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Acceptability, Engagement, and Implementation of Mobile-Based Sexual and Reproductive Health Education among Adolescents and Youth in Ethiopia: A Qualitative Process Evaluation

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Abstract

Background

Adolescents and youth in Ethiopia face persistent barriers to confidential, accurate, and youth-friendly sexual and reproductive health information, particularly in underserved settings. Low-bandwidth mobile learning may extend access, but evidence remains limited on how young people experience such interventions and how social, gender, and infrastructural conditions shape engagement. This study examined the acceptability, engagement, and implementation of the Leap Adolescent and Youth Health training, including engagement mechanisms, barriers, facilitators, and perceived outcomes.

Methods

We conducted a qualitative process evaluation in implementation areas in Oromia, Amhara, and South Ethiopia. Qualitative data collection and secondary program-data mapping occurred

between December 2025 and April 2026. Data comprised 14 focus group discussions with 121 participants, 13 in-depth interviews, and 8 key informant interviews, involving 142 adolescents, youth, peer leaders, school representatives, supervisors, and implementation actors. Transcripts underwent hybrid inductive-deductive codebook thematic analysis. Aggregate program records were used descriptively to contextualize registration, initiation, and completion.

Results

Participants valued Leap's low-bandwidth interactive voice response and short-message delivery, local-language storytelling, flexibility, privacy, and relevance to their sexual and reproductive health concerns. Engagement was constrained by unstable networks, electricity interruptions, shared or restricted phone access, changing phone ownership, and expectations of financial incentives. These barriers were particularly consequential for girls because device availability did not necessarily provide autonomous or confidential access. Peer reminders, troubleshooting, group discussions, and friendly competition supported initiation and continued engagement. Participants reported greater confidence in discussing sexual and reproductive health and seeking youth-friendly information and services, although these were perceived rather than independently measured outcomes. During the reporting period, 11,299 learners registered, 5,300 (46.9%) initiated training, and 3,508 completed all sessions, representing 66.2% of initiators and 31.0% of registered learners.

Conclusions

Low-bandwidth mobile learning can provide an acceptable and contextually relevant channel for sexual and reproductive health education in underserved settings, but technological simplicity does not ensure equitable participation. Scale-up should combine accessible mobile delivery with

gender-responsive strategies for private and autonomous phone use, recovery mechanisms following connectivity interruptions, structured peer support, and stage-specific monitoring from registration through completion.

Keywords: adolescent health; sexual and reproductive health; digital health; mobile learning; implementation science; gender equity; Leap

Plain English summary

Young people need private, trustworthy, and easy-to-access information about sexual and reproductive health, but internet access and smartphone ownership are not universal in Ethiopia. This study explored how adolescents and youth experienced Leap, a mobile learning program that delivers health education through basic or smart phones using voice calls and text messages. Across three Ethiopian regions, participants valued being able to learn in local languages, at convenient times, and through stories that reflected familiar situations. Poor mobile networks, electricity interruptions, shared phones, and restrictions on girls' phone use made participation harder. Peer leaders helped learners by giving reminders, solving technical problems, discussing lessons, and encouraging groups to finish together. Participants also felt more confident discussing sensitive health topics and seeking youth-friendly information, although the study did not independently measure changes in health-service use. The findings show that simple technology can expand access, but equitable participation also depends on privacy, control over devices, reliable infrastructure, and social support.

1. Introduction

Adolescents and young people across sub-Saharan Africa continue to face substantial barriers to accurate, confidential, and age-appropriate sexual and reproductive health (SRH) information. Social norms surrounding sexuality, gendered expectations, limited opportunities for comprehensive sexuality education, and geographic barriers to youth-friendly services can make these constraints particularly acute in underserved settings. In Ethiopia, evidence indicates that adolescent use of SRH services remains limited and is influenced by exposure to SRH information, awareness of available services, distance, privacy, provider attitudes, and service readiness [1, 2]. Digital educational tools are increasingly used to supplement school-, community-, and facility-based approaches by offering more private and flexible access to SRH information [3, 4].

However, digital delivery does not automatically produce equitable access. Rural Ethiopian evidence demonstrates a substantial gender divide in personal mobile-phone ownership and use, particularly among married women, underscoring the difference between household availability and individual control of a device [5]. Connectivity, electricity, digital literacy, privacy, and social permission may further determine whether adolescents can engage consistently. Ethiopia also continues to face a major electricity-access deficit, with approximately half of the population lacking reliable electricity in 2024 [6]. Low-bandwidth platforms using short-message service (SMS) and interactive voice response (IVR) can reduce dependence on smartphones and continuous internet access, but their implementation remains embedded in these social and infrastructural conditions.

Recent Ethiopian evidence supports the potential of digital approaches to strengthen adolescent sexual and reproductive health education. A quasi-experimental study among school adolescents and youth in Jimma found that a digital health intervention improved knowledge of sexual and reproductive health and rights, general sexual and reproductive health knowledge, and related attitudes [7]. Nevertheless, evidence from remote agrarian and pastoralist communities in southern Ethiopia demonstrates persistent inequalities in adolescent sexual and reproductive health service utilization, with access influenced by parental encouragement and proximity to services [8]. Together, these findings suggest that digital interventions can strengthen knowledge and attitudes but cannot independently overcome the social, geographic, and service-related barriers affecting participation and care seeking. Digital delivery should therefore be integrated with peer and community support, engagement

of trusted local actors, and effective referral pathways to youth-friendly services. Community-linked youth-friendly services may strengthen these referral pathways [9].

Leap is a mobile-learning platform used by Amref Health Africa to deliver structured learning through mobile phones since 2020. Its IVR and SMS architecture can operate on basic as well as smart phones without requiring continuous internet connectivity, making it potentially suitable for geographically dispersed learners. Its on-demand format may also offer flexibility and privacy when addressing sensitive SRH topics. Previous work in Kenya has shown the value of analyzing Leap platform data to understand completion, engagement, learning scores, and implementation patterns [10]. In Ethiopia, Leap was adapted to provide AYH content through IVR and SMS using local-language storytelling, questions, and explanatory content. The choice of a low-bandwidth platform was therefore based on its delivery flexibility and potential reach, while recognizing that network coverage, electricity, phone access, digital familiarity, and household permission could still constrain equitable participation.

