For example, in our town, if someone wears yellow clothing, people immediately ask: Has the polio campaign started?” (District EPI Officer, Somali)

However, repeated polio campaigns led to vaccine fatigue in some communities, with concerns about the safety of multiple doses. At the same time, supply chain constraints such as inconsistent availability of essential materials disrupted service delivery even in areas with high demand.

“Some parts of the community are concerned about the repeated polio vaccination; they are afraid that it may create adverse effects on children. This creates a poor community engagement.” (Zonal GPEI Partner, BG).

To address these challenges, local teams employed adaptive strategies to rebuild trust and maintain service continuity, including community dialogue and context-specific solutions to manage cold chain limitations.

"Sometimes we keep the ice packs in hotel refrigerators during night time and use during the day."

(Regional EPI Officer, Addis Ababa)

Domains of external facilitators and barriers

External factors, including social, political, economic, technological, and geographic factors played a critical role in influencing both service delivery and community engagement. Social and political contexts emerged as the most influential external drivers of polio vaccination delivery systems and community mobilization, while also acting as key barriers across different system levels (Table 3). The following sections present the main facilitators, barriers, and adaptive strategies related to these external domains.

Table 3
Key external facilitators and barriers to delivery systems and community engagement

Facilitators*	Definitions	Delivery systems, n (%)	Community engagement, n (%)
Social	Community norms and beliefs that support polio vaccination, including acceptance by members and engagement of leaders, volunteers, and local influencers to enhance participation	11 (47.8)	12 (42.9)
Political	Supportive political climate and leadership at all levels that enables coordinated polio vaccination and community mobilization activities	8 (34.8)	11 (39.3)
Economic	Sufficient resources to support polio vaccination delivery and community mobilization activities, ensuring sustained system development	2 (8.7)	2 (7.2)
Technological	Availability of external infrastructure or technological tools that support polio vaccination delivery and community engagement activities, such as mobile phones, mass media, and cold chain equipment	2 (8.7)	0.0
Barriers*			
Social	Prevailing social norms, beliefs, and misconceptions in the community that limit acceptance of polio vaccination and reduce participation in community engagement activities	7 (30.4)	9 (32.1)
Political	Weak political support, unstable political climate, or lack of coordination across administrative levels that impede the planning and implementation of polio vaccination and community engagement	8 (34.8)	8 (28.6)
Economic	Insufficient funding, limited revenue sources, or lack of financial support constrained vaccination delivery and mobilization efforts	6 (26.1)	7 (25.0)
Technological	Inadequate external infrastructure, limited access to technological tools, or insufficient cold chain and communication systems that hinder effective polio vaccination and community engagement	5 (21.7)	0.0
Geographic	Physical inaccessibility, challenging terrain, remoteness, or environmental conditions that impede delivery of polio vaccines and limit community engagement activities	6 (26.1)	8 (28.6)
Total		23	28

**Respondents could select few or multiple domains as facilitators or barriers to delivery systems or community engagement; therefore, percentages may not be 100%.*

Social environment

Social context played a central role in influencing both community engagement and vaccination delivery. A key facilitator was the program's ability to leverage trust in religious and traditional leaders, which helped legitimize vaccination and improved community acceptance.

"The most important contributor for this [polio] and other programs is the community's trust towards religious and clan leaders. Hence, if you are able to convince religious and clan leaders, it is easy to be understood and accepted by the community." (Zonal Partner, Somali).

Collaborative efforts between health authorities and partners further strengthened community awareness and engagement over time. However, deeply rooted cultural and religious beliefs posed significant barriers. In some settings, illness such as paralysis was attributed to spiritual causes, leading families to hide affected children and avoid seeking care. Misconceptions about vaccination, including beliefs that it was linked to family planning, also contributed to refusal.

"There are some community members that have traditional beliefs. If a child has any type of paralysis, they think it is because God is punishing the family, the family did evil things, the family has sin, etc. Because of that some parents hide their children at home that has paralysis, they don't want to expose them to the community and don't bring them to health facility." (District Health Promotion Coordinator, Addis Ababa).

Local social norms also affected timely vaccination. In some communities, newborns were not presented for vaccination until traditional ceremonies were completed, resulting in missed birth doses. In addition, gender roles limited women's participation in health-related activities, reducing opportunities for engagement with health services.

"Women carry a huge burden in managing and preparing food for their family which give them little time for other duties. Due to this, women in the community do not participate in a regular meeting organized by HEWs to discuss any health-related issues (including polio eradication) as per the schedule." (Zonal PHEM Officer, BG).

To address these barriers, programs implemented community-centered strategies, including engaging trusted leaders, conducted targeted advocacy, and using demonstration approaches to build confidence in vaccination.

"We have showed them [the community] that it [the polio vaccine] is not a family planning by vaccinating our children in front of them. We have engaged religious and tribal leaders, elderly people and women." (Frontline Health Worker, Somali)

Political environment

Political commitment was a key facilitator of vaccination delivery and community engagement. Strong support from government leaders at different administrative levels ensured prioritization of polio eradication and facilitated coordination across the health system. Local administrators, particularly at the kebele level, played an important role in enhancing community trust and legitimacy.

