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Intersection of adolescent sexual, reproductive, and mental health in Sub-Saharan Africa

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Intersection of adolescent sexual, reproductive, and mental health in Sub-Saharan Africa

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Editorial: Intersection of adolescent sexual, reproductive, and mental health in Sub-Saharan Africa

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Editorial on the Research Topic
Intersection of adolescent sexual, reproductive, and mental health in Sub-Saharan Africa

Introduction

Adolescence is a critical developmental stage marked by significant physical, emotional, and social changes (1). In sub-Saharan Africa (SSA), over 60% of the population is under the age of 25, underscoring the urgent need to invest in adolescent health—particularly sexual, reproductive, and mental health (SRMH)—as both a public health imperative and a strategic pathway to sustainable development (2, 3). These domains are deeply interconnected: untreated mental health challenges can increase vulnerability to risky sexual behaviours, while adverse sexual and reproductive experiences—such as sexual violence, unplanned pregnancies, and restricted autonomy—can negatively affect mental well-being, with long-lasting consequences into adulthood (4, 5).

Despite their significance, adolescent SRMH issues continue to be underprioritized, underfunded, and poorly integrated into health systems across the region (6, 7). Structural, cultural, and policy-related barriers further limit access to youth-friendly services and comprehensive SRMH education (8). This Research Topic seeks to address these critical gaps by bringing together a collection of studies that explore the multifaceted and often overlooked intersection of SRMH among adolescents in SSA. The articles present diverse methodological approaches and rich contextual insights that collectively enhance our understanding of adolescent SRMH and provide evidence to inform future directions in research, policy, and practice.

Overview of contributions

This Research Topic brings together eleven peer-reviewed articles from Ethiopia, Rwanda, the Democratic Republic of Congo (DRC), and Kenya, employing a variety of methodologies

including quantitative, qualitative, mixed-methods designs, systematic reviews, and scoping reviews. Collectively, these studies provide a comprehensive understanding of adolescent and youth SRH in sub-Saharan Africa, revealing persistent challenges and highlighting evidence-based policy and programmatic recommendations.

Several articles examine sexual violence and its associated psychosocial consequences. A case-control study from Southern Ethiopia revealed a high prevalence of childhood sexual abuse, significantly associated with early exposure to violence, substance use, and lack of parental supervision. These findings emphasize the need for integrated child protection systems and early intervention programs aimed at mitigating adverse childhood experiences and fostering safe, supportive home environments (Dinagde et al.). Similarly, a study from the Democratic Republic of Congo (DRC) found a high incidence of non-consensual sexual acts among adolescents, reinforcing the urgency of enacting and enforcing robust legal frameworks and community-based mechanisms to prevent sexual violence and provide support to survivors (Yode et al.).

The social determinants of adolescent SRH are also a critical focus. In Rwanda, analysis of national survey data identified low levels of education, early sexual initiation, and rural residence as key drivers of teenage pregnancy. These findings underscore the importance of expanding comprehensive sexuality education (CSE), particularly in rural schools, and increasing girls' access to secondary and higher education to delay early childbearing and empower adolescent girls (Nduhuye et al.).

Risky sexual behavior among specific population groups was also explored. A study among taxi drivers in northwest Ethiopia revealed patterns influenced by alcohol consumption, peer pressure, and limited access to SRH information. These insights suggest the need for targeted behavior change communication strategies and the deployment of mobile SRH services tailored to high-risk occupational groups (Laikemariam and Fetene).

In the higher education context, a study among university students in eastern Ethiopia found alarmingly low levels of knowledge regarding reproductive rights, particularly among first-year students. This calls for the integration of reproductive rights education into university orientation and life skills training programs to enhance informed decision-making among young adults (Hussen et al.).

Service utilization barriers were highlighted in a systematic review and meta-analysis of high school students across Ethiopia, which reported low use of SRH services due to negative provider attitudes and the lack of youth-friendly services. This underscores the need for the Ministry of Health and educational institutions to expand access to adolescent- and youth-friendly health services that are confidential, accessible, and non-judgmental (Delie et al.).

A cross-sectional study in Gondar further illustrated the limited nature of parent–adolescent communication on SRH matters. Parental education and prior exposure to SRH education were identified as positive predictors of such communication. These findings point to the importance of national strategies that promote family life education and facilitate community-level dialogue to foster intergenerational communication on SRH (Melese et al.).

Qualitative research from Ethiopia revealed that adolescent sexual behaviors are significantly influenced by peer pressure, romantic relationships, and weak adult guidance. This highlights the need for school- and community-based mentorship programs to support adolescents in building life skills and making informed decisions (Baraki and Thupayagale-tshweneagae). Additionally, a multilevel and latent class analysis in the Gamo Zone revealed disparities in SRH service utilization based on residential location and family involvement, indicating the importance of equity-focused health system planning and family-inclusive adolescent health promotion (Sidamo et al.).

At the regional level, a scoping review of SRH interventions in sub-Saharan Africa found that while youth-friendly services, peer education, and school-based programs have demonstrated impact, implementation gaps remain significant. This highlights the need for stronger monitoring and evaluation frameworks and sustained investment in capacity-building for SRH program implementers (Chipako et al.). Finally, a study from Kenya emphasized adolescents' preferences for contraceptive services that are private, respectful, and convenient. These insights advocate for adolescent-centered service delivery models that are confidential, responsive to user preferences, and designed to meet the unique needs of young people (Harrington et al.).

Together, these contributions provide an in-depth, evidence-based understanding of the diverse SRH challenges faced by adolescents and youth across sub-Saharan Africa. They call for multisectoral, rights-based, and context-specific approaches that prioritize equity, inclusivity, and the meaningful engagement of young people. To achieve sustainable progress in adolescent and youth SRH outcomes, policy and program efforts must be coordinated, responsive, and firmly grounded in the lived experiences of the region's adolescents.

Emerging themes and synthesis

Collectively, these studies surface several cross-cutting themes with implications for adolescent health programming and policy in SSA:

1. Integrated SRMH Services: The interconnected nature of sexual, reproductive, and mental health calls for integrated, adolescent-centered service delivery models. The psychosocial aftermath of sexual violence and unplanned pregnancies, compounded by limited access to care, demands holistic approaches that address both physical and mental well-being.
2. Gender Disparities: Adolescent girls continue to bear the brunt of adverse SRMH outcomes, including coerced sex, early pregnancies, and societal stigma. Effective interventions must adopt a gender-responsive lens that promotes equity, empowerment, and protection.
3. Socio-cultural and Structural Barriers: Taboos around sexuality, restrictive gender norms, limited parent–child communication, and structural inadequacies within health systems undermine adolescent access to essential services and information.

Culturally sensitive and community-based interventions are essential to overcome these challenges.

4. Adolescent Participation and Contextualization: Meaningful engagement of adolescents in the design, implementation, and evaluation of programs is crucial. Interventions must be context-specific and grounded in the lived realities of diverse adolescent populations.

Critical gaps and future directions

While this Research Topic contributes valuable evidence, several gaps still persist:

- Marginalized Adolescents: There remains a paucity of research focusing on adolescents from marginalized backgrounds, including those with disabilities, those living in humanitarian settings, and sexual and gender minorities. Targeted research is needed to understand and respond to their specific vulnerabilities.
- Mental Health Integration: Mental health remains understudied within SRH frameworks. Evidence underscores that mental health is both a determinant and consequence of SRH outcomes and it must be systematically integrated into adolescent health policies and programs.
- Research-to-Policy Translation: A recurring challenge is the disconnect between research findings and their translation into policy and scalable interventions. Strengthening implementation science, fostering multi-sectoral collaboration, and ensuring adequate funding are essential to bridge this gap.