This study was informed by the Medical Research Council process-evaluation framework, with attention to implementation, mechanisms of impact, and context [11]. Implementation outcomes and engagement mechanisms were further interpreted using Proctor's implementation-outcome taxonomy, the Technology Acceptance Model, and Self-Determination Theory [12-14]. These frameworks were applied hierarchically rather than as competing models.

Evidence remains limited on how adolescents and youth in low-connectivity Ethiopian settings experience low-tech mobile SRH education, why some learners initiate and sustain engagement while others do not, and how gendered access to mobile devices shapes participation. We therefore examined the acceptability, engagement, and implementation of the Leap AYH training, including barriers, facilitators, and perceived outcomes. Aggregate program records from the same December 2025–April 2026 period were used only to contextualize reach, initiation, and completion.

2. Methods

2.1 Study design, setting, and conceptual approach

We conducted a qualitative process evaluation in selected Reproductive, Maternal, Newborn, Child, Adolescent Health and Nutrition implementation areas in Jimma and Borena zones of Oromia Region, North Shewa and Wag Hemra zones of Amhara Region, and Wolaita Zone of South Ethiopia Region. Sites were purposively selected to capture variation in geographic setting, program implementation experience, network connectivity, and learner engagement.

Qualitative data collection and secondary program-data mapping from implementation reports were undertaken between December 2025 and April 2026. Focus group discussions (FGDs), in-depth interviews (IDIs), and key informant interviews (KIIs) were conducted after participants had initiated the Leap AYH training and experienced the relevant training sessions. These methods examined learner experiences, implementation processes, mechanisms of engagement, and contextual influences on training initiation and completion.

The qualitative component was the primary and defining study design. Aggregate Leap program data extracted from implementation reports were used only to describe intervention reach, registration, initiation, and completion and to contextualize the qualitative findings. These data were not analyzed as a separate quantitative study component. The Leap AYH intervention began before the data-collection period; therefore, December 2025–April 2026 refers only to qualitative data collection and secondary program-data mapping, not to the full intervention implementation period.

The Medical Research Council (MRC) process-evaluation framework provided the overarching analytical structure by distinguishing implementation, mechanisms of impact, and context [11]. Proctor et al.'s

taxonomy was applied selectively to interpret relevant implementation outcomes, particularly acceptability, appropriateness, adoption or initiation, and feasibility [13]. The Technology Acceptance Model (TAM) and Self-Determination Theory (SDT) were used as sensitizing theories to interpret perceived usefulness and ease of use and the roles of autonomy, competence, relatedness, and motivation, respectively [12, 14]. Gender and meaningful digital access were treated as cross-cutting equity considerations. These frameworks were applied hierarchically rather than as competing models: MRC organized the process-evaluation domains, Proctor clarified implementation-outcome terminology, and TAM and SDT supported interpretation of engagement mechanisms.

2.2 Description of Leap AYH intervention

Leap is a mobile-learning platform used by Amref Health Africa to deliver structured training through mobile phones. The Leap Adolescent and Youth Health intervention used interactive voice response (IVR) and short message service (SMS) to provide sexual and reproductive health education through basic and smart mobile phones connected to the Ethio telecom network. The intervention did not require a smartphone or continuous internet connectivity.

The curriculum comprised three main sessions delivered through local-language storytelling, audio instruction, questions and answers, SMS quizzes, and explanatory messages. Core topics included sexual and reproductive health and family planning, youth-friendly services and referral information, the consequences of early marriage and adolescent pregnancy, demand creation, and advocacy. Content was available in Amharic and Afan Oromo. Learners could access the training on demand at any time and were expected to complete the three sessions in approximately one hour. The training was provided at no direct cost to learners.

Learners were enrolled by registering their profiles and phone numbers in the Leap program system. Following registration, each learner received an SMS notification through short code 8335

confirming enrollment. Learners initiated the audio training by calling short code 8756. Completion was defined as completing all three sessions and receiving the system-generated completion message.

Youth-club leaders supported implementation by assisting with registration and platform navigation, providing reminders, facilitating group discussions, and troubleshooting access problems. Completion messages were provided to learners, while certificates and other forms of recognition were offered to high-performing youth-club leaders and implementation areas. Trophies were also awarded in selected settings.

Using the World Health Organization classification of digital health interventions, Leap was categorized as a person-facing digital intervention combining program-initiated targeted communication with learner-initiated, on-demand access to health information [15]. Reporting of the intervention was also informed by the mobile health Evidence Reporting and Assessment checklist [16]. Table 1 summarizes the operational characteristics of the Leap AYH intervention.

Table 1. Operational characteristics of the Leap AYH intervention

Intervention element	AYH implementation
Delivery channels	IVR and SMS using storytelling, audio instruction, questions and answers, quizzes, and explanatory messages
Device requirements	Basic or smart mobile phone with access to the Ethio telecom network
Training structure	Three main AYH training sessions
Core content	SRH and family planning; youth-friendly services and referral information; early marriage and adolescent pregnancy; demand creation; advocacy
Languages	Amharic, Somali, Afar, Tigrigna and Afan Oromo
Availability	On demand, 24 hours a day
Intended duration	Approximately one hour
Interactive elements	Audio instruction, questions and answers, and SMS quizzes or response prompts
Enrollment	Learner profile and phone number registered in the Leap program system; enrollment confirmation sent through SMS short code 8335
Initiation	Learner begins the audio training by calling short code 8756 after receiving the enrollment notification sent from short code 8335
Completion	Learner completes all three sessions and receives a system-generated completion message
Peer support	Youth-club leaders assist with registration, navigation, reminders, group discussion, and troubleshooting
Learner cost	No direct cost to the learner

Recognition	Completion message for learners; certificates or other recognition for high-performing youth-club leaders and implementation areas; trophies in selected settings

Abbreviations: AYH, Adolescent and Youth Health; IVR, interactive voice response; SMS, short message service; SRH, sexual and reproductive health.

2.3 Participants, sampling and recruitment

Participants included in-school and out-of-school adolescents and youth aged 15–29 years who had initiated the Leap AYH training and experienced at least one training session. The sample also included peer and youth-club leaders, in-school and out-of-school youth representatives, supervisors, and implementation actors with direct experience supporting or overseeing training delivery. Eligible learners represented different levels of engagement, including those who initiated but did not complete the training and those who completed all three sessions. Key informants were eligible if they had a direct role in training facilitation, supervision, or implementation oversight.

Potential participants were identified purposively through Leap program records and participating schools, youth clubs, and local implementation structures. In-school participants were approached face-to-face through school gender-club leaders, while out-of-school participants were approached through youth-council members and youth-club leaders. Before deciding whether to participate, potential participants received information about the study purpose, participation requirements, confidentiality protections, and voluntary nature of participation.

