

Implementation and summative evaluation of a family-focused intervention to promote fathers' engagement and support childhood immunization in peri-urban Ghana: a mixed methods study

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Research Article

Keywords: male engagement, immunization, caregiver barriers, implementation research, evaluation

Posted Date: June 14th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-9707682/v1>

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Additional Declarations: No competing interests reported.

Abstract

Background

Implementation of stakeholder-informed, evidence-based interventions is critical to address childhood immunization barriers that affect male and female caregivers differently. We aimed to adapt, implement, and evaluate a family-focused intervention to promote fathers' engagement and support childhood immunization in peri-urban Ghana.

Methods

We conducted a mixed-methods evaluation in Kpone Katamanso District, Ghana (April 2023-July 2024) in three phases: 1) formative assessment, 2) implementation with iterative refinement and monitoring, and 3) qualitative summative evaluation to assess perceived intervention effect and implementation feasibility and acceptability. In Phase 1, we conducted a baseline household survey (n=481 caregivers), eight focus group discussions (FGDs) among caregivers, and 20 interviews (n=10 healthcare workers, n=10 caregivers). Findings informed a stakeholder co-creation workshop to tailor the intervention, which included interpersonal communication training of health workers, community meetings, and community-based quality improvement teams. In Phase 2, the intervention was implemented and refined, with implementation monitoring and through rapid surveys (n=250 caregivers) of community meeting participants' relevant vaccination knowledge, attitudes, and experiences. In Phase 3, a summative evaluation was conducted, including seven FGDs among caregivers and 23 interviews (n=14 health workers, n=9 caregivers) and a rapid survey of caregivers (n=160). The Framework for Reporting Adaptations and Modifications to Evidence-based interventions (FRAME) guided adaptation throughout.

Results

We designed our intervention to address 1) fathers' limited involvement in immunization decision-making by increasing their vaccine knowledge and awareness and 2) mothers' reported need for greater social support to access services. During the co-creation workshop, stakeholders reported acceptability of proposed intervention components. Community input informed on-going intervention adaptations: sex-specific community meetings, weekend scheduling to promote male engagement, expanded outreach sites to engage new participants. Findings suggest perceived improvement in fathers' engagement, including greater participation in joint decision-making and provision of social support for vaccination (e.g. sharing reminders, attending the visit, providing money for transport to vaccination sites).

Discussion

This work highlights evidence translation in a resource-limited setting, demonstrating how community engagement in vaccination program design and implementation may help address persistent sex-related barriers to vaccine demand, potentially improving uptake. Future research should include longer-term and longitudinal evaluations to assess impact on immunization outcomes.

INTRODUCTION

Persistent behavioral and socio-cultural barriers impede vaccine uptake, particularly for childhood immunization. Increasing attention has been given to women's role as caregivers and how such barriers may be experienced by male and female caregivers differently (1–3). Women are generally the primary caregivers for child health but their access to immunization services can be affected by limited decision-making power in the household, inadequate access to and control of economic resources that could be leveraged for health service uptake, and competing demands on their time due to high workloads (1, 4–7). Prior research strongly indicates that a woman's ability to immunize her child(ren) is associated with her decision-making power (8). In many communities, however, the final decision to vaccinate a child rests on the male head of household, frequently the father of the child. Limited decision-making power among women also constrains their mobility, including their access to health facilities and other places outside of the home, thereby negatively affecting their health-seeking behavior. Access to and control of economic resources and time are also crucial barriers to immunization. Women's lack of monetary resources due to economic dependence on the male head of household, particularly for low socio-economic status households may prevent them from seeking immunization services (9). Women's time constraints and high workload due to multiple responsibilities at home and need for income generation may prevent them from seeking vaccinations for their children according to the recommended schedule (10). These challenges were further exacerbated during the COVID-19 pandemic, which increased women's workloads and disrupted routine immunization services (11).

Growing evidence highlights that men and other influential family members (e.g. grandparents) can play a keyrole in reducing vaccination barriers. Immunization programs can alleviate these barriers within the household by engaging fathers to increase the community's immunization awareness

, promote male behavior change to support women in decision-making. These changes, if leading to successful seeking of immunization services, can increase immunization uptake within the community. Evidence from maternal health programming suggests that engagement of fathers (e.g. is linked with greater likelihood of childhood immunization (12–14). Addressing these sex-specific barriers (e.g. social, cultural, and economic factors that may create barriers to vaccination, which are experienced differently by female and male caregivers) has the potential to increase immunization coverage, improve access among hard-to-reach populations, empower women and families to achieve optimal health, and support progress towards immunization goals (e.g., Immunization Agenda 2030, the Sustainable Development Goals 2030).

Ghana, for the past decade, has reported high coverage of routine immunizations (e.g., about 90 to 95% coverage) (2, 24). However, coverage remains uneven, with some areas falling below national levels for the recommended childhood vaccines. Disparities exist for both overall coverage as well as delays in receiving recommended vaccine doses (16), with greater disparities for recently introduced vaccines (17), such as the second dose of measles-containing vaccine (MCV2). Children under five in rural communities are more likely to be fully vaccinated than those in urban communities (18). Lower

coverage in urban settings may be related to context-specific challenges (e.g., reduced engagement with health services by migrant groups, lower social cohesion and community organization, and over-burdened health facilities) (19–21).

As calls for increasing family engagement within immunization programs become more widespread (1), it is important to identify interventions that can improve male engagement. Further, there is also the need for better measurement to understand the impact of men's engagement strategies to address the sex-specific barriers experienced by male and female caregivers (36). It is also important to understand the implementation context for interventions to address these sex-specific barriers, to inform an approach more likely to be accepted and feasibly implemented in such a setting. Community engagement is a crucial tool for supporting implementation of evidence-based socio-behavioral health interventions, including to promote vaccination (22). Therefore, our study applied community engagement principles to inform the intervention design based on local needs (e.g., which sex-specific barriers were present); encourage evidence-based approaches while allowing space for context-specific adaptations; and implement an intervention to promote fathers' engagement and improve childhood immunization in peri-urban Ghana.

The objective of this implementation study was to describe the intervention, including its implementation, related adaptations and associated implementation outcomes, and to examine the perceived changes in male engagement, family social support, and related norms and childhood immunization practices following the intervention.

METHODS

Study aims

This study had five aims:

1. Understand family engagement in household immunization decision-making.
2. Examine the role of fathers in routine immunization demand and uptake.
3. Refine and deliver intervention strategies and messages to family members, particularly fathers, of vaccine eligible children.
4. Assess the intervention strategies for their feasibility, acceptability, fidelity, appropriateness, and any potential for scale-up.
5. Evaluate the perceived changes associated with these family-based interventions on male engagement in immunization

Overall design

This study used an explanatory sequential design in which the results of the Phase 1 (mixed methods study) and Phase 2 (implementation, iteration, and quantitative monitoring) informed Phase 3, a summative qualitative evaluation, (Figure 1) (23). The primary outcomes of interest were perceived

changes in fathers’ engagement and social support for childhood immunization. Secondary outcomes included perceived changes in norms and implementation outcomes (feasibility, acceptability, fidelity, and appropriateness).