“There is a high level of support from the political leaders. Polio eradication is given high priority. The planning and strategy developments are supported with implementing partners and the interest of community members is reflected in it.” (Regional MCH Coordinator, Addis Ababa).

Collaboration between government and non-state actors further strengthened implementation by supporting capacity building and improving coordination of human and logistical resources.

“The presence of different NGOs and governmental organizations working collaboratively on polio eradication has contributed to capacity building and the strengthening of campaign implementation in both the supply side and human resources.” (Regional EPI Officer, Gambella).

However, political instability and population mobility posed significant barriers. Insecurity, internal conflict, and the movement of pastoralist communities disrupted service delivery, limited supervision, and reduced access to affected populations.

“Due to the current internal conflict, we couldn't support health workers by giving on job orientation and conduct monitoring and evaluation. Due to this we couldn't reach the community.” (Regional Partner, BG).

To mitigate these challenges, the program adopted coordinated and intersectoral approaches, including cross-border collaboration and engagement of local leaders to support community mobilization and address misconceptions.

“We worked with donating partners and neighboring countries in the border areas by planning and acting together, by provision of training to increase the awareness of the community.” (Regional PHEM Officer, BG)

Economic environment

Economic support from NGOs was a key facilitator of service delivery and engagement. Financial incentives from external partners, such as per diems for health workers and volunteers, helped address existing resource gaps and sustain frontline workers participation during polio vaccination campaigns.

“NGOs operating in surrounding areas play a significant role by providing per diem support to volunteers participating in GPEI activities and assisting HEWs in achieving program objectives.” (Frontline Health Worker, Oromia).

However, economic constraints limited program effectiveness. Insufficient government budget restricted outreach activities in hard-to-reach areas and undermined the maintenance of essential infrastructure, including the cold chain.

“Strengthening delivery system in remote areas need a lot of resources which we don't have.” (District EPI Officer, BG).

In addition, stagnant incentive structures reduced motivation among frontline workers, where remuneration for vaccinators had not kept pace with rising living costs.

“Low payment to supervisors and vaccinators who work at service delivery; no improvement in payment, and 100 Birr has been paid starting from the program inception which is not enough for the current expense [District EPI Officer, Somali].

To mitigate these challenges, targeted financial strategies were introduced in some settings, including additional incentives for outreach in hard-to-reach areas and small stipends for community volunteers to sustain mobilization efforts.

“For those who are willing to go to hard-to-reach area for vaccination campaign, we pay them extra per diem for their motivation.” (Zonal GPEI Officer, BG)

Technological environment

Technological capacity played an important role in supporting vaccine delivery and community engagement. Reliable cold chain systems, including improved refrigeration and transport infrastructure, helped maintain vaccine integrity across long distances.

“The commitment of cold chain technicians and technological advancements such as the development of large-capacity refrigerators, expansion of road infrastructure, and continuous donor support, were some of the key contributing factors.” (CGPP Partner, Somali).

Communication technologies also facilitated community engagement by enabling standardized messaging and broad dissemination of campaign information through mass media.

“Broadcasts about the program are aired on state television, and political and religious leaders are actively engaged in supporting the program.” (Regional Partner, Somali)

However, technological gaps constrained implementation in some settings, while lack of access to communication channels in remote areas hindered information dissemination and reduced community trust.

“Due to shortage of refrigerators, we were challenged to keep the vaccines at the right temperature.” (Regional EPI Officer, Addis Ababa).

To overcome these challenges, the program adopted context-specific technological solutions, such as solar-powered refrigeration, to cold chain functionality in off-grid and hard-to-reach areas.

“Solar-powered refrigerator is recently sent to those hard-to-reach areas so that they can start to give routine immunization.” (Zonal GPEI Surveillance Officer, BG)

Geographic factors

Geographic conditions acted as both facilitators and barriers to program implementation. Improvements in road infrastructure enhanced access to remote areas, enabling more reliable transport of vaccines, personnel, and supplies.

“Expansion of road infrastructure and continuous support from donors were some of the contributing factors.” (Regional Partner, Somali).

However, the physical environment, characterized by mountainous areas, desert, and rivers, often limited timely vaccine delivery and hindered community mobilization. These constraints were further compounded in border and conflict-affected areas where insecurity restricted outreach activities.

“Due to the topography of the area, the lifestyle of the pastoral community, and the border security issues, community engagement is difficult.” (Regional EPI Officer, Oromia).

In pastoral communities, mobility patterns and livestock priorities also influenced service uptake, with greater emphasis placed on livestock care than preventive child health services.

“In pastoral community, people regularly seek care for their livestock, but they often pay little attention to child vaccination because it is a preventive care.” [CGPP Partner, National]

To reach these challenges, the program implemented context-specific One Health approach, including human vaccination with animal health services and deploying mobile clinics aligned with pastoral movement patterns.