Purposive sampling sought variation by sex, age, schooling status, geographic setting, participant role, and training-completion status. A completer was defined as a learner who completed all three Leap AYH sessions and received the system-generated completion message. A noncompleter was defined as a learner who initiated at least one session but had not completed all three sessions by the end of the data-collection and program-reporting period.

Recruitment continued until the research team judged that additional data collection was yielding limited substantively new information relevant to the study objectives and that adequate variation

had been captured across participant groups, training-completion statuses, sexes, and implementation settings. This judgment was based on iterative review of field notes and emerging findings rather than on a predetermined numerical saturation threshold.

A total of 150 individuals were invited to participate. Six declined participation, and two withdrew or did not attend, resulting in a final qualitative sample of 142 participants. Reasons for refusal, withdrawal, and non-attendance were not systematically documented. Each participant contributed to only one data-collection session and was assigned to one mutually exclusive primary participant-role category.

The final sample comprised 80 learners, 20 peer or youth-club leaders, 15 in-school or out-of-school youth representatives, 15 supervisors, and 12 implementation actors.

2.4 Data collection and researcher reflexivity

Semi-structured FGD, IDI and KII guides were developed specifically for this study based on the study objectives, the Medical Research Council process-evaluation domains and the implementation outcomes addressed by the evaluation. The guides explored experiences of using Leap AYH, content relevance and acceptability, barriers and facilitators to participation and completion, perceived changes in knowledge and confidence, peer and supervisor support, and recommendations for improvement. The guides were reviewed by the study technical team, translated into Amharic and Afan Oromo, and pretested with participants representing approximately 5% of the planned sample. Findings from the pretest were used to refine question wording, sequencing and probes. The English-language versions of the data-collection guides are provided in Additional file 2.

Data collection comprised 14 focus group discussions involving 121 participants, 13 in-depth interviews, and 8 key informant interviews involving 8 participants, resulting in a total qualitative sample of 142 participants. FGDs generally included 6–10 participants and were organized to facilitate discussion among participants with similar roles or schooling status.

FGDs and interviews were conducted in private rooms at schools, youth centers, health facilities, and community venues. FGDs lasted approximately fifty-five minutes, IDIs 40 minutes, and KIIs 35 minutes. No repeat interviews were conducted. Sessions were conducted in Amharic or Afan Oromo, audio-recorded with participants' permission, and supplemented by field notes recorded during or immediately after data collection.

Data were collected by 16 trained health workers, comprising 12 women and 4 men. All had training or experience in qualitative interviewing and adolescent-sensitive research. Although data collectors had no prior personal relationships with participants, some had previous programmatic contact through Leap implementation. Before data collection, participants were informed about the researchers' roles, the purpose of the evaluation, and the voluntary nature of participation. The team considered how familiarity with the program, perceived authority, and expectations concerning Amref could influence participants' responses. Voluntariness, confidentiality, and the right to decline participation were therefore emphasized, and possible courtesy and social-desirability bias were considered when interpreting favourable accounts.

2.5 Data management, analysis, and trustworthiness

Audio recordings were transcribed verbatim in the original language and translated into English by bilingual members of the research team. Translated transcripts were checked against the original audio recordings by bilingual research-team members. Quotations selected for publication were reviewed against the original-language transcripts to preserve their meaning and contextual nuance.

Qualitative data were managed and coded using ATLAS.ti version 26.1.2 (ATLAS.ti Scientific Software Development GmbH, Berlin, Germany). We conducted a hybrid inductive-deductive codebook thematic analysis informed by established principles of thematic analysis [17]. Analysis began with repeated reading of the transcripts and inductive coding of participants' accounts. The preliminary coding framework was then developed and refined iteratively. Deductive codes reflected the MRC process-evaluation domains and the

implementation and engagement concepts specified in the conceptual framework, while inductive codes captured unanticipated experiences and contextual influences.

Two researchers independently coded all 35 transcripts, comprising 14 FGD, 13 IDI, and 8 KII transcripts. They compared their coding, discussed disagreements, clarified code definitions, and reached consensus through discussion. Intercoder agreement statistics were not calculated because double coding was used to strengthen interpretive consistency rather than to quantify coder reliability. Themes were developed by grouping related codes and comparing patterns across participant groups, settings, sex, and training-completion status. The analysis explicitly examined convergent, less-favourable, and contradictory accounts.

Analytically, the MRC domains of implementation, mechanisms of impact, and context formed the higher-order organizing categories. Within the implementation domain, relevant findings were mapped to Proctor's implementation outcomes, including acceptability, appropriateness, adoption or initiation, and perceived feasibility. Within the mechanisms domain, TAM informed interpretation of perceived usefulness and ease of use, while SDT informed interpretation of autonomy, competence, relatedness, and motivation. Framework-based matrices were used to compare patterns across participant roles, settings, sex, and training-completion status. Inductively generated codes that were not adequately explained by these frameworks were retained and interpreted as contextual or emergent findings rather than being forced into predetermined theoretical categories. Structural influences—including network reliability, electricity, control over mobile phones, gender norms, and household permission—were therefore retained as empirically derived contextual factors. Reporting followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) [18]. A completed COREQ checklist is provided in Additional file 3.

Credibility was supported through triangulation across FGDs, IDIs, KIIs, participant groups, and implementation settings. Dependability was supported through iterative refinement of the codebook and documentation of analytic decisions. Confirmability was strengthened through

team discussion and attention to divergent accounts, while transferability was supported through detailed description of the intervention, participants, and implementation contexts.

Preliminary findings were presented during a validation meeting with participants and implementation stakeholders, and the feedback was considered during final interpretation. The final coding framework included deductive domains derived from the conceptual frameworks and inductive codes developed from the data.

2.6 Secondary program-data analysis

Aggregate Leap AYH program data were extracted on 27 August 2026 from the monitoring dashboard and implementation report for the December 2025–April 2026 implementation-reporting cohort. The program dataset covered the broader Leap AYH reporting cohort in Afar, Amhara, Oromia, and South Ethiopia. Afar contributed only to the descriptive program figures and was not a qualitative study setting. Variables included registration status, initiation of at least one training session, completion of all three sessions, sex, operational age category, and implementation region. The dashboard age categories (<20, 20–24, 25–34, and 35+ years) differed from the qualitative participant categories and were therefore reported separately.