Phase 1 focused on problem identification, which included identifying priority barriers to address. The intervention components were then conceptually mapped to these barriers through the human-centered design workshop (Phase 2), and thereafter key outcomes of interest were selected for evaluation in Phase 3. The project duration, resources, and methodology did not allow for observing longer-term impact, but these are presented in the figure below as part of the logic model (Figure 2). This paper provides an overview of phases 1 and 2 findings and primarily focuses on the phase 3 findings as part of the summative evaluation.

Setting

The intervention and related activities were implemented in Kpone Katamanso, a peri-urban district in Ghana. This district has a mix of urban, peri-urban, rural, and migrant populations and varied household demographics such as a mix of traditional larger family structures and nuclear families. This district also has a high prevalence of under-vaccinated children according to the Ghana Health Services (GHS). The peri-urban district has five sub-districts and 85 communities (13 rural, 64 peri-urban, 8 urban). Six communities were randomly selected for implementation, with two representing each type of urbanicity (rural, peri-urban, and urban) (Table 1). This geographic selection was done in consultation with the district health authorities.

Table 1: Intervention communities and their population estimates*, Kpone Katamanso District, Ghana

Name of Community	Sub-district	Category	Population < 2 years	Number of households
Bawaleshie	Oyibi	Rural	393	711
Okushiribi/Appolonia	Appolonia	Rural	422	729
Halleluyah	Gbetsile	Urban	376	249
School Junction	Zenu	Urban	365	1,069
Shangai	Kpone	Peri-urban	429	1,416
Switzerland	Zenu	Peri-urban	1,153	2,003
Total			3,138	6,177

**Based on Ghana Health Services administrative data (2023), also in Chase et al. (2026)*

Researcher characteristics and reflexivity

The study team was comprised of researchers and practitioners representing experience and expertise in vaccination programming, vaccine demand, social behavior change, social epidemiology, and implementation science. Study team members lived in communities within the target region of Greater Accra. The study team was provided with the opportunity to observe immunization services in the community to better understand context, which helped shape the overall study concept and approach.

Study procedures

We implemented and evaluated the family-focused intervention in three phases as described below.

Phase 1- Formative Assessment

Design:

This involved a formative assessment (April 2023) to understand the extent and nature of caregiver barriers for immunization in Kpone Katamanso District, the findings of which were reviewed by stakeholders in a co-design workshop to inform adaptation to the proposed intervention and tailor its implementation for this context.

Sampling:

Details on sample size and related methods are available in supplementary table 1.

Data collection:

We first conducted a cross-sectional household survey with a random sample of 481 caregivers of children under 24 months to understand the vaccination knowledge, confidence, and uptake; caregiver socio-demographic characteristics; and household dynamics related to health and immunization decision making, resources, and norms around fathers' engagement in childhood immunization. The data collection instrument was informed by the Demographic and Health survey (43) and Behavioral and Social Drivers of Vaccination survey (44). (See supplementary file 1)

We also conducted eight focus group discussions (FGDs) and 10 in-depth interviews (IDI), with caregivers of young children and 10 key informant interviews (KIIs) with health care workers and district health officials to explore caregiver barriers to immunization at individual, household and health system levels; social norms around vaccination; and engagement of fathers and other family members in immunization. This qualitative data collection is described in detail in another publication (24).

We used these formative assessment findings to conduct a co-design workshop with the community (mothers, fathers, and healthcare workers (HCW)), and district health staff to introduce, adapt, and refine the intervention components for the local community context. The workshop helped to identify key intervention implementors and define their roles and responsibilities, and procedures for implementing the intervention over the course of six months.

Data analysis:

We conducted descriptive statistics on the household survey and a thematic analysis of the qualitative data. Findings were triangulated to identify key barriers to target for the intervention.

Phase 2- Implementation:

Design:

The intervention was implemented in the three selected areas of Kpone Katamanso District from November 2023 to May 2024. The three key intervention activities were:

- 1) **HCW training**, aimed at building capacity to deliver the intervention at the community level, strengthening HCW interpersonal communication skills to engage fathers, and providing tools for documentation.
- 2) **Quality Improvement Teams (QIT)**, consisting of a core group of HCWs and community members, which identified community needs and developed monthly community engagement plans.
- 3) **Community conversations**, which were meetings that provided a forum for HCW to engage with mothers and fathers to discuss family involvement in child immunization.

Additional details of these activities are presented in Table 2. The implementing partner also integrated mechanisms such as supportive supervision and quarterly review meetings conducted by the district health management team, to facilitate joint engagement with HCWs.

Sampling:

Intervention participants were selected in collaboration with the Kpone Katamanso District Expanded Programme on Immunization (EPI) team. HCWs who were direct immunization service providers and working at health facilities within the six intervention communities were selected to participate in the intervention. Although recruitment was to include an equal mix of male and female health care providers, the limited number of available male providers resulted in predominantly female sample. Participating HCWs used their community volunteer networks to recruit QIT members, including both male and female community leaders and caregivers. QIT members then recruited participants for community conversations through house-to-house visits in their communities, and through visits to popular social forums (e.g. football matches, marketplaces).

A subset of participants (15 people per meeting) from the larger community conversations were selected to complete a rapid survey as part of monitoring. Participants for the rapid survey conducted between January and May 2024 were selected using a systematic sampling approach as described below. A final survey was conducted in June 2024. Mothers and fathers of children under the age of two attending monthly community conversation sessions between January and May 2024 were asked to sign an attendance list upon arrival, which served as the sampling frame. The names of mother and father attendees were divided into separate lists and the total number of participants on each list was

divided by the desired sample size. A starting point on each list by sex of the participant was then randomly chosen by drawing from individual slips of folded paper bearing a number ranging from one to the maximum number of participants on each list, and participants were systematically selected at the determined sampling interval until the desired sample size was reached for each group. To be eligible for the survey, participants had to reside in one of the intervention communities, be 18 years or older, be a father or mother of a child under two and be willing and able to give their informed consent. Additionally, participants were not eligible for the survey if they had already completed the survey at an earlier date. If a selected respondent declined to participate or was ineligible for the survey, the systematic selection process continued until the desired sample size was met.