Future research should prioritize longitudinal studies to track SRMH outcomes over time, robust intervention trials to assess efficacy in real-world settings, and implementation research to support the uptake of evidence-based practices.

Conclusion

This collection of SRMH-related papers represents a significant step forward in illuminating the multidimensional and interrelated nature of adolescent SRMH in SSA. We extend our sincere appreciation to the contributing authors for their scholarly rigor, to the reviewers for their constructive feedback, and to all those who supported the development of this Research Topic.

As SSA continues to grapple with the dual challenges of a youthful population and constrained health systems, it is essential to prioritize integrated, inclusive, and evidence-based adolescent health strategies. The future of the continent depends on the well-being of its adolescents—not only in terms of their reproductive health, but also their mental wellness, identity, and aspirations. The health and dignity of young people in SSA are not optional—they are fundamental human rights and critical pillars for sustainable development.

Author contributions

NS: Validation, Methodology, Writing – review & editing, Formal analysis, Supervision, Project administration, Data curation, Investigation, Software, Conceptualization, Writing – original draft, Resources, Funding acquisition, Visualization. SH: Resources, Funding acquisition, Writing – review & editing, Software, Formal analysis, Methodology, Writing – original draft, Project administration, Data curation, Investigation, Visualization, Conceptualization, Validation, Supervision. SC: Project administration, Formal analysis, Writing – original draft, Supervision, Data curation, Methodology, Visualization, Validation, Investigation, Conceptualization, Resources, Software, Writing – review & editing, Funding acquisition. ZT: Supervision, Resources, Investigation, Visualization, Software, Validation, Funding acquisition, Conceptualization, Writing – review & editing, Project administration, Formal analysis, Data curation, Methodology, Writing – original draft.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The author(s) declare that no Generative AI was used in the creation of this manuscript.

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Impact of sexual and reproductive health interventions among young people in sub-Saharan Africa: a scoping review

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Objectives: The aim of this scoping review was to identify and provide an overview of the impact of sexual and reproductive health (SRH) interventions on reproductive health outcomes among young people in sub-Saharan Africa.
Methods: Searches were carried out in five data bases. The databases were searched using variations and combinations of the following keywords: contraception, family planning, birth control, young people and adolescents. The Cochrane risk-of-bias 2 and Risk of Bias in Non-Randomized Studies-of-Interventions tools were used to assess risk of bias for articles included.
Results: Community-based programs, mHealth, SRH education, counselling, community health workers, youth friendly health services, economic support and mass media interventions generally had a positive effect on childbirth spacing, modern contraceptive knowledge, modern contraceptive use/uptake, adolescent sexual abstinence, pregnancy and myths and misperceptions about modern contraception.
Conclusion: Sexual and reproductive health interventions have a positive impact on sexual and reproductive health outcomes. With the increasing popularity of mHealth coupled with the effectiveness of youth friendly health services, future youth SRH interventions could integrate both strategies to improve SRH services access and utilization.

KEYWORDS

sexual and reproductive health, young people, adolescents, contraception, family planning, sub-Saharan Africa

1 Introduction

Sexual and reproductive health (SRH) challenges are currently recognised through Sustainable Development Goal (SDG) number 3 (1, 2). SRH problems have been shown to account for about one-fifth of the disease burden worldwide (3) and the burden is much higher among young women in the reproductive age group (4). Sexual activity and experimentation are normative parts of adolescent development that may, at the same time, be associated with adverse SRH outcomes, including the acquisition of sexually transmitted illnesses (STIs), unplanned pregnancies and abortions (5, 6). Moreover, many young women are at high risk of lack of access to, and inconsistent or incorrect use of contraception leading to unintended pregnancies (7, 8). Unintended pregnancies result in disruptions in young women's education, professional opportunities and, essentially, reproductive sovereignty. Inequalities such as these have implications on a central pillar of the SDGs: to leave no one behind. While overall,

significant progress has been made on the SDGs in years gone by, some discrepancies have continued, including those between rural and urban communities as well as those caused by socioeconomic status, gender, age and other demographic factors (9).

Young people especially in sub-Saharan African have been reported to have limited access to SRH services (10, 11). Access to SRH services is affected by a myriad of factors related to young people's SRH knowledge and awareness of availability of services, and access and usage of these services. Several cultural, socioeconomic and political factors further act as barriers to the delivery of SRH information and services to young people. Additionally, failure to provide youth friendly SRH services, unwelcoming behaviour and negative attitude by healthcare workers often act as barriers to young people's access and usage of SRH services (12, 13). These scenarios puts pressure on sub-Saharan Africa policy makers and practitioners to find ways of mitigating SRH challenges (14). Therefore, health care providers have an important role to play in ensuring that young people have access to high quality and non-judgmental SRH services in youth-friendly settings that recognize the unique bio-psychosocial needs of young people (6).

Several countries in sub-Saharan Africa including Zimbabwe, Malawi, Kenya, Rwanda, Ethiopia and South Africa have implemented successful SRH programs targeting young people (15, 16). Thus, African countries have acknowledged the importance of SRH among young people, and as a result, have been implementing related strategies both at community and facility levels. These strategies have included comprehensive sexuality education (CSE), referred to as sexuality and relationship education curricula that are age-appropriate and culturally relevant (17, 18). They have also encompassed peer education, mass media campaigns, cash transfers and youth-friendly centres—which are spaces created for young people to access SRH health information and services (19–21), and youth-friendly services—which are accessible and appropriate services that appeal to youths in a manner that promotes equity and interactions between users and providers (22).

2 Objective

The aim of this scoping review was to identify SRH interventions and provide an overview of the impact these interventions on reproductive health outcomes among young people in sub-Saharan Africa.

3 Methods

Preferred Reporting Items for Systematic reviews and Meta-Analysis extension for Scoping reviews (PRISMA-ScR) guidelines were used to search and select the articles included in this scoping review (23). To make sure that all relevant information was included in the analysis, the PRISMA-ScR checklist (Table 1) was utilised. Data extraction was also guided by the PROGRESS-Plus framework, which was suggested by the Campbell and Cochrane Equity Methods Group (24). The population, intervention, comparison, outcome and context (PICOC) model for review questions was applied in the designing of the research question (25).

3.1 Search strategy

Five databases were searched: PubMed, Scopus, Psychological Information Database (PsycINFO), Cumulative Index to Nursing and Allied Health Literature (CINAHL), and the Cochrane Central Register of Controlled Trials. Predefined keywords, such as "contraceptives" and "young adults," together with their synonyms, were used to search the databases. It was decided to create each concept's variations based on similar reviews. The initial search was conducted in August 2021 and updated in August 2023. Table 1 illustrates the search strategy for PubMed including Boolean operators, which was adapted for the other databases. Relevant articles were also searched using the PubMed "similar articles" function. To maximise the findings' applicability to current policy, a literature search was conducted from January 2010 to August 2023.

3.2 Data collection and analysis

3.2.1 Selection of studies

Two reviewers independently examined the titles and abstracts, excluding articles that were irrelevant. The articles that were identified were transferred to Mendeley Desktop, where any duplicated articles were eliminated. Afterwards, the reviewers assessed the eligibility of the remaining articles.

3.2.2 Data extraction

Two reviewers independently gathered information from each article that was included in the comprehensive review by utilizing a predetermined excel spreadsheet form for data extraction. The excel spreadsheet form was developed by the reviewers. In case of any discrepancies, a third reviewer was involved to achieve a resolution. The following information was extracted from each article:

(1) Bibliographic information
(2) Study aims or questions.
(3) Study characteristics (design, sample size, number of arms)
(4) Intervention and control (type and characteristics of interventions and controls)
(5) Study setting (country)
(6) PROGRESS-Plus factors
(7) Outcome measures (type of outcome, definition of outcome)

3.2.3 Criteria for considering studies for this review

Studies that met the following criteria were included:

Population: Studies that focused on youths aged 15–24 years in Sub-Saharan Africa. However, for the purpose and context of the

TABLE 1 Search strategy in pubMed.