Training initiation was calculated as the number of registered learners who began at least one training session divided by the total number of registered learners. Completion among initiators was calculated as the number of learners who completed all three sessions divided by the number who initiated training. Overall completion was calculated as the number completing all three sessions divided by the total number of registered learners.

Before analysis, the program data were checked for completeness and descriptive summaries were generated. No inferential comparisons, individual-level linkage, or estimation of intervention effects was undertaken. The program data were used only to describe intervention reach and engagement and to contextualize the qualitative findings.

2.7 Use of generative AI in manuscript preparation

During manuscript preparation, the authors used OpenAI ChatGPT to support language editing, reference formatting, and table presentation. The authors reviewed and verified all AI-assisted output and take full responsibility for the accuracy, integrity, and originality of the manuscript. Generative AI was not used to collect data, code transcripts, generate study findings, or make analytic decisions.

2.8 Ethical considerations

Ethical approval for this study was obtained from the Ethiopian Public Health Association Research Ethics Review Committee (EPHA-RERC) (Ref. No. EPHA/OG/728/23, dated July 17, 2023). The approval was subsequently renewed under Ref. No. EPHA/OG/466/24, dated August 7, 2024, and Ref. No. EPHA/OG/550/25, dated August 18, 2025. Written permission to conduct the study was also obtained from the relevant Regional Health Bureaus, zonal health departments.

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Written informed consent was obtained from participants aged 18 years or older. For participants younger than 18 years, written informed consent was obtained from a parent or legal guardian, and assent was obtained from the adolescent participant. Participants were informed about the study's purpose, procedures, potential benefits and risks, confidentiality protections, voluntary nature, and their right to decline any question or withdraw at any time without consequence. Interviews and focus group discussions were conducted only after the required consent and assent had been documented. All data were de-identified before analysis, and appropriate measures were implemented to protect participants' privacy and confidentiality.

3. Results

3.1 Participant characteristics and program context

A total of 142 participants contributed to the qualitative study, including 73 males and 69 females. Participants were drawn from multiple implementation settings and represented in-school and out-of-school adolescents and youth, youth council members, school gender-club members or leaders, supervisors, and implementation actors. The final field log confirmed 14 FGDs, 13 IDIs, and 8 KIIs. Although some participants held more than one program or youth-leadership role, each participant was assigned to one mutually exclusive primary role category for descriptive reporting. Age was categorized as 15–19, 20–24, and 25–29 years; 57 participants were aged 15–19 years, 57 were aged 20–24 years, and 28 were aged 25–29 years.

Participant characteristics are presented in Table 2.

Table 2. Characteristics of qualitative participants (N = 142)

Characteristic	Category	n
Sex	Male	73
	Female	69
Age group, years	15–19	57
	20–24	57
	25–29	28
Region	Oromia	67
	Amhara	50
	South Ethiopia	25
Primary participant role*	Learner	80
	Peer or youth club leader	20
	In-school or out-of-school youth representative	15
	Supervisor	15
	Implementation actor	12

Note: Each participant was assigned to one mutually exclusive primary participant-role category; therefore, the role frequencies sum to the total qualitative sample of 142. Each participant contributed to only one FGD, IDI, or KII.

Within the implementation-reporting window, 11,299 learners were registered in Leap AYH, 5,300 (46.9%) initiated training, and 3,508 completed the course. Completion represented 66.2% of those who initiated and

31.0% of all registered learners. The initiation proportion was lower among females than males (43.4% versus 50.3%), whereas completion among those who had initiated was more similar (64.7% versus 67.4%). Regionally, initiation ranged from 28.7% in South Ethiopia to 55.6% in Amhara, while completion among initiators ranged from 59.9% in South Ethiopia to 78.1% in Amhara. Regional registration, initiation, and completion figures are presented in Table 3.These aggregate figures are included solely to describe the implementation context of the qualitative study.

Table 3. Leap AYH registration, initiation and completion by region

Region	Registered, n	Initiated, n	Initiation, %	Completed, n	Completion among initiators, %	Completion among registered, %
Afar	111	59	53.2	45	76.3	40.5
Amhara	822	457	55.6	357	78.1	43.4
Oromia	8248	4176	50.6	2742	65.7	33.2
South Ethiopia	2118	608	28.7	364	59.9	17.2
Total	11299	5300	46.9	3508	66.2	31.0

Note: Initiation was calculated among registered learners. Completion among initiators was calculated among learners who initiated at least one session. Completion among registered learners used all registered learners as the denominator. Figures are descriptive program-monitoring data and were not used for inferential analysis. Detailed sex-, age-, region- and training-stage-disaggregated program figures are provided in Additional file 1.

Experiences showed both convergence and variation across participant groups and settings. Female and male participants generally valued the flexibility, local-language content, and peer-supported nature of Leap. However, gendered differences were most evident in meaningful digital access. Female participants described restricted or shared phone access and limited control over when they could use a device, while male participants also emphasized infrastructure-related barriers such as prolonged network interruption. Some variation was evident across locations: participants in Jimma emphasized practical guidance from youth leaders; those in Debre Birhan described storytelling, group competition, and increased confidence in discussing SRH; and participants in Borena emphasized network disruptions and school restrictions on

students bringing mobile phones. In some schools, gender-club leaders requested permission from the school administration for students to bring mobile phones to school so they could participate in the Leap AYH training. These examples illustrate contextual variation but should not be interpreted as systematic regional differences because the number and distribution of supporting quotations were limited. Common patterns and contextual variations across participant groups and settings are summarized in Table 4.