“We address the concerns of the pastoralists by designing mobile health clinics that move with pastoralist communities, and by integrating vaccination with animal vaccination campaigns to reach isolated populations.” (Pastoralist Concern, National)

The program also adapted strategies to address harsh environments by selecting staff capable of working in difficult conditions and using traditional transport methods to reach remote communities.

“For hard-to-reach areas, we choose people who can endure harsh environment based on their will. We used traditional transport system such as boat for rivers, and donkeys for long distances.” (Zonal Partner, BG)

Interactions between service delivery and community engagement

The cross-domain synthesis showed that service delivery and community engagement were closely connected during polio eradication activities. They reinforced one another when HEWs, HDAs, community leaders, and other local actors were incorporated into vaccination activities. Participants described that frontline health workers, particularly HEWs, frequently served as the link between vaccination services and communities. Participants also described HDAs as working with HEWs to

mobilize communities, facilitate access to underserved populations, and support vaccine delivery, particularly in hard-to-reach and pastoralist areas. Community-based structures also helped extend service delivery beyond fixed health facilities through locally adapted approaches, including mobile immunization. At the same time, trusted religious, clan, tribal, and community leaders helped communicate vaccination messages and address community concerns, facilitating acceptance of vaccination. Across the accounts, community actors were described as facilitating access to communities and acceptance of vaccination, while frontline health workers were described as providing technical and organizational support for vaccination activities. A participant described how the use of HDAs facilitated an enabling environment for polio vaccination:

“The HDAs are representatives of the community who are assigned at kebele level to represent the community in any health-related issues. They work together with the HEWs in engaging and strengthening the community involvement in the polio eradication activities. The HEWs in the kebeles also visit households in the community regularly.” (Zonal Partner, BG).

The interaction between service delivery and community engagement was constrained when weaknesses in service availability, planning, communication, resources, or accountability affected community participation and confidence. Participants reported vaccine stock-outs, incomplete vaccination supplies, facility closures, staff absenteeism, and delays in planned activities, while repeated vaccination activities and limited responsiveness to broader community health needs were also described as contributing to concerns and fatigue. At the same time, weak community participation and social accountability could allow service-delivery problems to persist. Participants also described how inadequate incentives and competing responsibilities affected the motivation and availability of community-based actors. In addition, the vertical organization of the polio program limited communication with local implementers and communities, particularly regarding campaign schedules and budgets. Participants described these constraints as making it difficult for health workers and community structures to maintain community engagement and deliver vaccination activities effectively. A participant described how gaps in higher-level communication and planning could constrain the ability of local teams to organize and implement community-level activities:

“In the polio program, decisions are made at higher levels. There is little feedback to the lower levels regarding the budget or the scheduling of activities. Unless the budget and timeline are communicated from higher level, local teams don't know when campaigns will be conducted.” (District EPI Officer, Oromia).

Service delivery and community engagement were also adapted together in response to geographic, cultural, mobility, and resource constraints. Participants described the use of HDAs and locally trusted administrators to connect health services with communities, while mobile immunization approaches using camels and donkeys were used to reach pastoralist populations in hard-to-reach areas. Participants also described incorporating community engagement into annual planning and using community officials to identify discrepancies in reported and actual vaccination activities. Engagement of religious and community leaders was adapted to address concerns about vaccination and the

activities of implementing organizations, and vaccination was combined with other services, including animal health activities, to reach mobile pastoralist communities.

The adaptations described by participants involved changes in service delivery, community engagement, or both, including approaches to planning, communication, access, and monitoring. One participant described how adapting service delivery to pastoralist communities facilitated access to vaccination:

“Mobile immunization systems have been established using traditional transport, such as camels and donkeys, to reach hard-to-reach areas and address challenges of the pastoralist community.” (CGPP Partner, National)

Discussion

This study demonstrates that polio eradication in Ethiopia is not driven by service delivery or community engagement alone, but by how effectively frontline workers translate technical services into trusted, locally acceptable practices. Our findings show that successful vaccine delivery is strongly enabled by committed frontline health workers, supportive leadership structures, and community-based actors, including HEWs and HDAs, who collectively build trust and derive service uptake. However, this interplay dynamics is inconsistent across settings, as it is often constrained by weak accountability, resource limitations, and contextual challenges such as geographic inaccessibility, insecurity, and diverse local beliefs. Overall, these findings demonstrate that service delivery and community engagement are not parallel, independent processes, but rather interdependent systems whose alignment, or misalignment, directly dictates the effectiveness of polio eradication efforts.

Frontline workers, specifically HEWs and HDAs, function as the primary relational interface through which formal health systems are translated into acceptable community practices [25, 30]. Through direct engagement with households, they do not merely deliver vaccines but also actively interpret and communicate health messages in ways that align with local socio-cultural beliefs, thereby mitigating fear and facilitating physical and psychological access [5, 11]. Our findings suggest that their mobilization capacity is not determined solely by training or technical competence, but is contingent up on their social credibility, community trust, and the local socio-economic contexts [16, 21, 36].