Search number	Search details	Results
25	((“Contraception”[Title/Abstract] OR “Contraceptives”[Title/Abstract] OR “family planning”[Title/Abstract] OR “family plan”[Title/Abstract] OR “birth control”[Title/Abstract] OR “birth prevention”[Title/Abstract] OR “planned parenthood”[Title/Abstract]) AND (“young person”[Title/Abstract] OR “young people”[Title/Abstract] OR “young adults”[Title/Abstract] OR “young adulthood”[Title/Abstract] OR “young women”[Title/Abstract] OR “young men”[Title/Abstract] OR “emerging adults”[Title/Abstract] OR “college students”[Title/Abstract] OR “Adolescents”[Title/Abstract] OR “Teenagers”[Title/Abstract] OR “Teenage”[Title/Abstract] OR “Teens”[Title/Abstract] OR “Youth”[Title/Abstract] OR “generation z”[Title/Abstract])) AND (2010:2023[pdat])	4,274
24	(“Contraception”[Title/Abstract] OR “Contraceptives”[Title/Abstract] OR “family planning”[Title/Abstract] OR “family plan”[Title/Abstract] OR “birth control”[Title/Abstract] OR “birth prevention”[Title/Abstract] OR “planned parenthood”[Title/Abstract]) AND (“young person”[Title/Abstract] OR “young people”[Title/Abstract] OR “young adults”[Title/Abstract] OR “young adulthood”[Title/Abstract] OR “young women”[Title/Abstract] OR “young men”[Title/Abstract] OR “emerging adults”[Title/Abstract] OR “college students”[Title/Abstract] OR “Adolescents”[Title/Abstract] OR “Teenagers”[Title/Abstract] OR “Teenage”[Title/Abstract] OR “Teens”[Title/Abstract] OR “Youth”[Title/Abstract] OR “generation z”[Title/Abstract])	10,851
23	“young person”[Title/Abstract] OR “young people”[Title/Abstract] OR “young adults”[Title/Abstract] OR “young adulthood”[Title/Abstract] OR “young women”[Title/Abstract] OR “young men”[Title/Abstract] OR “emerging adults”[Title/Abstract] OR “college students”[Title/Abstract] OR “Adolescents”[Title/Abstract] OR “Teenagers”[Title/Abstract] OR “Teenage”[Title/Abstract] OR “Teens”[Title/Abstract] OR “Youth”[Title/Abstract] OR “generation z”[Title/Abstract]	480,416
22	“generation z”[Title/Abstract]	237
21	“Youth”[Title/Abstract]	95,550
20	“Teens”[Title/Abstract]	7,545
19	“Teenage”[Title/Abstract]	10,043
18	“Teenagers”[Title/Abstract]	14,468
17	“Adolescents”[Title/Abstract]	241,992
16	“college students”[Title/Abstract]	26,817
15	“emerging adults”[Title/Abstract]	2,754
14	“young men”[Title/Abstract]	16,668
13	“young women”[Title/Abstract]	27,500
12	“young adulthood”[Title/Abstract]	9,827
11	“young adults”[Title/Abstract]	87,376
10	“young people”[Title/Abstract]	38,199
9	“young person”[Title/Abstract]	1,751
8	“Contraception”[Title/Abstract] OR “Contraceptives”[Title/Abstract] OR “family planning”[Title/Abstract] OR “family plan”[Title/Abstract] OR “birth control”[Title/Abstract] OR “birth prevention”[Title/Abstract] OR “planned parenthood”[Title/Abstract]	86,045
7	“planned parenthood”[Title/Abstract]	1,413
6	“birth prevention”[Title/Abstract]	311
5	“birth control”[Title/Abstract]	5,700
4	“family plan”[Title/Abstract]	18
3	“family planning”[Title/Abstract]	44,156
2	“Contraceptives”[Title/Abstract]	30,807
1	“Contraception”[Title/Abstract]	43,904

scoping review the word youths was used interchangeably with young people.

Intervention: This review focused on articles that reported on the effectiveness of SRH interventions on pregnancy and contraceptive use. The review also focused on papers that report effectiveness of SRH interventions on secondary outcomes such as increased knowledge of contraceptives, positive attitude/change towards contraceptives and dispelling myths and misconceptions.

Comparison: Studies with comparison groups that included older people (25 and above), no intervention, standard care group and another intervention.

Study designs: Randomised controlled trials (RCTs), interrupted time series, prospective or retrospective cohort studies and controlled before and after designs that meet the inclusion criteria were considered for the study.

Outcomes:

Primary outcomes included studies with at least one of the following metrics:

- Using contraception; using a new technique; continuing or improving the usage of an existing method.
- Becoming pregnant (at least six months after the intervention started).

Secondary outcomes include the following:

- Attitude about contraception or a particular type of contraception.
- Knowledge of the effectiveness of contraceptives or the usage of effective methods.
- Adolescent sexual abstinence.

Context: sub-Saharan Africa.

Studies were excluded if:

- Full text and abstract were both unavailable or only the abstract was available but did not convey the needed data.
- Conference abstract
- Narrative or systematic reviews
- Published before January 2010

3.3 Assessment of study quality

The Cochrane Risk-of-Bias tool for randomised trials (RoB 2), version 2, was employed by the reviewers for randomised controlled trials (RCTs). Five categories were used to evaluate bias, with each aspect receiving a judgement (high, low, unclear), namely selection, performance, attrition, reporting, and other (26). Reviewers employed the Risk of Bias in Non-Randomized Studies —of Interventions (ROBINS-I) tool to evaluate the risk of bias in non-randomized controlled trials. Studies were categorised as having a low, moderate, significant, or critical risk of bias (27).

3.4 Data synthesis

Due to the heterogeneity in the design of the studies that were included, along with the diversity in outcomes and interventions, it was deemed unsuitable to conduct a meta-analysis. To enable the exploration of descriptive themes derived from the research, a thematic synthesis approach was employed for data synthesis. A narrative summary was utilized to provide an interpretation of the results and elucidate their connection to the objectives and inquiries of the review (28).

3.5 Patient and public involvement statement

Since the data for the review article was extracted from published articles, without direct patient involvement, ethical approval was not required.

4 Results

4.1 Identification of potential studies

Electronic searches of 5 databases identified 20,960 potential articles (Pubmed: 4,274, CINAHL: 5,500, Cochrane: 3,418, PsycINFO: 4,768, Scopus: 3,000). After 20,458 were excluded through screening the titles and abstracts, followed by removal of 89 duplicates, a total of 413 full text articles were screened for eligibility. Full text screening led to a total of 30 full text articles and 46 studies that were included in the scoping review. Figure 1 shows the flow chart of the studies identification and selection process.

4.2 Usage of PROGRESS-Plus factors

All 30 articles and 43 individual studies reported at least 2 PROGRESS-Plus factors (Tables 2, 3). Age distribution was the most reported PROGRESS-Plus factor (reported in 39 studies) followed by education levels, marital status, and parity which were reported in 35, 27 and 19 studies respectively. Religion was reported in 13 studies, and gender, occupation and socio-economic status were reported in 11 studies each. Place of residence and race/ethnicity were reported in 7 and 8 studies respectively. Living situation was the least reported PROGRESS-Plus factor, being reported in 3 studies. Most studies ($n = 43$) considered PROGRESS-Plus factors as control variables when measuring the effect of the intervention for example in logistic regression. Among these, age, education levels and marital status were the most controlled for. Three studies in an article by Morgan and colleagues (29) and one study in an article by Levy and colleagues (30) identified PROGRESS-Plus factors, but failed to include them in their final analyses.