Table 2: Program implementation components, rationale, and implementation support, Kpone Katamanso District, Ghana

Intervention Component	Rationale and Frequency of implementation	Person(s) responsible for implementation	Data and documentation collected during implementation
Healthcare worker training	- October 2023; - One time activity to build capacity of HCWs to implement intervention on engaging with fathers/families	Implementing partner, training facilitators and advisors in collaboration with district health authorities	Workshop evaluation
Quality Improvement Teams (QITs)	Monthly from November 2023 through May 2024 To engage with core group of HCW and community members to understand community needs and make community engagement plans	Led by Healthcare Workers and involved key influential mothers and fathers of the community	- QIT Agendas - QIT meeting notes - QIT Scorecards
Community conversations	Monthly from November 2023 through May 2024; adaptations started in February 2024 To engage with mothers and fathers at the community-level to discuss family engagement in child immunization Coupled with vaccination outreach	Led by Healthcare Workers	- Community Conversation registration data - Community conversation reports - Pulse rapid survey data (Jan-June 2024)
Implementation Support Mechanism (e.g., implementation strategies)			
Supportive supervision visits	3X over 6-month intervention period Coordinated with district GHS/Epi to support HCW providing the intervention	Kpone Katamanso District staff; Jon Snow Inc. (JSI) staff	Supportive supervision checklists
Quarterly review meetings	2X over 6-month period Coordinated with district GHS/EPI to understand overall progress	Kpone Katamanso District staff; JSI staff	Agenda and meeting notes

Data collection and analysis:

Monitoring data collected during implementation included meeting agendas, meeting notes and related action items. This helped to ensure continuous information that helped build understanding of implementation challenges and improve fidelity in real time.

The rapid pulse surveys were administered to mothers and fathers who attended community conversations, to assess key caregiver decision-making and social support for vaccination. Survey data were collected using KoboCollect mobile application and descriptively analyzed to generate frequencies and proportions of responses.

Phase 3: Summative Evaluation:

Design:

The summative evaluation consisted primarily of qualitative inquiry with mothers, fathers, HCWs, and district health officials; this was complemented by the rapid survey of caregivers. This phase focused on two primary objectives:

1. to understand key implementation outcomes of the intervention, specifically fidelity, feasibility, acceptability, and appropriateness
 - Fidelity was defined as the degree to which the intervention was implemented as it was prescribed in the original protocol or as it was intended by the program developer
 - Feasibility was defined as the extent to which innovation can be successfully used or carried out within a given agency or setting (25).
 - Acceptability was defined as the perception among implementation stakeholders (beneficiaries and implementers) that the innovation is satisfactory, based on anticipated or experiential cognitive and emotional responses to the intervention. This may include constructs of self-efficacy, perceived effectiveness, opportunity costs, understanding of the intervention and how it works, how it fits with the value system, the burden to engage with the intervention, and affective attitude regarding the intervention (26).
 - Appropriateness was defined as the perceived fit, relevance, or compatibility of the intervention for the given practice setting, provider, or beneficiary; and/or perceived fit of the intervention to address a particular issue or problem (27).
2. to examine perceived changes in norms and practices around fathers’ engagement in decision-making and social support for vaccination.

Sampling:

The sample for the qualitative evaluation is reported in Table 3 below.

Table 3. Summary of summative evaluation data collection, Kpone Katamanso District, Ghana, June 2024

Strategy	Respondent type	# types	Total #
FGD	Fathers of children under 2 years who have been exposed to intervention strategies	4 (4-6 per group)	7 groups
	Mothers of children under 2 years who have been exposed to intervention strategies	3 (6-8 per group)	
KII	Health care workers who provide routine immunization services at Community-Based Health Planning & Services (CHPS) facilities and serve as QIT leads	3	14
	Health officials at sub-district level who supervise routine immunization services	3	
	Health officials at district level who supervise routine immunization services	2	
	Male QIT members	3	
	Female QIT members	3	
IDI	Mothers of children under 2 years who have been exposed to intervention strategies	6	9
	Fathers of children under 2 years who have been exposed to intervention strategies	3	
Endline Rapid Survey	Endline survey of fathers and mothers who attended community conversations from Jan-May 2024	-	160

FGD: Focus group discussions; KII: Key information interviews; IDI: In-depth interview; CHPS: Community-based health planning and services; QIT: Quality Improvement Teams

Data collection:

We conducted key informant interviews, in-depth interviews, and focus group discussions in June 2024 after intervention implementation was complete. We purposively selected mothers and fathers of children exposed to the intervention to understand their thoughts and feelings about the intervention and how that potentially affected norms and practices. QIT members and HCWs who delivered this intervention were selected to understand the implementation aspects and the perceived change they observed in the community. Health officials at three levels of the health system (district EPI, sub-district health center, and community health center), who were aware of this intervention were selected to understand how this intervention was received by the health authorities. All interviews and discussions were conducted in either English, Ga, or Twi and lasted between 30-60 minutes. The audio recordings from these interviews and discussions were transcribed and translated to English. Transcripts and

recordings were stored in an online password-protected folder with each file following a consistent and systematic naming convention.

Respondents who were surveyed during the monthly community conversations between January and April 2024 were contacted via telephone for a post-intervention follow-up survey in June 2024. Respondents who were initially surveyed in May 2024 were omitted from the follow-up sample to ensure that at least a month had passed between the initial and follow-up surveys.

Data Analysis:

We used a thematic analysis approach for analyzing the data. First, the study team (NR, SK, MR, TC, LO, RC, EH, EY) read and reviewed all transcripts, which were coded in Atlas.ti. Two analysts coded a quarter of the transcripts (n=7) to ensure inter-coder reliability. Second, coding was done in an iterative manner to comprehensively capture all topics that emerged from the discussions after which a final codebook was developed to code all transcripts. Lastly, themes were developed through an iterative process of identifying and organizing codes based on their interrelationship. Excerpts were de-identified. Qualitative findings were triangulated with rapid survey results regarding perceived effect of the intervention, whereas acceptability and feasibility results came exclusively from qualitative findings.

Quantitative findings from the rapid survey during community conversations was descriptively analyzed to generate frequencies and proportions of responses, and were disaggregated by sex of the respondent, where appropriate.

Results

We present results from the three study phases, with an emphasis on findings from the predominantly qualitative summative evaluation.

Phase 1: Formative Assessment

Phase 1 formative assessment results build on qualitative findings previously published (24), which showed that there was varied childhood immunization decision-making power among caregivers in a household. Childcare and related health care seeking behaviors, including immunization, were primarily seen as a mother's responsibilities. Fathers' involvement in childhood immunization was low and mainly rooted in social norms that frame caregiving as a woman's role, as well as time constraints that limited fathers' ability to take child for vaccinations. Household survey results related to immunization decision-making and practices are presented in Table 4 and complement the qualitative findings. A majority of caregivers (79%) reported that it was very important for fathers to receive information about childhood immunizations.