Specifically, our study highlights that frontline worker must sometimes resort to personal advocacy and behavioral modeling, such as publicly vaccinating their own children, to actively counter misinformation and reinforce community confidence in vaccine safety [5, 37]. This indicates that community engagement is driven not only by passive information provision or service availability, but by socially embedded face-to-face interactions that shape how services are perceived and accepted [11, 18]. Consequently, these dynamics underscore the urgent necessity of strengthening support systems for HEWs and volunteers, ensuring fair remuneration, consistent supervision, and supportive working environments as their position at the system and community interface directly influences the sustainability of immunization efforts [25, 30, 38].

The interaction between service delivery and community engagement is strongest when the formal health system effectively integrates community influencers directly into the implementation process [16, 39]. Engaging religious and clan leaders as trusted intermediaries enables vaccination programs to address cultural concerns and improve access in settings where technical delivery services alone are insufficient [9, 16, 36]. In Ethiopia's Somali region, for example, aligning vaccination campaigns with religious and clan leaders helped reposition the program from a perceived external intervention to a trusted, locally accepted service [4, 5]. Similarly, the One Health approach functioned as an effective integration strategy by linking human immunization with veterinary services, thereby aligning health delivery with the livelihood priorities of pastoralist communities [40]. This approach enhanced participation and coverage in hard-to-reach areas, where trust is a prerequisite for service uptake [5, 16]. These findings demonstrate that vaccination programs achieve maximum effectiveness when service delivery is structurally integrated with, and adapted to, local social and cultural systems.

Despite these successes, the interaction between service delivery and community engagement is frequently weakened when centralized, vertical program structures conflict with local operational realities. Top-down planning often leaves frontline workers underprepared due to delayed information flows and limited resources, contributing to localized vaccine stockouts and eroded public trust [4, 24]. Furthermore, highly vertical structures tend to overlook local gender dynamics, specifically, heavy maternal domestic workloads and restricted mobility frequently prevent women from participating in campaigns, contributing to missed children and reduced community engagement [36, 41]. Additionally, the repetitive nature of door-to-door polio campaigns can generate intense vaccine fatigue, reducing community responsiveness over time [41]. Evidence suggests that co-delivering broader maternal and child health services alongside polio vaccination through integrated health services and engaging trusted local influencers can successfully mitigate fatigue and sustain community participation [22]. Overall, these challenges highlight the limitations of the vertical, disease-specific approaches that treat communities as passive recipients rather than active partners [39, 42]. Strengthening integration within broader PHC systems may help mitigate these challenges and sustain community engagement [43].

Weak social accountability mechanisms emerge as a significant barrier to polio program performance in some settings, reflecting a gap between policy expectations and actual practice [44]. In many resource-constrained settings, community engagement remains largely passive, rather than enabling active, community-led monitoring and feedback [11, 44]. Because local communities are frequently excluded from crucial microplanning, budgeting, and participatory evaluation processes, this sense of ownership is severely compromised [11]. While community engagement has the potential to strengthen decision-making and improve primary care, its effectiveness depends on strong local accountability frameworks and continuous, two-way communication [11]. Institutionalizing these social accountability mechanisms is therefore critical for improving health system responsiveness, resolving local grievances, and ensuring equity in service delivery [30]. Recent efforts by the Ethiopian MoH to strengthen social accountability frameworks are therefore timely [29].

Inadequate incentives and poor compensation for frontline workers and volunteers represent major structural barriers that drive low motivation and high staff turnover [20, 45]. While per diems provide short-term support, they are health system distortions that remain unsustainable unless integrated into fair, formalized and consistent remuneration systems structures [6]. Crucially, these payment systems must account for restrictive gender dynamics and domestic power structures, ensuring that the significant social costs and household burdens borne by female frontline workers are equitably compensated [36, 46]. Political commitment is also critical, particularly in conflict affected areas where local administrators play a key role in facilitating access, resolving security challenges, and mobilizing communities. Evidence from similar fragile settings shows that actively engaging local and informal leadership networks enhances community ownership, resolves local grievances, and maintains healthcare service continuity during times of instability [22, 47]. Overall, these dynamics illustrate that technical health delivery is easily compromised without addressing local accountability, and sustained local political support.

Our findings strongly align with global implementation science evidence demonstrating that sustainable immunization coverage depend on the interaction between resilient health delivery systems and active community engagement [39, 48, 49]. Strategically addressing delivery system barriers, such as cold chain limitations, and community barriers, including misinformation, is more effective than isolated technical interventions [42, 50, 51]. The strategies observed in Ethiopia, including the use of community influencers and the One Health approach, illustrate how locally adapted solutions can strengthen implementation within global health frameworks [6, 40]. These approaches reinforce the principle that community engagement is not a supplementary activity, but an indispensable component of health system performance [39]. Embedding social accountability, local political ownership, and sociocultural context directly into service delivery is therefore essential to ensure equitable and effective immunization outcomes [7].