4.3 Risk of bias in included RCT studies

The risk of bias results for RCT studies ($n = 20$) are summarised in Figures 2, 3. Reporting on the overall risk of bias domain, six studies had low risk bias, one study each from articles by Yakubu and colleagues, Wondimagege and colleagues and Gichangi and colleagues (31–33), and three studies from an article by Silverman and colleagues (34). Most of the studies 45% ($n = 9$) had some concerns in the overall risk of bias domain. Lastly, five studies, two studies each from articles by Nuwamanya and colleagues (35) and Erdhardt-Ohren colleagues (36) and one study from an article by Lemani and colleagues (37) had high risk of bias.

4.4 Risk of bias of non-randomised control studies included in the scoping review

The risk of bias assessment results using the ROBINS-I tool for the non-RCTs studies ($n = 26$) is shown in Figure 4. Based on the ROBINS-I tool none of the studies included in the review had an overall low risk of bias. As expected with non-RCTs, most studies 76.9% ($n = 20$) included were labelled as moderate risk studies across all domains. Five studies were labelled as serious risk studies across all domains (30, 38–41) and one study by Fikree and colleagues (42) was judged to be critical risk of bias study.

4.5 SRH interventions identified from the review

The narrative synthesis of the results used in this scoping review was done in line with the recommendations set out in the PRISMA-ScR guidelines. Based on the research objectives, studies were classified into one of the following eight research domains: community-based program interventions, community health workers interventions, SRH education interventions, Youth friendly health services (YFHS) interventions, counselling interventions, mobile phone-based interventions, economic support, and mass media.

4.5.1 Community-based program intervention

Four studies in an article by Morgan and colleagues 2020, used a community-based program with multiple interventions to improve SRH among young people. The program included home

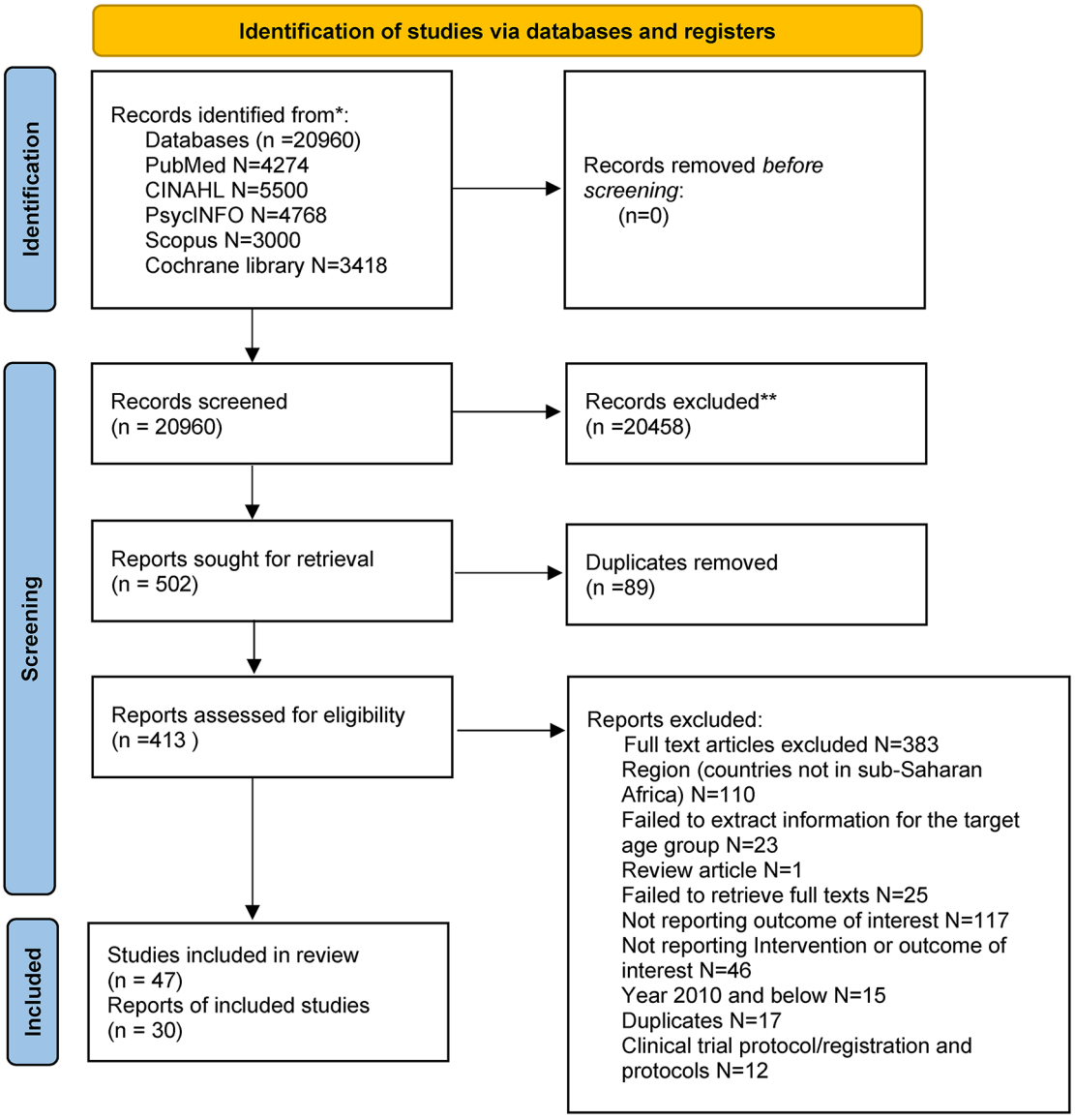

FIGURE 1
Flow chart of the studies identification and selection process.

visits by community health workers, community sensitization, and continuing family planning service delivery at facilities and through mobile outreach. It also included peer group sessions with first-time mothers, small group sessions with the husbands or partners of peer group members, and small group sessions with older women, usually the mothers or mothers-in-law of peer group members (29).

4.5.2 Community health workers interventions

Community health workers (CHWs) or lay health worker are defined as healthcare workers who perform functions related to health care delivery and are trained in some way in the context of an intervention, but who has not received a formal professional or para-professional certificate or tertiary education degree (7, 43). CHWs are an effective means to reach clients when access is limited especially in poor resourced remote rural areas (44). In the current review, 7 studies assessed the impact of CHWs interventions on SRH outcomes among adolescents and young adults. Brooks and colleagues, 2019 and Silverman and colleagues, 2023, reported that CHWs improved modern contraceptive uptake among adolescent girls (single, pregnant, married or pregnant) (34, 45). Mbizvo and colleagues, 2023, reported that CHWs coupled with comprehensive sexuality education (CSE) or YFHS improve pregnancy outcomes among adolescent girls. Lastly, Erhardt and colleagues, 2023, and Lemani and colleagues, 2017, reported that CHWs coupled with counselling improve modern family planning uptake among young women (36).

4.5.3 SRH education

Comprehensive SRH education has been reported to be an effective strategy for improving young people's SRH outcomes

TABLE 2 Characteristics of studies included in the review.