Table 4

Household dynamics as reported in caregiver household survey, Kpone Katamanso District, Ghana, 2023,
N = 481

Survey Question		Total (N = 481) %	Female caregiver (N = 408) %	Male caregiver (N = 73) %
Who decides on major household purchases?	Spouse/partner	33.7	35.3	24.7
	Jointly with spouse	29.1	30.4	21.9
	Myself	27.4	23.5	49.3
	Other ¹	9.8	10.8	4.1
Who usually makes the decisions about immunizing children?	Myself	62.0	60.1	72.6
	Jointly by spouse/partner	26.0	28.2	13.7
	Spouse/partner	8.5	8.3	9.6
	Other ²	3.4	3.4	4.1
Need permission from other family members to take your child(ren) to get vaccinated?	Yes	11.0	7.8	26.0
	No	89.0	92.2	74.0
Who is responsible for childcare?	Myself	58.0	55.9	70.0
	Jointly by spouse/partner	28.5	30.2	19.2
	Spouse/partner	8.0	8.9	4.1
	Other ³	5.6	5.0	6.7
Who is responsible for household chores?	Myself	83.4	82.8	86.3
	Jointly by spouse/partner	11.0	11.5	8.2
	Spouse/partner	1.0	1.0	1.4
	Other ⁴	4.6	4.6	4.1
Amount of household chores workload	Just about right	61.5	63.2	52.1
	Light	8.7	9.1	6.8
	Too much	29.7	27.7	41.1

Survey Question		Total (N = 481) %	Female caregiver (N = 408) %	Male caregiver (N = 73) %
How important do you think it is for fathers of children to receive information about childhood immunization?	Not at all important	3.7	2.5	11.0
	A little important	8.7	6.6	20.6
	Somewhat important	8.9	9.1	8.2
	Very important	78.6	81.9	60.3

Phase 2: Implementation

Phase 2 focused on implementation fidelity and related monitoring to assess whether the intervention was implemented as planned. The results highlight intervention challenges identified in the routine monitoring data as described above and the adaptations and related results (Table 5). We used the Framework for Reporting Adaptations and Modifications to Evidence-based interventions (FRAME), to guide adaptation throughout (28). Adaptations were documented according to FRAME domains, including the nature of the modification, rationale, timing, and actors involved.

Table 5

Intervention challenges, adaptations made, and resulting changes in community conversations, Kpone Katamanso, Ghana (2024)

Intervention challenge	Adaptation	Did the adaptation result in change
Reaching new community members. Declining attendance.	Varied locations for community conversations	Trend towards improved attendance by new and existing community members
Low participation of male caregivers in the community	Changed community conversation days to weekends rather than weekdays	Mixed results in attendance of male and female caregivers at community conversations.
Health workers not speaking the local languages at outreach points	QIT members led community conversations to reduce language barriers	Addressing language barriers facilitated lively discussions
Intervention focused on immunization only; did not address holistic needs of the community or Ghana Health Services integration policy	Health workers asked about additional health needs and provided services or referrals during clinic visits	Study design did not allow assessment of changes in clinic attendance attributable to the intervention
Differing male and female views on responsibilities, caregiving, and needed resources	Conducted separate community conversation sections by caregiver sex	Reduction in argumentative nature of dialogue between male and female caregivers
Limited opportunity for peer-to-peer engagement among male caregivers	Conducted separate community conversation sections by caregiver sex	Provision of safe space for dialogue
QIT: Quality Improvement Teams		

Phase 3: Summative Evaluation

Phase 3 summative evaluation results focus on the intervention implementation outcomes and reported changes in caregiver practices and norms related to childhood immunization, including how related caregiver-related barriers were addressed by the intervention. Overall, respondents reported that in their opinion, the intervention was feasible, acceptable, and appropriate for their community and context, with some perceived effect on immunization barriers experienced differently by male and female caregivers.

Rapid Survey Results (Endline)

Endline rapid survey results highlighted several aspects of social support receipt. By the time of the last community meeting, most participants reported receiving social support related to child vaccination. The most commonly reported forms of support were material assistance, reviewing the child's vaccine card, and appointment reminders (Table 6). Among women, the most prevalent type of support was receiving funds for travel assistance, provided almost entirely by their spouse. Among men, it was receiving emotional support, mostly from their spouse. Although not all respondents reported the source of their

social support, among those who did, men most frequently reported receiving support from their spouse. However, for childcare and information related to child vaccination, non-spousal network members also provided this support.

Among women respondents who indicated a source of social support, spouses were the most commonly reported source of support for travel funds, reviewing the vaccination card, and appointment reminders. Other members of their social network provided emotional support, information, and childcare. Provision and receipt of social support within the family related to child vaccination varied by sex, with most community meeting participants reporting some form of social support by the end of the intervention duration.

Table 6

Reported Social support for immunization among community conversation attendees who participated in rapid survey in the last month of activity implementation, Ghana, June 2024 (N = 160)

	Overall (n = 160)		Female (n = 122)		Male (n = 38)	
	Received social support	Source	Received social support	Source	Received social support	Source
Material support <i>Someone provides funds to support travel to get vaccinated (if applicable)</i>	75%	Spouse: 90 (99%) Other: 1 (1%)	79%	Spouse: 76 (99%) Other: 1 (1%)	56%	Spouse: 14 (100%) Other: 0 (0%)
Reviews card <i>Someone who reviews the child's vaccine card</i>	74%	Spouse: 109 (92%) Other: 10 (8%)	73%	Spouse: 80 (90%) Other: 9 (10%)	79%	Spouse: 29 (97%) Other: 1 (3%)
Reminders <i>Someone who shares reminders for vaccination appointments</i>	69%	Spouse: 102 (93%) Other: 8 (7%)	64%	Spouse: 70 (90%) Other: 8 (10%)	84%	Spouse: 32 (100%) Other: 0 (0%)
Emotional support <i>Someone to confide in or talk to about problems with getting child(ren) vaccinated</i>	64%	Spouse: 68 (67%) Other: 34 (33%)	57%	Spouse: 41 (59%) Other: 29 (41%)	86%	Spouse: 27 (84%) Other: 5 (16%)
Informational support <i>A trusted individual who can provide advice or suggestions on getting child(ren) vaccinated</i>	59%	Spouse: 54 (57%) Other: 41 (43%)	55%	Spouse: 32 (48%) Other: 35 (52%)	74%	Spouse: 22 (79%) Other: 6 (21%)
Childcare support <i>Someone provides childcare for child(ren) who are not taken for</i>	58%	Spouse: 25 (56%) Other: 20 (44%)	57%	Spouse: 18 (51%) Other: 17 (49%)	62%	Spouse: 7 (70%) Other: 3 (30%)

	Overall (n = 160)		Female (n = 122)		Male (n = 38)	
	Received social support	Source	Received social support	Source	Received social support	Source
<i>vaccination (if applicable)</i>						

Note: Rapid survey data reported here for last month of implementation—trends not reported as monthly samples included both new participants and those with repeated attendance. Response options for social support were not mutually exclusive (e.g., select all question types). Not all respondents who indicated receipt of social support also indicated the source of that support.

Monthly rapid survey results did not show discernible trends in receipt of social support (Supplementary table 2). More women responded to the survey than men, where response was dependent on male attendance during community conversations. Generally, female caregivers reported receiving more social support than men, likely due to being the primary caregivers of children.