Table 4. Contextual variation in Leap AYH implementation experiences

Theme	Common pattern across participants	Contextual variation and interpretation
Accessibility, flexibility and privacy	Participants valued the ability to access training at convenient times and engage with sensitive SRH content more privately than in public or group-based settings.	Flexibility was particularly relevant to participants balancing school, household work and livelihood responsibilities. Privacy depended on having sufficient control over when and where a phone could be used.
Content relevance and local-language delivery	Storytelling and delivery in Amharic and Afan Oromo supported comprehension, interest and perceived relevance.	Participants in Debre Birhan emphasized the value of storytelling, while participants in Borena highlighted the importance of having an accessible channel for discussing sensitive SRH topics. These examples illustrate contextual experiences rather than systematic regional differences.
Infrastructure and meaningful digital access	Network interruption, electricity constraints, phone loss or replacement, and shared devices disrupted participation across implementation settings.	Restricted or shared phone access was particularly consequential for female participants. Infrastructure barriers affected both female and male participants, but nominal access to a phone did not necessarily provide girls with private, continuous or autonomous access.
Training-completion experience	Network interruption and restricted phone access were associated with discontinuation, while content relevance, reminders and technical assistance supported continued participation.	These patterns distinguish barriers to sustained engagement among initiators from the broader registration-to-initiation gap shown in the aggregate program data. Registered learners who did not initiate were not included in the qualitative sample.
Peer support and motivation	Peer leaders supported engagement through reminders, troubleshooting, group discussion and encouragement. Friendly competition and recognition also motivated some participants.	Participants in Jimma emphasized practical guidance from youth leaders, whereas those in Debre Birhan described motivation through group competition. The data illustrate different peer-support mechanisms but do not establish systematic regional differences.
Perceived SRH communication and agency	Participants described greater confidence in discussing SRH concerns and seeking information or youth-friendly services.	These accounts represent perceived proximal outcomes. The study did not objectively measure changes in knowledge, behaviour, service utilization or health outcomes, and subgroup differences in these outcomes were not established.

The analysis generated five interrelated themes: (1) accessibility, flexibility, and privacy; (2) content relevance, local language, and acceptability; (3) infrastructure, gender, and meaningful digital access; (4) peer support, collective learning, and motivation; and (5) perceived pathways to SRH communication and service-seeking. Sections 3.2-3.6 present these themes, with illustrative participant quotations linked to each theme.

3.2 "Learning on my own terms": accessibility, flexibility, and privacy

Participants commonly described Leap as flexible and easier to fit around school, household work, farming, and other responsibilities than scheduled face-to-face learning. The ability to engage during evenings, weekends, or other convenient periods supported a sense of autonomy and control over the learning process. Participants also valued being able to engage with sensitive SRH topics away from public discussion.

The IVR/SMS format reduced dependence on smartphones and continuous internet access. Participants viewed this technical simplicity as a major strength in rural and resource-constrained settings, while the narrative structure of lessons helped sustain curiosity and encouraged progression from one message or session to the next.

"Amref and other organizations provide training on SRH and advocacy for youth-club leaders, who are then expected to share the information with other young people. The mobile-based training is different from traditional face-to-face training because participants receive the information directly through audio and SMS. It can also reach many young people in rural woredas who otherwise have limited access to SRH information." *— Male youth-club member, Debre Birhan*

"I was introduced to the mobile-based adolescent health training through a phone orientation from the project team. Although network problems meant that my own training took four days, I found it engaging and informative. I then registered 12 youth-club members—four girls and eight boys—and, with encouragement, all completed the training." — Youth-club leader, Wag Hemra

"After 2 p.m. is the most convenient time for me to attend the training. In the morning, I am at school and also need to help my family. I have more time to concentrate on the training in the afternoon and evening." — School gender-club member, Borena

"The messages were clear and easy to follow. I could learn even when I was in the field or at home after school." — Female youth participant, Jimma

These accounts indicate that the simple IVR and SMS interface, ability to use basic devices, and straightforward navigation supported perceived ease of use. Temporal flexibility, privacy, and compatibility with daily life were interpreted primarily as aspects of appropriateness and contextual fit.

3.3 "The stories felt relevant": content relevance, local language, and acceptability

Participants across study sites described the AYH content as relevant to issues encountered in everyday life. Frequently discussed topics included menstruation, family planning, early marriage, teenage pregnancy, and access to youth-friendly services—issues that participants said were often difficult to discuss openly in families, schools, or communities.

Story-based pedagogy was repeatedly described as helping participants understand and remember sensitive or complex SRH information. Familiar names, locally recognizable situations, and delivery in Amharic and Afan Oromo increased comprehension and cultural resonance.

"The stories made it easier to understand than reading long texts." — Male participant, Debre Birhan

"We didn't have anyone to talk to about family planning or menstruation, but now thanks to Leap, we can." — Female participant, Borena

"The training contains important life-skills information and helps me advise young people about their sexual and reproductive health." — Male youth-club leader, Wag Hemra

"I learned about physiological changes among girls and the importance of menstrual health. Early marriage is common in my village, and the training story explained the consequences of early marriage and pregnancy in a way that reflected the situation of girls in my community." — Female gender-club leader, Wag Hemra

"The training is concise and addresses important adolescent and youth health issues, including substance use and sexual and reproductive health." — Female youth-council member, Wolaita

Several participants also described sharing messages or lesson content with siblings, parents, and peers. Such accounts suggest informal diffusion of information beyond the registered learner, although these were perceived social effects rather than measured household outcomes.

3.4 "Having a phone does not mean having access": infrastructure, gender, and meaningful digital access

Unstable network coverage was the most consistently reported implementation barrier. Delayed messages and prolonged network interruptions disrupted continuity and sometimes led to temporary disengagement or noncompletion. Electricity interruptions, phone loss, changes in phone ownership, and registration using another family member's number created additional discontinuity.

"Some of us stopped in the middle because the network was off for many days." — Male participant, Borena

"Students were interested in the training, but network interruptions made it difficult for them to complete it. Students were also not normally allowed to bring mobile phones to school, which further affected completion." — Male school gender-club leader, Arero, Borena

"Because mobile phones were not normally allowed at school, I requested permission for 40 students to bring their phones and attend the training during their free time. I also followed up

after school and encouraged students who had registered with a relative's or neighbour's number to use their own SIM card where possible." — Male gender-club leader, Moyale, Borena

"When registering students, some provided a family member's phone number. Changes in phone numbers and limited access to those family phones made follow-up and training management difficult." — Male school gender-club leader, Borena

"Reaching 214 young people was not easy. I collected their phone numbers for registration, communicated with the Amref team, and continued following up when network problems made participation difficult." — Male health professional, Wolaita

"The main barriers to completion were Leap server problems, interrupted calls and SMS messages because of poor network connectivity, and limited engagement among some participants." — Male youth-council member, Wag Hemra

Gender shaped how these constraints were experienced. Some girls had access only to shared family phones or used a parent's number for registration. Parental concerns about inappropriate communication or relationships sometimes restricted when and how girls could use a phone. As a result, nominal device availability did not guarantee private, continuous, or autonomous access to SRH learning.