Strengths

A key strength of this study is its focus on the interaction between service delivery systems and community engagement, capturing multi-level implementation dynamics across diverse urban, agrarian, and pastoralist settings in Ethiopia. The inclusion of perspectives from national policymakers to frontline workers enabled a comprehensive understanding of how program strategies operate across different levels of the health system. The use of a theory-informed CFIR framework strengthened the analytical rigor by enabling systematic identification of multi-level factors influencing implementation.

Limitations

As with all research, the reliance on self-reported data may introduce recall and social desirability bias. The interview guides did not explicitly ask about the interaction between service delivery and community engagement, and the findings relied on participants' accounts of how the two domains influenced, reinforced, constrained, or adapted to one another. The study was conducted in December 2018 and

therefore reflects participants' experiences at that time. Changes in Ethiopia's health system, program strategies, and community perceptions since then may limit the direct applicability of some findings to current program conditions. In addition, while the study provides in-depth contextual insights, the transferability of findings to other settings may be limited. Nonetheless, the study provides contextually grounded insights into the factors shaping service delivery, community engagement, and their interaction across different health-system levels and complex settings.

Conclusions and recommendations

This study highlights that sustaining polio eradication requires both effective service delivery and meaningful community engagement, supported by context-specific and trust-building approaches. Technical components such as cold chain systems, vaccine availability, and effective planning are necessary but insufficient without community trust and participation. Frontline health workers and local influencers play an important role in connecting health services with communities and translating program activities into locally acceptable practices. However, both service delivery and community engagement are constrained by contextual challenges such as geographic barriers, resource limitations, weak accountability, and sociocultural factors. Efforts should focus on integrating service delivery and engagement strategies as interdependent components of polio eradication.

Abbreviations

AFI: Acute Flaccid Paralysis

BG: Benishangul-Gumuz

CFIR: Consolidated Framework for Implementation Research

CGPP: CORE Group Polio Project

CV: Community Volunteer

cVDPV: Circulating vaccine-derived poliovirus

EPI Expanded Program on Immunization

MCH: Maternal and Child Health

MoH: Ministry of Health

GPEI: Global Polio Eradication Initiative

HEWs: Health Extension Workers

HDAs: Health Development Armies

IRB: Institutional Review Board

NGOs: Non-Governmental Organizations

PHC: Primary Health Care

PHEM: Public Health Emergency Management

STRIPE: Synthesis and Translation of Research and Innovation from Polio Eradication

WDAs: Women Development Armies

WPV: Wild Poliovirus

Declarations

Ethics approval and consent to participate

The study protocol for the project titled “Implementation Science for Global Health: Lessons Learned from the Global Polio Eradication Initiative in Ethiopia” received ethics approval from the Institutional Review Board (IRB) of the College of Health Sciences at Addis Ababa University (Protocol No: 081/18/SPH; dated December 04, 2018). The study protocol also received ethical approval by the IRB at the Johns Hopkins Bloomberg School of Public Health (IRB No: 00008721; dated May 14, 2018). The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Consent was obtained from all respondents prior to interviews. Each participant provided written informed consent and permission to participate in the interview. No identifying personal information was collected from the participants. Confidentiality was maintained by de-identifying transcripts and securing data storage.

Consent for publication

Not applicable

Competing interests

The authors have declared that no competing interests exist.

Funding

This work was funded by the Bill & Melinda Gates Foundation through grant OPP1178578 awarded to OA at Johns Hopkins University as part of the Synthesis and Translation of Research and Innovation from Polio Eradication (STRIPE) project. The funder did not play any role in writing the protocol or interpreting

the data. The conclusions and opinions expressed in this work are those of the authors alone and shall not be attributed to the Foundation.

Author Contribution

OA conceptualized the study, acquired the funding, and contributed to the data interpretation with AK and SC. OA, AK, WD, AS, and SH developed the methodology. WD, AS, and SH conducted the investigation, managed the project, and supervised the work. WD curated the data, performed the formal analysis with SH, and wrote the original draft. WD, SH, AS, OA, AK and SC reviewed and edited the manuscript. WD is responsible for the overall content as the guarantor. All authors reviewed and approved the manuscript.

Acknowledgement

We would like to thank the study team members from the Addis Ababa University School of Public Health and the STRIPE Consortium. We also gratefully acknowledge our colleagues at Johns Hopkins University for their valuable inputs. Finally, we are grateful to all data collectors, supervisors, and coordinators who contributed to this study.

Data Availability

All data relevant to the findings of this study are provided within the manuscript.