Feasibility

Overall, the intervention was successfully carried out within the context of peri-urban Ghana. Respondents noted that community engagement integrated into the intervention components helped to implement the intervention successfully. For example, one HCW noted:

“Committees were formed with community members, headed by the assembly man [local official representing an electoral area]. So, what happened was that we made them understand that we cannot do the work all by ourselves. So, it got to a time when we go, we did the work with them. So, the team members understood the work, so they started educating their community members: their sisters, wives, and friends. And we realized that they helped us more than we, the health workers. This was because they were in the community, and they were committee members. So, they heard them better. At the end of the day, we were improving. And we saw that not only the nurses could do the work”. (KII, Male Healthcare Worker, Shanghai)

Similarly, caregivers appreciated engaging with known community members to ask questions or have discussions related to the intervention.

“Because these community members know them, it helped [the community members] to feel free to come to ask questions or even come with these QIT members to the durbar [community meetings] so that we can talk about [vaccination] to them”. (FGD, Female caregiver, Switzerland)

Feasibility of the intervention was, in some instances, affected due to logistical reasons such as distance or timeliness of when the meeting could start. Both HCWs and caregivers noted issues.

"What didn't go well is that the crowd don't come early, so we don't start early and so we don't close early". (KII, Male QIT member, Appolonia)

"There were not enough chairs for the people who came making many people to stand in the sun for long hours". (FGD, Male caregiver, Shanghai)

Acceptability

HCWs reported that the interpersonal communication training equipped them with new and needed skills, enabling them to engage with the community. They also noted that through the community conversations and other opportunities, the HCWs had time and a place to have discussions with male caregivers.

"So, from the training, I really equipped myself with my counseling skills. Counseling couples or male partners shouldn't be the same as counseling others, it should be exceptional, and some priority given to them. So, it really helped me equip myself in my counseling skills." (KII, Female HCW, Shanghai)

Female and male caregivers discussed that the intervention was acceptable, as they perceived its effect on improving their understanding of childhood immunization.

"...The things about the child and the husband. For instance, my husband goes to work on Sundays too and he doesn't come home early. He doesn't have the time to go through the CWC book. And so, we were also taught how to read the book, in a case where your husband doesn't have the time to help you. So that you don't miss your appointment dates. So, they really explained everything to our satisfaction." (FGD, Female caregiver, Appolonia)

Participants noted it took fathers time to fully accept this intervention but that eventually fathers realized the importance of supporting immunization and gaining more knowledge for better child health.

"At first, they [fathers] weren't feeling comfortable but now from the education we have given them, we have noticed that [fathers] are eager to bring their children to come for the injection ... most of these men complain that their children fall sick but because of the education we give them, they ensure that their children go for weighing or go for injection". (KII, Male QIT Member, Switzerland)

Appropriateness

All respondent types reported that the intervention was appropriate to address issues related to caregiver barriers, for both female and male caregivers. The intervention was seen as a good fit because of its accessibility by the caregivers.

"I think it was very nice because how it was arranged, the meeting was brought closer to the homes of the people. And it wasn't held at one place because they are all not at one place. So sometimes, we are able to go to this church and tell them that we have a durbar [community meeting] at this place and we want to meet all men and women". (IDI, Male caregiver, Appolonia)

Intervention activities and follow-up were integrated within existing health system mechanisms of supportive supervision and quarterly review meetings. This helped with guidance to HCW for the

intervention and encouraged a higher level of visibility of intervention activities among the district level officials.

“We discussed a lot [during supportive supervision]. My supervisor was actually guiding me on how to be technical in my counseling and then how to know what to say and what not to say when it comes to male partners. And how to strategize to get the males more involved in my activities. And then he was also always guiding me on how to engage with the women to have patience, so we can attend to the men first when they come to the Child Welfare Clinic. (KII, Female HCW, Shanghai)

“Yes, I attended the first quarter review meeting. It was on data review on immunization coverage and how the family-focused intervention was going and the challenges encountered so far”. (KII, District health officer, Shanghai)

Intervention effect

Caregivers and HCWs alike reported on perceived intervention effects on barriers experienced by male and female caregivers:

1. Perceived increase in fathers' knowledge on vaccination

Male and female caregivers reported an increase in fathers' knowledge on vaccination, resulting from the community conversation activities. Learning about immunization and the child health card also helped fathers understand the vaccination schedule and improved awareness and support to mothers with reminders for when to take their child for vaccination.

“It is about how we the men are getting involved in the meeting. What the nurses are actually explaining to us too, we learn, pay attention and make the time convenient for the lady to go to the vaccination center. About the meeting, it is good for us” (FGD, Male caregiver, Switzerland)

“My husband never cared about her weighing. He doesn't even know anything about the book, whether the book has been marked with a red pen or blue pen. He doesn't know anything. But during this one time through the durbar, he has come to know. Sometimes he opens the book and review...The last time we were supposed to come for weighing, which was Monday, he was then at work. I was home when I heard my phone [ringing], 'I am reminding today, you will go for weighing.' If [he] hadn't called, I [would] have forgotten to send her. “(FGD, Female caregiver, Switzerland)

2. Perceived increase in fathers' social support for vaccination

Caregivers reported that information from community conversations with HCWs have helped fathers become more involved in child immunization actions. Fathers recognized the importance of being equally involved as mothers in child health care and supported activities such as taking the child for vaccinations, reminding them about upcoming appointments, and helping with household and childcare activities when mothers were constrained for time. These discussions highlighted a change in emotional and informational support fathers provided to the mothers to support childhood immunization. One father explained:

“At first, we thought it was the responsibility of the woman to take the child to be vaccinated but the change now is that we share in household chores to relieve the woman of some of these responsibilities. If the child is crying and the woman is tired, the father can handle the child. Secondly, we used to put hot water or ointment on the injection area, we have been made to understand that we can use ice. If the woman doesn’t know this, we can teach her.” (FGD, Male caregiver, Appolonia)

HCWs also concurred with increased fathers’ support at home

“Before the intervention, some fathers were so scared holding their kids to sit for immunization but after the introduction of the intervention, things have changed. They now understand things better. Initially, a father will tell a mother not to come for immunization because the child will run temperature after vaccination. After engaging and encouraging the fathers, they have gotten a better understanding of immunization.” (KII, Female HCW, Shanghai)

Another father highlighted the change in fathers taking their children for immunization at the clinic.

“At first when the women see a man bringing his child for immunization or a man coming with his wife, they laugh at him and that deterred other men from bringing their children for immunization but during the durbars the health workers were able to address this issue and now everyone sees it as a normal thing to do”. (FGD, Male caregiver, Appolonia)

Fathers also recognized the need to provide financial support for traveling to the clinic, which was identified as a barrier in the formative assessment.

“For now, it is going well, and the male partners are becoming aware that when the female caretakers are going for the immunization it is required that they give them money for transport and take care of the other kids, if there are any, so that the wife can take the child for the immunization. Sometimes when they have the time, they take the children to the immunization center by themselves.” (FGD, Female caregiver, Appolonia)

HCWs and health officials reported seeing an increase in fathers bringing their children for vaccination at the clinics.