Author	Study design	Year	Location (Country)	Sample characteristics	Comparator	Outcome measures	Intervention details	Duration/ length of intervention	Reported equity characteristic(s)
Morgan (29)	Non RCT (quantitative pre-test-post-test design)	2020	Nigeria	Non-pregnant first-time mothers (mean age 20.6), 63% were aged 20–24 years and 29% were aged 15–19 years. 224 participating partners	Pre-intervention	Increase birth spacing intentions	Community-based programs (Peer group sessions with first time mothers; small group sessions with the husbands/partners of peer group members; small group sessions with older women, typically the mothers or mothers-in-law of peer group members; home visits by Community health workers; community sensitization; and ongoing family planning service delivery at facilities and through mobile outreach).	4 months	None
Morgan (29)	Non RCT (quantitative pre-test-post-test design)	2020	Nigeria	Non-pregnant first-time mothers (mean age 20.6), 63% were aged 20–24 years and 29% were aged 15–19 years. 224 participating partners	Pre-intervention	Increase knowledge/ awareness of modern contraceptive	Community-based programs (Peer group sessions with first time mothers; small group sessions with the husbands/partners of peer group members; small group sessions with older women, typically the mothers or mothers-in-law of peer group members; home visits by Community health workers; community sensitization; and ongoing family planning service delivery at facilities and through mobile outreach).	4 months	None
Morgan (29)	Non RCT (quantitative pre-test-post-test design)	2020	Nigeria	Non-pregnant first-time mothers (mean age 20.6), 63% were aged 20–24 years and 29% were aged 15–19 years. 224 participating partners	Pre-intervention	Decrease myths and misperceptions of using modern contraception	Community-based programs (Peer group sessions with first time mothers; small group sessions with the husbands/partners of peer group members; small group sessions with older women, typically the mothers or mothers-in-law of peer group members; home visits by Community health workers; community sensitization; and ongoing family planning service delivery at facilities and through mobile outreach).	4 months	None
Morgan (29)	Non RCT (quantitative pre-test-post-test design)	2020	Nigeria	Non-pregnant first-time mothers (mean age 20.6), 63% were aged 20–24 years and 29% were aged 15–19 years. 224 participating partners	Pre-intervention	Increase modern contraception use	Community-based programs (Peer group sessions with first time mothers; small group sessions with the husbands/partners of peer group members; small group sessions with older women, typically the mothers or mothers-in-law of peer group members; home visits by Community health workers; community sensitization; and ongoing family planning service delivery at facilities and through mobile outreach).	4 months	**Age** (15–19, 20–24, 25–29) **Gender Marital status** (Never married, living with partner/married, Divorced/ separated/widowed) **Education levels** (Primary Junior Secondary, Secondary, Polytechnic, University) **Age of youngest child No. of living children** (0, 1, 2)
Brooks (45)	Non RCT (retrospective cross-sectional study)	2019	Niger	Young married women living in rural areas. Slightly over half (53.3%) of the women in the study population were older adolescents (18–19 years old) and about half (48.9%) had no formal education.	No intervention (No CHWs visits)	Increase modern contraception use	CHWs visits.	3 months	**Age** (13–15, 16–17, 18–19) **Education** (No school, Quranic school, Government school) **Parity/number of children** (0, 1, 2, 3+) **Race/ethnicity/ tribe** (Zama, Hausa) **Occupation Place of residence**

(*Continued*)

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TABLE 2 Continued

Author	Study design	Year	Location (Country)	Sample characteristics	Comparator	Outcome measures	Intervention details	Duration/ length of intervention	Reported equity characteristic(s)
Yakubu (31)	RCT	2019	Ghana	367 adolescent girls between the ages of 13–19 years. 185 in the intervention group and 182 in the control group.	Normal classes.	Improve adolescent sexual abstinence	Sexual Health Education (In addition to normal classes CSE was delivered to students for 1 month)	3 months	**Age** (years) (14–16, 17–19) **Social class** (Lower, Middle, Upper) **Ethnicity** (Dagombas, Gonjas, Ashantis, Others) **Religion** (Islam, Christianity)
Nuwamanya (35)	RCT	2020	Uganda	1,112 participants between the ages 18–30 years. The median age of participants was 21 years of age, and the majority were female (over 60%), unemployed (over 85%) and Christian (90%). Over 50% were resident in off-campus hostels and in a relationship.	Standard of care-SRH service	Increase contraceptives knowledge	mHealth (internet based mobile phone app for SRH service).	6 months	**Age Gender** (Male, Female) **Living situation** Campus hall, Off-campus hostel Rental home, Own home, Parent/ Guardian home) **Residence (Hometown)** (Urban, Peri-urban Rural) **Marital status** (Relationship Single, Cohabiting, Married, Divorced, Widowed) **Employment** (Employed, Volunteer, Self-employed) **Religion** (Christian, Muslim, and Others)
Nuwamanya (35)	RCT	2020	Uganda	1,112 participants between the ages 18 and 30 years. The median age of participants was 21 years of age, and the majority were female (over 60%), unemployed (over 85%) and Christian (90%). Over 50% were resident in off-campus hostels and in a relationship.	Standard of care-SRH service	Increase use of modern Contraceptive	mHealth (internet based mobile phone app for SRH service).	6 months	**Age Gender** (Male, Female) **Living situation** Campus hall, Off-campus hostel Rental home, Own home, Parent/ Guardian home) **Residence (Hometown)** (Urban, Peri-urban Rural) **Marital status** (Relationship Single, Cohabiting, Married, Divorced, Widowed) **Employment** (Employed, Volunteer, Self-employed) **Religion** (Christian, Muslim, and Others)
Ahmed (66)	Non RCT (Cross sectional study)	2020	Ethiopia	Women who were the age group between 15 and 24 years residing in rural areas (n = 4,061) and women who were the age group between 15 and 24 years residing in the urban area (n = 2,340)	No intervention	Increase use of modern Contraceptive	Mass Media Family Planning Messages (radio, television, newspaper/magazines, and mobile phones).	Cross sectional study	**Age** (15–19, 20–24) **Religion** (orthodox, catholic, protestant, Muslim, other) **Marital status** (single, married, separated, /divorced) **Education** (no education, primary, secondary, higher) **Wealth index** (poorest, poorer, middle, richer, richest,) **Region Parity/number of children** (0, 1–2, 3^{+})
Oberth (51)	Non RCT	2021	Zimbabwe	The mean age of participants was 15 years. The vast majority (91.17%) were adolescent girls (10–19 years old), with fewer (8.84%) young women (20–24 years old). Participants' education ranged from none to tertiary level. Most (82.41%) were currently in school, while 17.60% were out of school or had never attended	Baseline vs. endline	Increase modern contraceptives knowledge	YFHS (Sista2Sista girls-only clubs create safe spaces for supporting and mentoring vulnerable AGYW) and Peer group SRH education.	12 months	**Age** (10–14, 15–19, 20–24 years). **Region/Province** (Harare, Manicaland, Mashonaland Central Mashonaland, East Mashonaland West, Masvingo, Matabeleland North, Matabeleland South, Midlands) **Education** (Never attended school, out of school, In primary school, In secondary school, In tertiary education) **Marital status** (Cohabitating Never married, Married Separated, Divorced, Widowed)

(*Continued*)