References

1. Heymann D. Global polio eradication initiative. *Bull World Health Organ.* 2006;84(8):595.
2. Kew O, Pallansch M. Breaking the Last Chains of Poliovirus Transmission: Progress and Challenges in Global Polio Eradication. *Annu Rev Virol.* 2018;5(1):427–51. 10.1146/annurev-virology-101416-041749.
3. Tegegne AA, Fiona B, Shebeshi ME, Hailemariam FT, Aregay AK, Beyene B, et al. Analysis of acute flaccid paralysis surveillance in Ethiopia, 2005–2015: progress and challenges. *Pan Afr Med J.* 2017;27(Suppl 2):10. 10.11604/pamj.supp.2017.27.2.10694.
4. Deressa W, Kayembe P, Neel AH, Mafuta E, Seme A, Alonge O. Lessons learned from the polio eradication initiative in the Democratic Republic of Congo and Ethiopia: analysis of implementation barriers and strategies. *BMC Public Health.* 2020;20(Suppl 4):1807. 10.1186/s12889-020-09879-9.
5. Stamidis KV, Bologna L, Bisrat F, Tadesse T, Tessema F, Kang E. Trust, Communication, and Community Networks: How the CORE Group Polio Project Community Volunteers Led the Fight against Polio in Ethiopia's Most At-Risk Areas. *Am J Trop Med Hyg.* 2019;101(4Suppl):59–67. 10.4269/ajtmh.19-0038.

6. Closser S, Neel AH, Gerber S, Alonge O. From legacy to integration in the Global Polio Eradication Initiative: looking back to look forward. *BMJ Glob Health*. 2024;9(5):e014758. 10.1136/bmjgh-2023-014758.
7. van den Ent MMVX, Mallya A, Sandhu H, Anya BP, Yusuf N, Ntakibirora M, et al. Experiences and Lessons From Polio Eradication Applied to Immunization in 10 Focus Countries of the Polio Endgame Strategic Plan. *J Infect Dis*. 2017;216(suppl1):S250–9. 10.1093/infdis/jix047.
8. Vassallo A, Dunbar K, Ajuwon B, Lowbridge C, Kirk M, King C, Sheel M. Assessing the impact of polio supplementary immunisation activities on routine immunisation and health systems: a systematic review. *BMJ Glob Health*. 2021;6(11):e006568. 10.1136/bmjgh-2021-006568.
9. Eze OV, Meyer JC, Campbell SM. Poliomyelitis in Nigeria: Impact of Vaccination Services and Polio Intervention and Eradication Efforts. *Vaccines (Basel)*. 2025;13(3):232. 10.3390/vaccines13030232.
10. Majidulla A, Sultan MA, Zaman A, Shafique M, Ahmed S, Naz F, Nayyab S, Sohail A. Engage less, provide more: Community health workers' perspectives on how to overcome opposition to polio vaccination in Pakistan. *Glob Public Health*. 2025;20(1):2465645. 10.1080/17441692.2025.2465645.
11. Erku D, Khatri R, Endalamaw A, Wolka E, Nigatu F, Zewdie A, Assefa Y. Community engagement initiatives in primary health care to achieve universal health coverage: A realist synthesis of scoping review. *PLoS ONE*. 2023;18(5):e0285222. 10.1371/journal.pone.0285222.
12. Neel AH, Closser S, Villanueva C, Majumdar P, Gupta SD, Krugman D, Akinyemi OO, Deressa W, Kalbarczyk A, Alonge O. 30 years of polio campaigns in Ethiopia, India and Nigeria: the impacts of campaign design on vaccine hesitancy and health worker motivation. *BMJ Glob Health*. 2021;6(8):e006002. 10.1136/bmjgh-2021-006002.
13. Renne E. Perspectives on polio and immunization in Northern Nigeria. *Soc Sci Med*. 2006;63(7):1857–69. 10.1016/j.socscimed.2006.04.025.
14. Brunton G, Thomas J, O'Mara-Eves A, Jamal F, Oliver S, Kavanagh J. Narratives of community engagement: a systematic review-derived conceptual framework for public health interventions. *BMC Public Health*. 2017;17(1):944. 10.1186/s12889-017-4958-4.
15. Questa K, Das M, King R, Everitt M, Rassi C, et al. Community engagement interventions for communicable disease control in low- and lower- middle-income countries: evidence from a review of systematic reviews. *Int J Equity Health*. 2020;19(1):51. 10.1186/s12939-020-01169-5.
16. Andrus JK, Perry HB. Community Engagement, Ownership, and Civil Society Organizations in Polio Eradication. *Am J Trop Med Hyg*. 2019;101(4Suppl):1–3. 10.4269/ajtmh.19-0529.
17. Duru JI, Usman S, Adeosun O, Stamidis KV, Bologna L. Contributions of Volunteer Community Mobilizers to Polio Eradication in Nigeria: The Experiences of Non-governmental and Civil Society Organizations. *Am J Trop Med Hyg*. 2019;101(4Suppl):74–84. 10.4269/ajtmh.19-0068.
18. Akinyemi OO, Adebayo A, Bassey C, Nwaiwu C, Kalbarczyk A, Fatiregun AA, Alonge OO, Owoaje E. Assessing community engagement in Nigeria polio eradication initiative: application of the