“We’ve seen an increase in their attendance because previously, you will only find one man during vaccination session. But now even if it’s not the man who brought the child for vaccination, you will see that they come together”. (KII, health official, sub-district)

“First they didn’t know, now, they know, they don’t just know but they know it’s also their responsibility and they have to get involved, so now, it’s the caring of the children that has gone up.” (KII, Male HCW, Appolonia)

3. Improvement in healthcare and caregiver interaction on childhood immunization

HCWs acknowledged better interpersonal communication and greater knowledge sharing with fathers as a result of the intervention, especially in discussions related to childhood immunization. One HCW explained:

“They fathers, most of the time we educate them...just like I was saying, the communication skills, the vaccine they were taking, what to expect. And in case they have any misconceptions or myths, we address those issues.” (KII, Female HCW, Appolonia)

In the Ghanaian context, fathers seeking health services may be given priority, and participants’ perspectives on this practice came out in the discussions:

“I have also noticed that, when, we take the children for immunization, the health workers are very quick to notice our presence and they attend to us first before attending to the other women who come without their partners.” (FGD, Male caregiver, Shanghai)

4. Acceptance of increased fathers’ involvement was gradual at times due to strong social norms

While respondents reported a general trend in improved engagement of fathers in childhood immunization activities, several noted that messaging and conversations took time to be accepted by fathers, mainly due to existing social norms. As one respondent noted:

“There are a lot of challenges because most men are of the view that women should solely be responsible for house chores so you have to spend a lot of time explaining to them before they will understand.” (KII, Male QIT, Switzerland)

“For that he won’t go, weighing he won’t go for my eldest child. We were going to Ashiaman [location of health facility] if you tell him today is weighing, he will give you the transport to go but to send her himself he won’t. Even just here he won’t go; he will tell you is women’s duty because is only women who go there so he won’t go.” (FGD, Female caregiver, Switzerland)

Discussion

Our findings demonstrate how community engagement in vaccine program design and implementation — specifically approaches that engage both male and female caregivers — may help address persistent sex-related barriers to vaccine demand, potentially improving uptake. The intervention included components of interpersonal communication training of health workers to strengthen their capacity to engage fathers; community meetings to promote family engagement in vaccination and address sex-related barriers to immunization; and community-based QITs to strengthen planning, implementation, and monitoring of the community meetings. Overall, respondents reported that the intervention was acceptable. The community perceived the intervention improved their knowledge of childhood immunization, the HCWs perceived their own development of new and needed skills to communicate to caregivers, and the implementers (e.g., health workers, QIT members) reported the intervention had some perceived effect on caregiver-related barriers. Among fathers, initial lower levels of acceptability—consistent with challenges reported for other male engagement strategies (38)—improved over time. The intervention was also considered appropriate for this community and context, in that it was integrated within the existing health system and addressed sex-related barriers to uptake. Our findings are reinforced by prior evidence suggesting that community dialogue approaches can encourage shared

decision making between partners and challenge norms that child health is the sole responsibility of the mother (39).

The intervention was feasible, in that it could be implemented within this context with reported perceived changes on male engagement in immunization. Our findings align with a limited body of mixed- methods research of male engagement strategies to improve child health outcomes in low-resource settings, including a couple's communication and parenting intervention involving fathers in Kenya (35), which showed significant positive associations between child development and men's engagement (e.g., a father's support to mother and shared decision-making). Our rigorous evaluation is novel in its quantitative focus on measuring sex-related barriers (e.g., social support source and type), which has been highlighted in recent reviews of the immunization programming literature (36–38). When immunization studies include measurement of paternal behaviors, indicators often focus narrowly on whether men/fathers brought the child for vaccination. In contrast, our quantitative and qualitative findings highlight the diversity of social support types that men can provide to encourage their child's vaccination, many of which occur in the household or community settings and may not be observable (but can be recalled) at the health facility (e.g., providing funds prior to transport to the vaccination site). Notably our work is novel in its inclusion of fathers' emotional support to mothers, an aspect identified in child development studies as an important mediator of fathers' influence on child development outcomes (35) but is not commonly examined in the immunization literature.

Our Phase 1 findings highlight sex-specific barriers to childhood immunization that have been observed in similar settings (8), including that the decision for immunization was generally a joint decision between both parents, but that women were responsible for bringing the child for immunization. Fathers' involvement in childhood immunization was low and was mainly rooted in social norms around caregiving being a woman's responsibility and time constraints for fathers to take the child for vaccinations. There was potential to increase fathers' engagement in immunization by improving their immunization knowledge and awareness. In various settings, it has been reported that fathers sometimes opposed immunization and prevented their wives from bringing the child for immunization via withholding necessary social and financial support (12, 29–31). In a recent DHS secondary analysis, Azubuike and Ardelt (2025) found that characteristics of fathers in Nigeria, including higher educational attainment and joint-decision making with mothers, are associated with higher childhood vaccination uptake (32). We designed our intervention on increasing fathers' involvement in childhood immunization by increasing their knowledge, awareness, and support for vaccination. Baseline findings suggested fathers needed vaccine knowledge and mothers, social support to seek vaccination. During the workshop, stakeholders reported acceptability of the proposed intervention components. We implemented on-going intervention adaptations: having sex-specific groups for community meetings, holding community meetings on weekends to promote male engagement, and expanding outreach sites to engage new participants. Summative evaluation findings suggest perceived improvements in joint decision-making between caregivers and social support among fathers for attending the vaccination visit, sharing reminders, and providing money for transport to vaccination sites.

Rapid survey data provided crucial insights on social support related to child vaccination. Among women respondents who indicated a source of social support, the most common source reported was their spouse for providing travel funds and reminders, as well as reviewing the immunization card. Other members of their social networks provided emotional support, information, and childcare. These findings further reinforce what emerged from the qualitative data. Provision and receipt of social support within the family related to child vaccination varied by sex, with most community meeting participants reporting some form of social support by the end of the intervention period. This suggests the intervention may have been responsive to the community need reported in the baseline household survey that caregivers, particularly women, needed additional social support with getting their child vaccinated. These findings can inform future intervention design for social support to promote demand for childhood vaccination.

Strengths and limitations

There are a few notable limitations to our study. During Phase 1, our baseline survey utilized a random but not representative sample; however, as the focus was identification of barriers to inform intervention and not generalization of prevalence of these barriers to a larger population, this seems appropriate. During Phase 2, we conducted a rapid and non-representative survey during monitoring, as our time and resource limitations would allow. This may lead to selection bias, but by integrating these rapid survey results with our qualitative data findings, we were able to examine the likelihood of these potential biases. There may be potential for selection bias based self-selection of caregivers to participate in the intervention activities. The intervention was conducted over a relatively short duration: we know that by their nature, social norms need an extended period to evolve. We present our findings as perceived effect, to emphasize that this evaluation was subjective and highlight that future research should quantitatively assess impact over a longer period of time. Our study design does not allow for causal inference—we have no comparison group and no random assignment to intervention— so we refer to ‘perceived effect’ rather than ‘effectiveness’.