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TABLE 2 Continued

Author	Study design	Year	Location (Country)	Sample characteristics	Comparator	Outcome measures	Intervention details	Duration/ length of intervention	Reported equity characteristic(s)
Oberth (51)	Non RCT	2021	Zimbabwe	The mean age of participants was 15 years. The vast majority (91.17%) were adolescent girls (10–19 years old), with fewer (8.84%) young women (20–24 years old). Participants' education ranged from none to tertiary level. Most (82.41%) were currently in school, while 17.60% were out of school or had never attended	Baseline vs. endline	Pregnancy	YFHS (Sista2Sista girls-only clubs create safe spaces for supporting and mentoring vulnerable AGYW) and Peer group SRH education.	12 months	**Age** (10–14, 15–19, 20–24 years). **Region/Province** (Harare, Manicaland, Mashonaland Central Mashonaland, East Mashonaland West, Masvingo, Matabeleland North, Matabeleland South, Midlands) **Education** (Never attended school, out of school, In primary school, In secondary school, In tertiary education) **Marital status** (Cohabitating Never married, Married Separated, Divorced, Widowed)
Fikree (38)	Non RCT (Quasi-experimental)	2017	Ethiopia	20 youth friendly health units	Non-intervention YFHS	Increase contraceptive (LARCs) use	Counselling, YFHS and access to contraceptives (Counselling and access to all contraceptive methods provided by trained LARC YFHS providers in the same YFHS).	8 months	**Age** (years) (15–19, 20–24) **Marital Status** (Married, Living together, Single) **Parity** (Nulliparous, One Two or more)
Fikree (42)	Non RCT (Quasi-experimental)	2018	Ethiopia	20 youth friendly health units where peer educators referred clients	Non-intervention (One-day family planning refresher training that included LARCs)	Decrease Myths and Misconceptions about LARCs	Sexual Health Education (Proved by trained peer educators at YFHS units).	6 months	**Age** (years) (10–14, 15–19, 20–24, 25^{+}) **Marital Status** (Married, living together, Single, Divorced/separated/ widowed) **Parity** (None, 1–3). **Education** (Primary, Secondary, Technical/Vocational Training, University, Out of school, Others)
Lemani (37)	RCT	2017	Malawi	808 women mostly between 20 and 25 years, median age (22 years) and interquartile range (5 years). Most women were from the rural areas.	Family planning untrained CHWs and routine counselling	Increase modern family planning uptake among young women	Couples counselling and CHWs (Family planning trained CHWs and Couples counselling)	6 months	**Age** (14–19, 20–25, 26–30 years). **Education** (Never attended school, out of school, In primary school, In secondary school, In tertiary education) **Marital status** (Not married, Married) **Residence** (Urban, Rural) **Parity** (None, 1–3 children).
Almeida (49)	Non RCT (Quasi-experimental	2018	Angola	589 individuals included (mean age of 16.8 ± 2.5 years), 56.7% were males	Baseline vs. endline	Increase modern contraceptive knowledge among students	Sexual health education (Lectures with time for questions and answers, group work sessions and individual work)	2 months	**Gender** (Male, female) **Age Marital status** (Not married, married or marital)
Rosenberg J (52)	Non RCT	2018	Malawi	Female, 15–24 years old	Standard of Care consisting of vertical HIV testing, family planning, and sexually transmitted infection management in adult-oriented spaces, by providers without extra training.	Increase family planning service uptake	YFHS. Consisting of vertical HIV testing, family planning, and sexually transmitted infection management in an integrated youth-dedicated spaces and staffed by youth-friendly peers and providers.	12 months	**Age (year)** (15–17, 18–20, 21–24) **Marital status** (Single, Married, Divorced/widowed) **Education level** (Primary incomplete, Primary complete) Ever pregnant (No, Yes)

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TABLE 2 Continued

Author	Study design	Year	Location (Country)	Sample characteristics	Comparator	Outcome measures	Intervention details	Duration/ length of intervention	Reported equity characteristic(s)
Wolf (39)	Non RCT	2017	Uganda	129 adolescents (ages 15–19)	Pre-intervention	Increase contraceptive knowledge	Reproductive health education (education program was taught as an interactive discussion)	3 weeks	**Gender** (Male,) Female) **Age** [Mean age 16.7 years (SD = 1.3)] **Marital status** (Unmarried) **Religion** (Catholic, Protestant, Muslim, Born again, Jewish, Orthodox, No Religion) **Education levels** Grade Level (S1, S2-S3, S4 23, S5-S6)
Gaughran (47)	Non RCT	2014	Kenya	42 female teenagers average age 16.5 (+/−1.31) years	Pre-intervention	Increase family planning knowledge of female teenagers.	Reproductive health education (which included didactic sessions, educational games, and open discussions)	6 weeks	**Age** (13–15, 16–17,>18) **Education levels** (Form 1, Form 2, Form 3)
Gaughran (47)	Non RCT	2014	Kenya	42 female teenagers average age 16.5 (+/− 1.31) years	Pre-intervention	Pregnancy	Reproductive health education (which included didactic sessions, educational games, and open discussions)	6 weeks	**Age** (13–15, 16–17,>18) **Education levels** (Form 1, Form 2, Form 3)
Hanne Keyser Hegdahl (48)	RCT	2022	Zambia	Adolescent girls mean age at baseline was 14.1 years (SD 1.34)	standard school and health services	Increase use of modern Contraceptive	CSE and economic support	2 years	**Age Wealth index Marital status Parity Education** (Highest level school parent/ guardian)
Hanne Keyser Hegdahl (48)	RCT	2022	Zambia	Adolescent girls mean age at baseline was 14.1 years (SD 1.34)	standard school and health services	Increase use of modern Contraceptive	Economic support	2 years	**Age Wealth index Marital status Parity Education** (Highest level school parent/ guardian)
Hanne Keyser Hegdahl (48)	RCT	2022	Zambia	Adolescent girls mean age at baseline was 14.1 years (SD 1.34)	standard school and health services	Increase in modern Contraceptive knowledge	CSE and economic support	2 years	**Wealth index Marital status Parity Education** (Highest level school parent/ guardian)
Hanne Keyser Hegdahl (48)	RCT	2022	Zambia	Adolescent girls mean age at baseline was 14.1 years (SD 1.34)	standard school and health services	Increase in modern Contraceptive knowledge	Economic support	2 years	**Wealth index Marital status Parity Education** (Highest level school parent/ guardian)
Michael T. Mbizvo (54)	RCT	2023	Zambia	986 adolescent girls aged 12–24 years from Solwezi and Mufumbwe	Routine CSE	Pregnancy	CHWs and CSE (To complement CSE community health workers provided information on available SRH services in schools)	3 years	**Age** (12–14, 15–19, 20–24) **Education** (Primary school and secondary school) **Religion** (Christianity and other)
Michael T. Mbizvo (54)	RCT	2023	Zambia	986 adolescent girls aged 12–24 years from Solwezi and Mufumbwe	Routine CSE	Pregnancy	YFHS and CSE.	3 years	**Age** (12–14, 15–19, 20–24) **Education** (Primary school and secondary school) **Religion** (Christianity and other)
Collins Annor (53)	Non-RCT	2021	Ghana	392 adolescents	community without YFHS	Increasing adolescent knowledge of contraceptives	YFHS	-	**Gender** (female, male) **Age (10–13, 14–15, 16–19) Place of residence** (Rural, urban) **Religion** (Catholic, other Christian, Islam) **Marital status of parents** (Single or married) **Education** (Education levels of breadwinner no formal education, basic education secondary and above)

(*Continued*)