- Consolidated Framework for Implementation Research. *BMJ Open*. 2021;11(8):e048694. 10.1136/bmjopen-2021-048694.
19. Nsagha DS, Tatah EK, Njamnshi AK, Sama M. Community Involvement in Polio Vaccination Activities in the Polio Eradication Process in Cameroon. *Am J Epid Inf D*. 2020;8(1):30–6. 10.12691/ajeid-8-1-5.
 20. Owoaje E, Rahimi A, Kalbarczyk A, Akinyemi O, Peters M, Alonge O. Conflict, community, and collaboration: shared implementation barriers and strategies in two polio endemic countries. *BMC Public Health*. 2020;20. <https://doi.org/10.1186/s12889-020-09235-x>.
 21. Choudhary M, Solomon R, Awale J, Dey R, Singh JP, Weiss W. Significance of a social mobilization intervention for engaging communities in polio vaccination campaigns: Evidence from CORE Group Polio Project, Uttar Pradesh, India. *J Glob Health*. 2021;11:07011. 10.7189/jogh.11.07011.
 22. Habib MA, Soofi S, Cousens S, Anwar S, Haque NU, Ahmed I, Ali N, Tahir R, Bhutta ZA. Community engagement and integrated health and polio immunisation campaigns in conflict-affected areas of Pakistan: a cluster randomised controlled trial. *Lancet Glob Health*. 2017;5(6):e593–603. 10.1016/S2214-109X(17)30184-5.
 23. Olateju A, Peters MA, Osaghae I, Alonge O. How service delivery implementation strategies can contribute to attaining universal health coverage: lessons from polio eradication using an implementation science approach. *BMC Public Health*. 2022;22(1):1271. 10.1186/s12889-022-13681-0.
 24. Agrawal P, Neel A, Deresse AS, Gerber S, Alonge O. Facilitators and barriers to community engagement in the Global Polio Eradication Initiative - A mixed methods study. *PLOS Glob Public Health*. 2023;3(4):e0001643. 10.1371/journal.pgph.0001643.
 25. Polonsky JA, Burns R, Odlum A, Hamza YA, Mulugeta Y, Abramowitz S, Enria L, Blanchet K. Community engagement for vaccine delivery in low- and middle-income countries and humanitarian settings: A scoping umbrella review. *PLOS Glob Public Health*. 2026;6(4):e0006307. 10.1371/journal.pgph.0006307.
 26. Khatri RB, Wolka E, Nigatu F, Zewdie A, Erku D, Endalamaw A, Assefa Y. People-centred primary health care: a scoping review. *BMC Prim Care*. 2023;24(1):236. 10.1186/s12875-023-02194-3.
 27. Alonge O, Neel AH, Kalbarczyk A, Peters MA, Mahendradhata Y, Sarker M, et al. Synthesis and translation of research and innovations from polio eradication (STRIPE): initial findings from a global mixed methods study. *BMC Public Health*. 2020;20(Suppl 2):1176. 10.1186/s12889-020-09156-9.
 28. Mbaeyi C. Polio vaccination activities in conflict-affected areas. *Hum Vaccin Immunother*. 2023;19(2):2237390. 10.1080/21645515.2023.2237390.
 29. MoH. Health Sector Social Accountability Strategy of Ethiopia. 2023/24-2025/26. Ethiopia: Addis Ababa; 2023.
 30. Assefa Y, Gelaw YA, Hill PS, Taye BW, Van Damme W. Community health extension program of Ethiopia, 2003–2018: successes and challenges toward universal coverage for primary healthcare services. *Global Health*. 2019;15(1):24. 10.1186/s12992-019-0470-1.