Indeed, there are various study strengths, also. Our rigorous mixed methods design allowed for triangulation to increase depth and confidence in our findings. Our participatory approach and stakeholder engagement likely increased the trustworthiness of the qualitative findings, as well as the appropriateness of our intervention approach. We also conducted an audit trail and inter-coder reliability exercise to ensure credibility of our qualitative data analysis. This work benefitted from engagement and support from the Ghana Ministry of Health, which may increase receptivity of the findings and deployment of similar strategies in immunization programming.

Our study has several implications for future public health research, practice, and policy. Our findings showcase the benefits of collecting socio-behavioral data and underscore opportunities for development of better measures of sex-specific barriers operating within household dynamics and at the health system level. Consistent with recent reviews (36–37), our work highlights that better understanding sex-related barriers to immunization experienced by caregivers requires more nuanced measures on

behaviors within the household dynamics, including how fathers' provision of social support may differ from mothers in part due to different time use patterns (40). Current approaches often focus on behaviors solely observed in the health facility, which narrowly operationalize men's engagement as whether the father brings the child for vaccination. Instead, health workers could ask about provision of social support during clinic interactions, including vaccination, as well as antenatal visits and other visits across the lifecourse. Although this focus in the vaccination literature on the role of men in decision making and seeking vaccination for their child is relatively recent, there exist many successful strategies for engaging men in other health seeking behaviors that benefit children and the household (e.g., sexual and reproductive health, maternal health, and interpersonal violence) (42).

Future research should include a longer period of intervention and observation, allowing for evaluation of longer-term impact. Our work aligns with the recent calls for more implementation research (41) and a research agenda expressed by immunization managers across Africa to prioritize stakeholder-engaged implementation research (33). We further expand on this agenda by showing the benefit of focusing on the different health promotion needs of male and female caregivers, an area that remains notably missing within this and other agendas and policies. This can also help improve measurement of sex-specific barriers to support more effective tracking of progress in immunization programs. Efforts to support male engagement in immunization have been mainly focused on observing fathers bringing the child for vaccination, including policies that promote male attendance in immunization clinics. For such policies that allow fathers to move to the front of the queue in clinical waiting areas, we were unable to identify evidence that this contributes to addressing the underlying barriers or increasing immunization uptake in this or similar settings. Instead, our findings suggest that efforts should focus on joint parenting and reinforcing provision of social support by fathers. Childhood immunization coverage forecasts to 2030, the target date for Immunization Agenda (IA 2030) and the United Nations Sustainable Development Goals (SDGs), suggest that only some of the recommended childhood vaccines would reach the target of 90% global coverage (under optimistic conditions) (15). Therefore, more focus is needed on addressing persistent barriers to implementation of evidence-based strategies to support immunization programming, particularly those barriers differently experienced by male and female caregivers.

Conclusions

This community-engaged intervention and evaluation, based in peri-urban Ghana, provides important insights to inform progress towards achieving routine immunization targets. Our implementation research suggests that training HCWs to engage fathers and community members in discussion on vaccination may be a feasible and acceptable intervention fit for this context. Future research should examine its transferability to comparable contexts to address persistent barriers to routine immunization experienced differently by male and female caregivers.

Abbreviations

CDC	United States Centers for Disease Control and Prevention
CHPS	Community Based Health Planning and Services
DPT	Diphtheria Pertussis and Tetanus Vaccine
EA	Enumeration area
EPI	Expanded Programme on Immunization
FGD	Focus Group Discussion
GHS	Ghana Health Service
HCD	Human Centered Design
HCW	Health Care Worker
HH	Household
IDI	In Depth Interview
IPC	Inter-Personal Communication
IRB	Institutional Review Board
KAP	Knowledge, Attitude and Practice
KII	Key Informants Interview
MOH	Ministry of Health
QIT	Quality Improvement Team
REDCAP	Research Electronic Data Capture
USA	United States of America
WHO	World Health Organization

Declarations

Ethics approval and consent to participate: Prior to the start of data collection, ethical approval was received from the Ghana Health Service Ethical Review committee, who review all relevant health study protocols in Ghana to ensure compliance with prevailing ethical standards (e.g., respect for persons, beneficence, justice, informed consent). This work was conducted in accordance with the Declaration of Helsinki. The U.S. Centers for Disease Control and Prevention's Global Health Center's Human Subject Office classified this assessment as a public health activity. It was deemed Program Evaluation under the Common Rule, 45 CFR 46.102(l). All study participants provided written informed consent prior to participation.

Consent for publication: Not applicable

Availability of data and materials: The datasets generated and/or analyzed during the current study are not publicly available due protection of participant's identity but are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

Funding: This work was supported by the Task Force for Global Health through cooperative agreement with Centers for Disease Control and Prevention (5 NU2RGH001916-02-00, 6 NU2RGH001916-02-17). CDC colleagues SK and NR contributed to the conceptualization, design, data collection, analysis, decision to publish, or preparation of the manuscript.

Authors' contributions: All authors have approved the submitted version of this manuscript and have agreed both to be personally accountable for the author's own contributions and to ensure that questions related to the accuracy or integrity of any part of the work. The respective author contributions include:

- Nessa Ryan: Contributed to the conception, design of the work, data acquisition, data analysis, data interpretation, drafted the manuscript, and substantively revised the manuscript.
- Shibani Kulkarni: Contributed to the conception, design of the work, data acquisition, data analysis, data interpretation, drafted the manuscript, and substantively revised the manuscript.
- Maya Raj: Contributed to data analysis, data interpretation, and substantively revised the manuscript.
- TaMiko Condoll: Contributed to data analysis, data interpretation, and substantively revised the manuscript.
- Eunice Baiden Laryea: Contributed to data interpretation and substantively revised the manuscript.
- Lisa Oot: Contributed to the conception, design of the work, data acquisition, data analysis, data interpretation, and substantively revised the manuscript.
- Rebecca Chase: Contributed to data acquisition, data analysis, data interpretation, and substantively revised the manuscript.
- Elena Herrera: Contributed to data acquisition, data analysis, data interpretation, and substantively revised the manuscript.
- Sofo Ali-Akpajiak: Contributed to data acquisition, data interpretation, and substantively revised the manuscript.
- Emmanuel Nuworzah: Contributed to data acquisition, data interpretation, and substantively revised the manuscript.
- Afari Beatrice Adwoa: Contributed to data acquisition, data interpretation, and substantively revised the manuscript.

- Eliasu Yakubu: Contributed to data acquisition, data analysis, data interpretation, and substantively revised the manuscript.
- Issahaku Budali: Contributed to data acquisition, data interpretation, and substantively revised the manuscript.
- Paul Konka: Contributed to design of the work, data acquisition, data analysis, and data interpretation.