"I registered my mother's phone, but she does not allow me to use it freely, so I could not continue the training." — Female participant, Borena

"In our community, where early marriage is common, girls are often not allowed to own or use mobile phones because families fear that they may communicate with boys. This limits their ability to participate in mobile-based training." — Male youth-council member, Dedo, Jimma

"I registered using my brother's phone number, but he frequently moved from place to place. I could not access his phone regularly, so I was unable to continue and complete the training." — Female gender-club member, Borena

"Some parents do not allow their children to own mobile phones because they fear that phone use may negatively influence young people." — Male gender-club leader, Moyale, Borena

Meaningful digital access therefore depended on several interacting conditions: availability of a device, control over that device, privacy, network availability, charging capacity, and social permission. The descriptive program data are consistent with a potential early-stage gender gap: females were less likely than males to initiate training after registration, while completion proportions among those who had already initiated were more similar. Because these program figures are descriptive, this pattern should be interpreted as supportive context rather than causal evidence.

"After completing the training, I encouraged other young people to join. At first they were hesitant, but after the orientation they began learning at their own pace." — Male youth-council member, Jimma

"To improve completion, I requested permission for selected students to bring their phones to school and undertake the training during breaks. I used daily reports to identify and encourage students who had not completed the sessions." — Male gender-club leader, Moyale, Borena

"We engaged other teachers to help students attend and complete the training. We also reached out to out-of-school young people in our area and encouraged them to participate." — Male gender-club leader, Dhas, Borena

3.5 "We finished together": peer support, collective learning, and motivation

Peer leaders and youth-club structures were repeatedly described as important mechanisms for sustaining engagement. Leaders reminded participants to continue lessons, supported navigation and troubleshooting, and organized group discussions to clarify content. This support was particularly valuable for participants with limited digital familiarity or those who had fallen behind after network interruptions.

"Our youth leader reminded us and showed us how to follow the steps. That helped us finish the training together." — Female youth-club member, Jimma

"Through the Leap training, I gained a better understanding of youth health issues. We now communicate more closely with adolescent- and youth-health service providers at Tuka Health Center about young people's concerns and available services." — Youth-council member, Moyale, Borena

"Before the training, I did not know that a health worker was available at the youth center or what youth-friendly services were offered. The training increased my understanding and gave me confidence to visit the center and use the available services." — Female youth-club member, Debre Birhan

"More adolescents and young people now come to our clinic, not only for treatment but also for counseling and health information. They appear more open and confident when discussing sexual and reproductive health concerns." — Male health professional, Wolaita

"The audio sessions were interesting and easy to understand. After completing the training, I shared what I had learned with club members and friends and let them use my phone to listen to messages about SRH, family planning, and youth-friendly services." — Male youth-club leader, Debre Birhan

Friendly competition between clubs or groups further supported engagement. Participants described wanting their group to complete all lessons and viewed recognition of collective

progress as motivating. In some settings, peer leaders went beyond routine reminders and helped participants locate areas with better network coverage.

"The competition between groups helped us to stay active. Everyone wanted to complete all the lessons." — Male participant, Debre Birhan

Certificates, recognition, or small rewards were also discussed as possible motivators. Some communities initially expected financial incentives; over time, participants and leaders described content relevance and peer encouragement as helping shift motivation toward completion. In SDT terms, flexible access could support autonomy, troubleshooting and successful platform navigation could support competence, and peer encouragement and group participation could support relatedness. Recognition and competition were interpreted as externally supported forms of motivation rather than evidence of intrinsic motivation.

3.6 From information to agency: perceived pathways to SRH communication and service-seeking

Participants described perceived improvements in SRH knowledge, confidence, and willingness to discuss topics that had previously been embarrassing or taboo. Several reported feeling more comfortable asking questions about menstruation, family planning, sexually transmitted infections, and other SRH concerns and more willing to engage with health professionals.

"Before the training, I did not want to discuss SRH issues with health professionals. After the training, we developed confidence and started discussing SRH topics without being shy." — Youth-club member, Debre Birhan

Participants and service providers also described perceived increases in interest in youth-friendly counseling and SRH information. Some youth linked the training to greater openness in family or peer discussions about early marriage, teenage pregnancy, and continuing education. These accounts suggest plausible pathways from information access to communication confidence, self-efficacy, and service-seeking intention. However, the study did not independently measure changes in service utilization, behavior, or health outcomes; these findings should therefore be interpreted as perceived outcomes rather than demonstrated effects.

The analytical interpretation of the qualitative themes using the MRC, TAM and SDT frameworks is summarized in Table 5.

Table 5. Analytical interpretation of qualitative themes

Theme	MRC domain	Implementation outcome / mechanism	Key contextual influence	Program implication
Accessibility, flexibility, privacy	Mechanisms	TAM: ease of use; SDT: autonomy	Connectivity; timing; privacy	Retain low-bandwidth, on-demand design
Content relevance and storytelling	Mechanisms	Acceptability/appropriateness; TAM: usefulness; SDT: competence	Language and cultural fit	Maintain local-language, narrative content
Meaningful digital access	Context	Feasibility; adoption/initiation	Gender norms; shared phones; parental restrictions; electricity	Design gender-responsive access and safeguarding strategies
Peer support and motivation	Implementation + mechanisms	SDT: relatedness/competence; engagement	Youth-club structures; incentive expectations	Institutionalize peer support and non-monetary recognition
Perceived SRH agency	Mechanisms / perceived outcomes	Confidence; self-efficacy; service-seeking intention	No objective downstream measurement	Link digital learning to youth-friendly health services and evaluate downstream outcomes

Abbreviations: MRC, Medical Research Council; SDT, Self-Determination Theory; TAM, Technology Acceptance Model.

Figure 1 synthesizes the relationship between context, intervention features, engagement mechanisms, implementation outcomes, and perceived proximal outcomes.