31. Gebremedhin S, Shiferie F, Tsegaye DA, Alemayehu WA, Wondie T, Donofrio J, DelPizzo F, Belete K, Biks GA. Oral and Inactivated Polio Vaccine Coverage and Determinants of Coverage Inequality Among the Most At-Risk Populations in Ethiopia. *Am J Trop Med Hyg.* 2023;109(5):1148–56. 10.4269/ajtmh.23-0319.
32. Fekadu H, Mekonnen W, Adugna A, Kloos H, HaileMariam D. Inequities and trends of polio immunisation among children aged 12–23 months in Ethiopia: a multilevel analysis of Ethiopian demographic and health survey. *BMJ Open.* 2024;14(3):e079570. 10.1136/bmjopen-2023-079570.
33. Bigouette JP, Henderson E, Traoré MA, Wassilak SGF, Jorba J, Mahoney F, et al. Update on Vaccine-Derived Poliovirus Outbreaks - Worldwide, January 2021-December 2022. *MMWR Morb Mortal Wkly Rep.* 2023;72(14):366–71. 10.15585/mmwr.mm7214a3.
34. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci.* 2009;4:50. 10.1186/1748-5908-4-50.
35. Peters MA, Deressa W, Sarker M, Sharma N, Owoaje E, Ahmad RA, Saljuqi T, Mafuta E, Alonge O. Sampling method for surveying complex and multi-institutional partnerships: lessons from the Global Polio Eradication Initiative. *BMC Public Health.* 2020;20(Suppl 2):1197. 10.1186/s12889-020-08592-x.
36. Delea MG, Browne L, Kaji S, Weiss AJ, Tchindebet O. Factors Influencing Community Engagement during Guinea Worm and Polio Eradication Endgames in Chad: Recommendations for Last Mile Programming. *Am J Trop Med Hyg.* 2024;111(3Suppl):36–48. 10.4269/ajtmh.23-0635.
37. Solomon R. The Untold Story of Community Mobilizers Re-engaging a Disengaged Community During the Endemic Era of India's Polio Eradication Program. *Glob Health Sci Pract.* 2021;9(Suppl 1):S6–8. 10.9745/GHSP-D-20-00425.
38. Alban R, Gibson E, Payne J, Chihana T. Leveraging community health workers as vaccinators: a case study exploring the role of Malawi's Health Surveillance Assistants in delivering routine immunization services. *Hum Resour Health.* 2023;21(1):42. 10.1186/s12960-023-00827-3.
39. Ismail SA, Lam ST, Bell S, Fouad FM, Blanchet K, Borghi J. Strengthening vaccination delivery system resilience in the context of protracted humanitarian crisis: a realist-informed systematic review. *BMC Health Serv Res.* 2022;22(1):1277. 10.1186/s12913-022-08653-4.
40. Sabahelzain MM, Tinessia A, King C, Nepali R, Mohamedali S, George J, Brookes VJ, Wiley K. Joint human and animal vaccination strategies to reach mobile pastoralists and their livestock in Africa: A scoping review. *Vaccine.* 2026;81:128594. 10.1016/j.vaccine.2026.128594.
41. Closser S, Rosenthal A, Maes K, Justice J, Cox K, Omidian PA, Mohammed IZ, Dukku AM, Koon AD, Nyirazinyoye L. The Global Context of Vaccine Refusal: Insights from a Systematic Comparative Ethnography of the Global Polio Eradication Initiative. *Med Anthropol Q.* 2016;30(3):321–41. 10.1111/maq.12254.
42. Blanc DC, Grundy J, Sodha SV, O'Connell TS, von Mühlenbrock HJM, Grevendonk J, et al. Immunization programs to support primary health care and achieve universal health coverage.

- Vaccine. 2024;42(Suppl 1):S38–42. 10.1016/j.vaccine.2022.09.086.
43. Sultan MA, Closser S, Majidulla A, Ahmed S, Naz F, Nayyab S, Zaman A, Shafique M, Sohail A. How to eradicate polio in Pakistan: Insights from community health workers. PLOS Glob Public Health. 2023;3(8):e0002289. 10.1371/journal.pgph.0002289.
 44. Danhouno G, Nasiri K, Wiktorowicz ME. Improving social accountability processes in the health sector in sub-Saharan Africa: a systematic review. BMC Public Health. 2018;18(1):497. 10.1186/s12889-018-5407-8.
 45. Tesfa H, Getahun FA, Alemu YM. Motivation and associated factors of health development army in the implementation of health extension packages in Northwest Ethiopia: a cross-sectional study. BMJ Open. 2024;14(3):e077060. 10.1136/bmjopen-2023-077060.
 46. Closser S, Rosenthal A, Justice J, Maes K, Sultan M, Banerji S, Amaha HB, Gopinath R, Omidian P, Nyirazinyoye L. Per Diems in Polio Eradication: Perspectives From Community Health Workers and Officials. Am J Public Health. 2017;107(9):1470–6. 10.2105/AJPH.2017.303886.
 47. Werner K, Kak M, Herbst CH, Lin TK. The role of community health worker-based care in post-conflict settings: a systematic review. Health Policy Plan. 2023;38(2):261–74. 10.1093/heapol/czac072.
 48. Ahonkhai AA, Odusanya OO, Meurice FP, Pierce LJ, Durojaiye TO, Alufohai EF, Clemens R, Ahonkhai VI. Lessons for strengthening childhood immunization in low- and middle-income countries from a successful public-private partnership in rural Nigeria. Int Health. 2022;14(6):632–8. 10.1093/inthealth/ihab089.
 49. Hester KA, Sakas Z, Ellis AS, Bose AS, Darwar R, Gautam J, et al. Critical success factors for high routine immunization performance: A case study of Nepal. Vaccine X. 2022;12:100214. 10.1016/j.jvacx.2022.100214.
 50. Jain M, Shisler S, Lane C, Bagai A, Brown E, Engelbert M. Use of community engagement interventions to improve child immunisation in low-income and middle-income countries: a systematic review and meta-analysis. BMJ Open. 2022;12(11):e061568. 10.1136/bmjopen-2022-061568.
 51. Xie YJ, Liao X, Lin M, Yang L, Cheung K, Zhang Q, et al. Community Engagement in Vaccination Promotion: Systematic Review and Meta-Analysis. JMIR Public Health Surveill. 2024;10:e49695. 10.2196/49695.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [S1InterviewGuide.pdf](#)