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TABLE 2 Continued

Author	Study design	Year	Location (Country)	Sample characteristics	Comparator	Outcome measures	Intervention details	Duration/ length of intervention	Reported equity characteristic(s)
Marlene Makenzius (40)	Non-RCT	2023	Kenya	1,368 school children mean (SD) ages were 16.4 years in the intervention group and 16.9 years in the control group.	Standard CSE	Decrease Myths and Misconceptions about LARCs	School based 8-hour stigma-reduction sexuality education over four sessions and standard CSE	1 month, 1 year	**Age Gender**
Wondimagegene (32)	RCT	2022	Ethiopia	224 sexually active secondary school adolescent girls aged 15 −19 years		Increase modern contraception use	School-based per-led education	6 months	**Age Place of residence Education levels Religion Marital status**
Quraish Sserwanja (69)	Non-RCT	2022	Sierra Leone	Young women aged 15–24 years	No exposure to mHeath	Increase modern contraceptive uptake	mHealth	-	**Age** (15–19 and 20–24 years) **Residence** (Urban and Rural) **Region** (Northern, Eastern, Southern, Western and Northwestern) **Religion** (Muslims and Christians and others) (Level of education No education, primary, secondary and tertiary) **Wealth index** (Richest, richer, middle, poorer and poorest) **Parity** (None, one and above 1) **Marital status** (Married and Not married)
Quraish Sserwanja (69)	Non-RCT	2022	Sierra Leone	Young women aged 15–24 years	No exposure to mass media	Increase modern contraceptive uptake	Mass media (family planning messages on radio)	-	**Age** (15–19 and 20–24 years) **Residence** (Urban and Rural) **Region** (Northern, Eastern, Southern, Western and Northwestern) **Religion** (Muslims and Christians and others) **Level of education** No education, primary, secondary and tertiary) **Wealth index** (Richest, richer, middle, poorer and poorest) **Parity** (None, one and above 1) **Marital status** (Married and Not married)
Peter Gichangi (33)	RCT		Kenya	740 youth aged 18–24 years	standard care	Busting contraception myths and misconceptions	mHealth	7 weeks	**Age** (18–19 years 20–24 years) **Gender** (Male Female) **Education level** (Never gone to school Primary school Secondary school Postsecondary education) **Place of residence Marital status** (Single Friends with benefits/ dating/cohabiting/engaged, Married) **Parity** (None One child, 2 + children)

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TABLE 2 Continued

Author	Study design	Year	Location (Country)	Sample characteristics	Comparator	Outcome measures	Intervention details	Duration/ length of intervention	Reported equity characteristic(s)
Selema Akuiyibo (41)	Non-RCT	2021	Nigeria	8,930 young people aged 15–24 years	Pre-intervention	knowledge of condom use	MTV Shuga Peer Education	5 days	**Age** (15–19 20–24 years) **Gender** (Male Female) **Marital status** (Single, Married, Previously married) **Place of residence** **Highest educational attainment** (None vocational education, quranic education, primary education, secondary education, tertiary education, no response) **Employment status** [Student (In School) employed, unemployed] **Living situation** (Who respondent lives with parent or relative or alone or friends or partner)
Jay G. Silverman (34)	RCT	2023	Niger	Married adolescent girls aged 13–19	No intervention	Increase modern contraceptive uptake	CHWs	2 years	**Wife parity** (None One child, 2 + children) **Husband education** (Any modern, quranic only, no schooling) **Wife education** (Any modern, quranic only, no schooling)
Jay G. Silverman (34)	RCT	2023	Niger	Married adolescent girls aged 13–19	No intervention	Increase modern contraceptive uptake	Gender-segregated group discussion sessions	2 years	**Wife parity** (None One child, 2 + children) **Husband education** (Any modern, quranic only, no schooling) **Wife education** (Any modern, quranic only, no schooling)
Jay G. Silverman (34)	RCT	2023	Niger	Married adolescent girls aged 13–19 years old	No intervention	Increase modern contraceptive uptake	CHWs and gender-segregated group discussion sessions	2 years	**Wife parity** (None One child, 2 + children) **Husband education** (Any modern, quranic only, no schooling) **Wife education** (Any modern, quranic only, no schooling)
Ritah Bakesiima (57)	RCT	2021	Uganda	588 refugee adolescent girls aged 15–19 years.	Routine counselling, the standard of care.	Increase modern contraceptive acceptance	Peer counselling	Same day	**Age** (15–17, 18–19) **Religion** [Catholic, Anglican, Adventist, Other (Pentecostal, EFC, AIC)] **Ethnicity** [Acholi, Nuer, Dinka, Lotuho, Other (Shilluk, Luo, Bari)] **Education** (None, Primary Secondary, Tertiary) **Occupation** (Unemployed Employed/Selfemployed Peasant farmer, Student) **Marital status** (Single, Cohabiting, Married, Separated/ Divorced/Widowed) **Parity**
Ritah Bakesiima (57)	RCT	2021	Uganda	588 refugee adolescent girls aged 15–19 years.	Routine counselling, the standard of care.	Decrease Myths and Misconceptions about modern contraceptives	Peer counselling	Same day	**Age** (15–17, 18–19) **Religion** [Catholic, Anglican, Adventist, Other (Pentecostal, EFC, AIC)] **Ethnicity** [Acholi, Nuer, Dinka, Lotuho, Other (Shilluk, Luo, Bari)] **Education levels** (None, Primary Secondary, Tertiary) **Occupation** (Unemployed Employed/Selfemployed Peasant farmer, Student) **Marital status** (Single, Cohabiting, Married, Separated/ Divorced/Widowed) **Parity**

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TABLE 2 Continued

Author	Study design	Year	Location (Country)	Sample characteristics	Comparator	Outcome measures	Intervention details	Duration/ length of intervention	Reported equity characteristic(s)
Nivedita L. Bhushan (55)	Non-RCT	2021	Malawi	Adolescent girls and young women aged 15–24 years.	Standard of care	Increased non-barrier contraception and condom uptake	YFHS	1 year	**Age** (15–19, 20–24 years) **Education level** (Completed primary, Did not complete primary) **Living Children** (Yes, no) **Marital status** (Single, ever married)
Nivedita L. Bhushan (55)	Non-RCT	2021	Malawi	Adolescent girls and young women aged 15–24 years.	Standard of care	Increased non-barrier contraception and condom uptake	YFHS ± Small group counselling sessions	1 year	**Age** (15–19, 20–24 years) **Education level** (Completed primary, Did not complete primary) **Living Children** (Yes, no) **Marital status** (Single, ever married)
Nivedita L. Bhushan (55)	Non-RCT	2021	Malawi	Adolescent girls and young women aged 15–24 years.	Standard of care	Increased non-barrier contraceptionand condom uptake	YFHS ± Small group counselling sessions ± Cash Transfer	1 year	**Age** (15–19, 20–24 years) **Education level** (Completed primary, Did not complete primary) **Living Children** (Yes, no) **Marital status** (Single, ever married)
Quraish Sserwanja (67)	Non RCT	2022	Zambia	3,000 adolescents aged 15–19 years	No access to mass media	Reduce teenage pregnancy	Mass media	-	**Age** (15–17 and 18–19 years) **Residence** (Urban and Rural) **Region** (Provinces) **Religion (Muslims and Christians and others) Level of education** (No education, primary, secondary and tertiary) **Wealth index** (Richest, richer, middle, poorer and poorest) **Parity (None, one and above 1) Marital status (Married and Not married) Working status** (Work, not working)
Marcy Levy (30)	Non RCT	2021	Kenya	384 pregnant adolescent girls, adolescent mothers aged 10–19 years	Pre-intervention	Increase modern contraceptive uptake	CHWs visits. (Home visiting team)	12 months	**Age Gender Marital status** (not consider in analysis)
Natsayi Chimbindi (68)	Non RCT	2023	South Africa	2,184 adolescent girls and young women aged 12–24 years	Pre-intervention	Increase modern contraceptive uptake	Mass media (MTV Shuga:Down South)	Baseline interviews were conducted between May 2017 and February 2018 and follow-up interviews April 2018 and September 2019	**Age** (13–14, 15–17, 18–19, 20–22) **Currently in school (No, Yes) Socioeconomic status** (Low, Middle, High) **Place of residence** (Urban/ Periurban, rural)