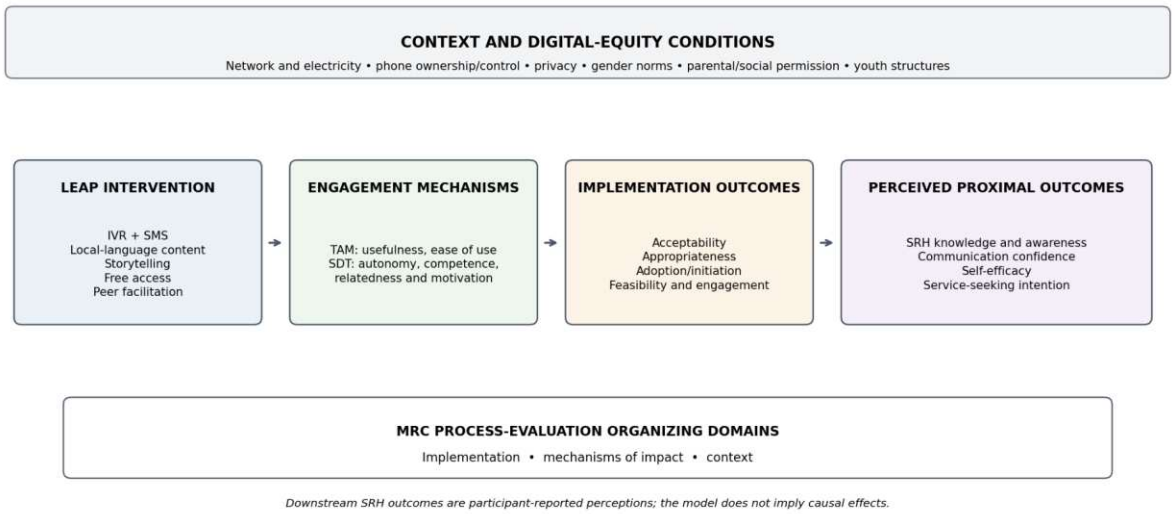


Figure 1. Conceptual interpretation of Leap AYH implementation and engagement

Note: The figure is an interpretive model derived from the qualitative findings. It does not imply causal effects. MRC = Medical Research Council; TAM = Technology Acceptance Model; SDT = Self-Determination Theory.

4. Discussion

This qualitative process evaluation found that low-bandwidth mobile SRH education was perceived as acceptable, relevant, and usable among adolescents and youth in the selected Ethiopian implementation settings. Five findings are particularly important. First, learners valued the flexibility and privacy offered through Leap. Second, local-language storytelling strengthened content relevance and comprehension. Third, access to the technology did not necessarily constitute meaningful digital access: network reliability, electricity, shared devices, and gendered control over phones affected whether learners could participate consistently. Fourth, peer leaders and collective learning structures were important perceived mechanisms for sustaining engagement. Fifth, participants described increased confidence in discussing SRH and seeking youth-friendly information and services, although these were perceived outcomes rather than independently measured changes. These

findings are consistent with evidence that digital SRH interventions can improve access to information and engagement when content is relevant and appropriately adapted, while implementation remains sensitive to technological and social conditions [3, 19].

The aggregate program data from December 2025 to April 2026 provide additional implementation context without changing the qualitative design of the study. Fewer than half of registered learners initiated the training, whereas approximately two-thirds of those who initiated completed all three sessions. This pattern suggests two distinct implementation challenges: supporting registered learners to begin the training and sustaining participation after initiation. These stages can be interpreted alongside participants' accounts of network reliability, phone control, privacy, motivation, and peer support. Distinguishing adoption or initiation from perceived feasibility and continued engagement is consistent with implementation-outcome theory [13]. Previous analysis of the Leap platform among community health volunteers in Kenya also demonstrated the value of examining completion and engagement patterns in program data, although its population and training purpose differed from those of the present study [10]. The aggregate figures in the present evaluation were descriptive and were not used for inferential analysis or causal attribution.

The findings reinforce the distinction between technological simplicity and equitable access. IVR and SMS delivery reduce dependence on smartphones and continuous internet connectivity, offering an important advantage in rural and resource-constrained settings. Nevertheless, low-bandwidth delivery remains vulnerable to weak networks, electricity interruptions, changing phone ownership, and household control over devices. Low-tech delivery should therefore not be assumed to be universally accessible. A multicountry study that included Ethiopia similarly found that adolescents' access to any phone was more common than personal phone ownership and that girls had lower mobile-phone ownership than boys [20]. Program design must consequently address not only the technical architecture of the platform but also the conditions under which adolescents can access and use mobile devices.

One of the clearest findings was that some female adolescents could access a phone without having autonomous or private control over its use. Shared devices and parental restrictions could interrupt participation and compromise the privacy required for engaging with sensitive SRH content. Digital inequity must therefore be understood in terms of meaningful access: whether an adolescent controls the device, when and where it can be

used, whether its use is private, and whether household norms permit participation. The aggregate program data showed lower initiation among females than males but more similar completion proportions among those who initiated. This pattern highlights the importance of examining barriers between registration and initiation. However, because the program data were aggregate and were not linked to individual qualitative participants, the observed sex difference cannot be attributed directly to restricted phone access or any other specific mechanism. Broader evidence from sub-Saharan Africa documenting sex-based inequalities in adolescents' access to mobile phones and digital media supports treating gender as an implementation condition rather than simply a demographic characteristic [20].

Participants' accounts indicate that acceptability arose from the interaction of several intervention features rather than from the mobile channel alone. Storytelling supported comprehension and perceived relevance, local-language delivery improved cultural fit, and on-demand participation provided flexibility and opportunities for privacy. Qualitative research with adolescents in Bangladesh has similarly shown that relatable content and private digital spaces can support engagement with sensitive SRH information [19]. Ethiopia-specific evidence also indicates that digital SRH interventions can improve adolescents' knowledge and attitudes, although evidence concerning longer-term behaviour and service-use outcomes remains limited [7]. In TAM terms, the simple IVR and SMS interface supported perceived ease of use, while the perceived value of the SRH information supported usefulness [12]. Local-language delivery, cultural relevance, temporal flexibility, and compatibility with participants' circumstances were interpreted primarily as aspects of appropriateness and contextual fit rather than as ease of use alone.

Peer support was not merely an additional implementation activity; participants described it as an important mechanism through which engagement was maintained. Reminders, troubleshooting, group discussion, and friendly competition supported accountability and collective progress. Research on digital SRH education has similarly highlighted the contribution of peer communication and facilitated discussion to adolescents' engagement with sensitive health information [19]. Multicountry sexuality-education evidence also demonstrates that educational interventions are influenced by the wider school, community, and institutional environments in which they are implemented [4]. In SDT terms, peer interaction supported relatedness, while assistance with navigation and successful task completion could strengthen perceived competence [14]. Flexible,

on-demand participation could support autonomy, whereas certificates, recognition, and competition represented externally supported motivation. Motivation should therefore not be understood solely as an individual characteristic.