Acknowledgements: The authors would like to express their sincere gratitude to the late Mr. Paul Konka, for his invaluable technical contributions in leading formative and summative data analysis and intervention implementation. Although he is no longer with us, his influence continues to resonate in this work. We would also like to thank all participants in this work.

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Figures

Mixed methods design: Evaluation of a family focused intervention to improve childhood immunization in peri-urban Ghana

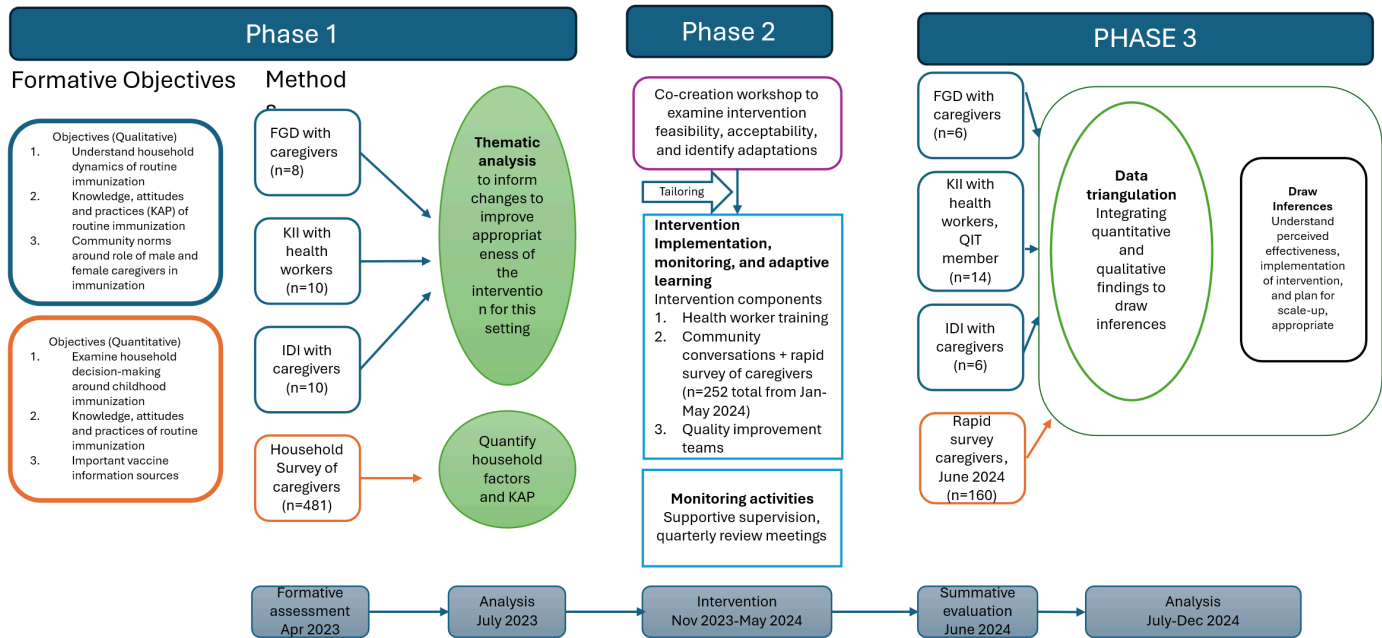


Figure 1

Mixed methods design: Evaluation of a family-focused intervention to improve childhood immunization in peri-urban Ghana

Note: Blue and orange colors are primarily to indicate alignment of the objectives and related methods

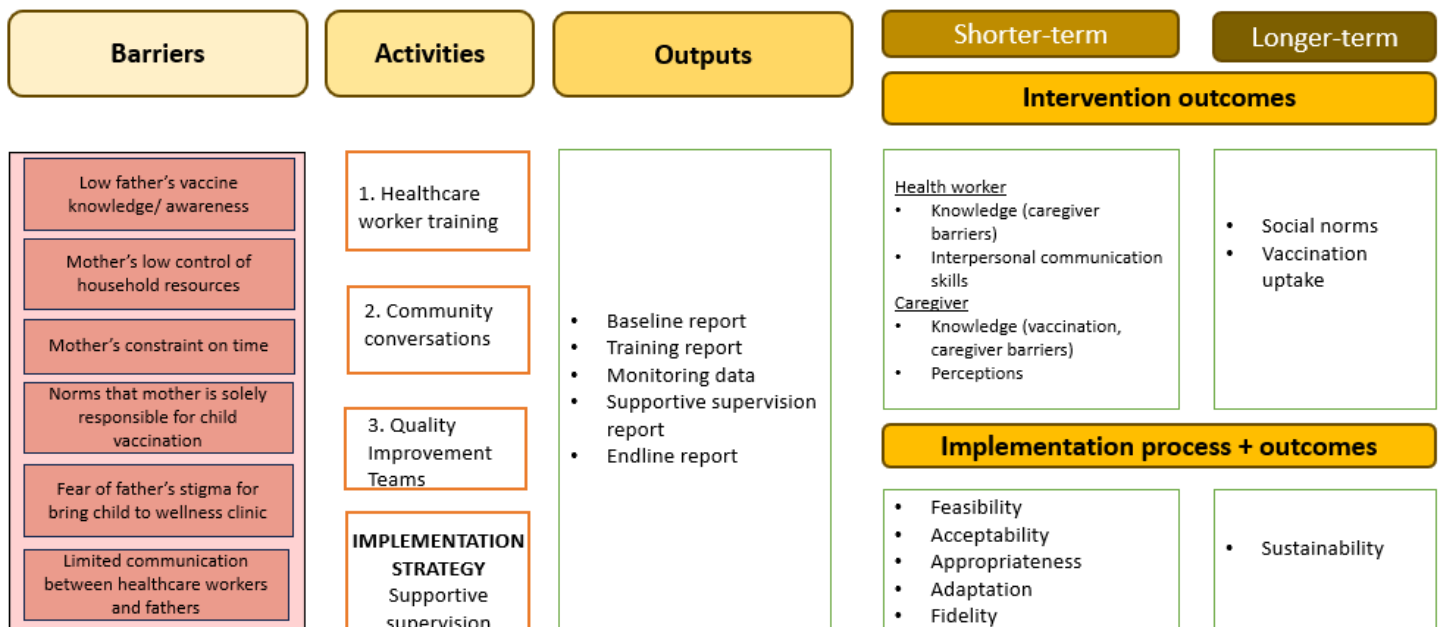


Figure 2

Logic model for the proposed intervention, informed by barriers identified during formative assessment

Note: The longer-term outcomes are indicated to show our theory of change; however, our project duration, resources, and methods did not allow measuring longer-term impact.

Supplementary Files

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

- [Supplementaryfile2rapidsurvey.docx](#)
- [Supplementaryfile1HouseholdSurveyTool.docx](#)
- [Supplementarytables.docx](#)