The findings suggest several priorities for future implementation. These include preserving low-bandwidth and on-demand delivery; establishing recovery mechanisms following network interruptions; developing gender-responsive options for adolescents who depend on shared devices; formalizing peer-support roles; retaining locally relevant stories and languages; clarifying expectations concerning certificates and incentives; and strengthening referral pathways to youth-friendly services. These priorities are consistent with reviews showing that digital SRH interventions require attention to access, contextual adaptation, and implementation support in addition to technology [3, 19]. They also align with the MRC position that implementation and outcomes are shaped by interactions among intervention delivery, mechanisms, and context [11]. Program monitoring should therefore distinguish registration, initiation, continued engagement, and completion rather than combining these stages into a single completion indicator.

This study has several strengths. It used multiple qualitative methods and included learners, peer and youth-club leaders, school and out-of-school youth representatives, supervisors, and implementation actors from different geographic and sociocultural settings. It incorporated the experiences of both completers and noncompleters and used program data from the same reporting period to contextualize the qualitative findings. The analysis also applied a clear conceptual hierarchy, using the MRC framework to organize the process-evaluation domains, Proctor's taxonomy to define implementation outcomes, and the Technology Acceptance Model and Self-Determination Theory to interpret engagement mechanisms.

Several limitations should be considered. First, the findings were based on self-reported experiences and may have been affected by recall, social-desirability, or courtesy bias, particularly because some data collectors were involved in program implementation. Second, the

qualitative sample included only learners who had initiated at least one Leap session. Registered learners who did not initiate, adolescents who did not enroll, and those facing the greatest digital-access barriers were therefore not represented. The study cannot explain their experiences directly. Third, changes in SRH knowledge, behaviour, service utilization, and health outcomes were not independently measured; participants' accounts of improvement should not be interpreted as evidence of causal effects. Fourth, translation from Amharic or Afan Oromo into English may have reduced some linguistic or contextual nuance. Fifth, although participants were purposively selected to capture variation, the study was not designed to quantify differences by sex, age, schooling status, region, participant role, or completion status. The limited and uneven distribution of illustrative quotations also restricts systematic subgroup comparison. Sixth, although the MRC framework informed the evaluation, the study did not independently measure implementation fidelity, dose delivered, exposure to specific content components, or local adaptations. It should therefore be interpreted as a focused process evaluation of implementation experience, engagement mechanisms, and context rather than a comprehensive assessment of every process-evaluation component. Finally, the program data were aggregate, were not linked to individual qualitative participants, and were used only to describe implementation reach and engagement. They cannot establish the causes of initiation or completion patterns.

5. Conclusions

Low-bandwidth mobile delivery can make sexual and reproductive health education more accessible, flexible, and acceptable to adolescents and youth in underserved Ethiopian settings. However, the central finding of this evaluation is that technological access is not equivalent to

meaningful access. Participation depended not only on the availability of a mobile phone but also on reliable networks and electricity, private and autonomous control of the device, supportive gender and household norms, and timely social and technical assistance.

Leap's local-language storytelling, on-demand IVR and SMS delivery, and peer-supported learning were perceived as important for sustaining engagement. Participants also described greater confidence in discussing sexual and reproductive health concerns and seeking youth-friendly information and services, although these outcomes were not independently measured.

Scaling up low-bandwidth mobile SRH education therefore requires more than expanding technological reach. Programs must address gendered control over devices, provide recovery mechanisms following connectivity interruptions, institutionalize peer support, strengthen referral pathways to youth-friendly services, and monitor progression from registration through initiation and completion. Combining accessible technology with the social and implementation conditions required for sustained participation will be essential to achieving equitable reach.

List of abbreviations

AYH, adolescent and youth health; COREQ, Consolidated Criteria for Reporting Qualitative Research; FGD, focus group discussion; IDI, in-depth interview; IVR, interactive voice response; KII, key informant interview; MRC, Medical Research Council; SDT, Self-Determination Theory; SMS, short message service; SRH, sexual and reproductive health; TAM, Technology Acceptance Model.

Additional files

Additional file 1. Microsoft Excel workbook (.xlsx). Title: Leap AYH program-monitoring tables. Description: Registration, initiation, completion, learner-status, and training-stage data disaggregated by region, sex, and operational age category.

Additional file 2. Microsoft Word document (.docx). Title: English-language focus group discussion, in-depth interview and key-informant interview guides. Description: Semi-structured guides used to explore accessibility, acceptability, engagement, implementation experience, perceived outcomes, and recommendations for improving Leap AYH.

Additional file 3. Microsoft Word document (.docx). Title: Completed COREQ checklist. Description: Reporting locations for the 32-item Consolidated Criteria for Reporting Qualitative Research checklist.

6. Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Ethiopian Public Health Association Research Ethics Review Committee (EPHA-RERC) (Ref. No. EPHA/OG/728/23, dated July 17, 2023). The approval was subsequently renewed under Ref. No. EPHA/OG/466/24, dated August 7, 2024, and Ref. No. EPHA/OG/550/25, dated August 18, 2025. Written permission to conduct the study was also obtained from the Ministry of Health, the relevant Regional Health Bureaus, zonal health departments, and participating institutions. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Written informed consent was obtained from participants aged 18 years or older. For participants younger than 18 years, written informed consent was obtained from a parent or legal guardian, and assent was obtained from the adolescent participant. Participants were informed about the study purpose, procedures, potential benefits and risks, confidentiality protections, the voluntary nature of participation, and their right to decline any question or withdraw at any time without consequence. Interviews and focus group discussions were conducted only after the required consent and assent had been documented. All data were de-identified before analysis, and appropriate measures were implemented to protect participants' privacy and confidentiality.

Consent for publication

Not applicable.

Availability of data and materials

The qualitative data generated and analyzed during this study are not publicly available because they contain sensitive sexual and reproductive health information and participants did not provide consent for unrestricted public sharing of interview and focus group transcripts. De-identified data may be made available from the corresponding author upon reasonable request, subject to ethical approval, institutional data-governance requirements, and appropriate safeguards to protect participant confidentiality. Aggregate program-level data are subject to the data-governance requirements of the implementing organization.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

GMA and LA contributed to the conceptualization, methodology, formal analysis, and writing—review and editing. MA, MB, BA, GAK, ST, GA, NG, CG, TD, WG, SA, BM, DGM, WK, TW and MDM contributed to validation and writing—review and editing. All authors read and approved the final manuscript.

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Supplementary Files

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- Additionalfile1.xlsx
- Additionalfile2EnglishDataCollectionGuides.docx
- Additionalfile3COREQChecklist.docx