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TABLE 2 Continued

Author	Study design	Year	Location (Country)	Sample characteristics	Comparator	Outcome measures	Intervention details	Duration/ length of intervention	Reported equity characteristic(s)
Anjali Sharma (61)	Non RCT	2022	Zambia	1,627 young people with a median age of 22 (IQR 21–23) years	Pre-intervention	Increase knowledge of condom use	mHealth [Be in the Know Zambia (BITKZ) web application]	5 weeks	**Gender** (Female, Male) **Age** (18, 19, 20, 21, 22,23,24) **Marital status** (Single, married, divorced/widowed, prefer not to answer) **Education levels** (Less than secondary, secondary, vocational/ technical, college/university) **Employment status** (Unemployed, student/trainee, part-time, full-time, prefer not to answer) **Wealth index** (Poor, average wealth, very wealthy)
Paul Macharia (62)	RCT	2023	Kenya	Adolescents aged 15−19 years randomly assigned to the intervention ($n = 146$) and control ($n = 154$)	Accessed SRH information from regular sources	Increase SRH knowledge	mHealth [Unstructured Supplementary Service Data (USSD)-based app]	3 months	**Gender** (Female, Male) **Education levels** (Primary, secondary and above)
Erhardt-Ohren (36)	RCT	2022	Niger	404 married adolescent girls	No intervention	Increase modern contraceptive and LARC utilization	Counselling (Small group discussions)	1 year 6 months	**Age** (13–14, 15–17, 18–19 years) **Education level** (None, koranic only, government school) **Parity** (0, 1, 2+) **Tribe** (Hausa, Zarma, Fula) **Worked in last 12 months** (Yes, NO)
Erhardt-Ohren (36)	RCT	2022	Niger	404 married adolescent girls	No intervention	Increase modern contraceptive and LARC utilization	CHWs visits	1 year 6 months	**Age** (13–14, 15–17, 18–19 years) **Education level** (None, koranic only, government school) **Parity** (0, 1, 2+) **Tribe** (Hausa, Zarma, Fula) **Worked in last 12 months** (Yes, NO)
Erhardt-Ohren (36)	RCT	2022	Niger	404 married adolescent girls	No intervention	Increase modern contraceptive and LARC utilization	CHWs visits and counselling (Small group discussions)	1 year 6 months	**Age** (13–14, 15–17, 18–19 years) **Education level** (None, koranic only, government school) **Parity** (0, 1, 2+) **Tribe** (Hausa, Zarma, Fula) **Worked in last 12 months** (Yes, NO)

CHWs, community health workers; CSE, comprehensive sexuality education; YFHS, youth friendly health services; RCT, randomized controlled trials; LARCs, long-acting reversible contraceptives.
Bold values indicates the progress plus factors.

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TABLE 3 Usage of PROGRESS-plus factors within all studies.

PROGRESS-Plus factor	Use of PROGRESS-Plus factors	Control variables in measuring intervention effect
Place of residence	7	7
Race/ethnicity	8	8
Occupation/employment status	11	11
Gender/sex	11	10
Religion	13	13
Education levels	35	35
Socio-economic status (SES)	10	10
Income	0	0
Number of living children/parity	19	19
Age	39	38
Marital status	27	26
Living situation	3	3

(46). In the current review, 12 studies reported use of SRH education interventions as a strategy to improve SRH outcomes. Firstly, Yakubu and colleagues, 2019, and Guaghran and colleagues, 2014, reported that sexual health education improved sexual abstinence and pregnancy outcomes among adolescents girls (31, 47). Secondly, Fikree and colleagues, 2018, and Makenzius and colleagues, 2023, reported that SRH education provided by trained peer educators at YHFs and stigma-reduction sexuality education decreased myths and misconceptions about LARCs utilization (40, 42). One study from an article by Hegdahl and colleagues, 2022, reported that comprehensive sexuality education (CSE) combined with economic support improved modern contraceptives uptake among adolescent girls (48). Lastly, 5 studies reported that SRH education improved knowledge of modern contraceptive methods among young people (39, 41, 47–49). Details of the reproductive health education strategies utilized by each study are shown in Table 2.

4.5.4 Youth friendly health services (YFHS) interventions

There is evidence that YFHS improve access to, and utilisation of SRH services by young people (19, 50). In the current review, 9 studies reported the use of YFHS interventions among young people. Four articles reported that YFHS interventions improved modern contraceptives knowledge and uptake by young people (38, 51–53). Oberth and colleagues, 2021, and Mbizvo and colleagues, 2023, reported that YFHS combined with peer group education and CSE, respectively, improved pregnancy outcomes among adolescent girls (51, 54). Three studies from an article by Bhushan and colleagues, 2021, reported that YFHS interventions improved non-barrier contraceptives and condoms uptake among young women (55) (see Table 2 for details of the interventions).

4.5.5 Counselling interventions

Counselling, as an intervention, has been shown to improve SRH services utilisation among young people. Counselling can be delivered directly in person, online, or via the telephone, either by medical or nursing staff, or peers, in individual or group settings. The counselling interventions may consist of a single component or multiple components delivered in a single session, or in multiple sessions at various time points (56). In the present review, 10 studies utilized counselling interventions as strategies for improving modern family services uptake and decreasing myths and misconceptions about modern contraceptives. Among these studies, 2 from an article by Bakesiima and colleagues,

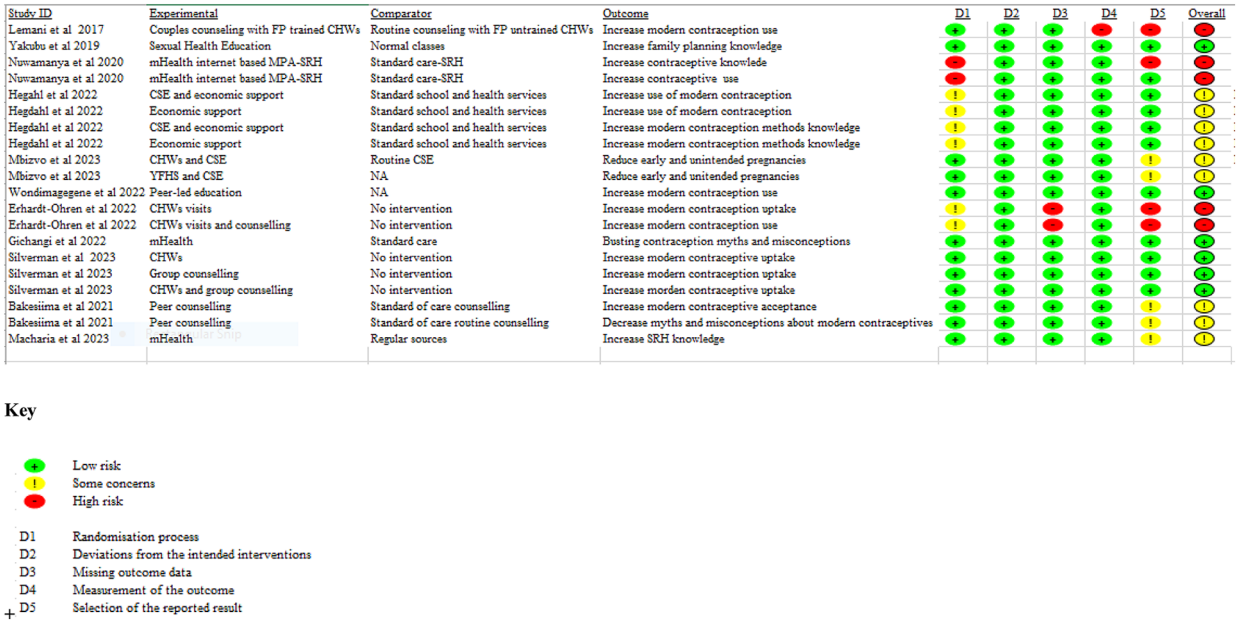

FIGURE 2
Risk of bias for each domain for RCT studies included in the review.

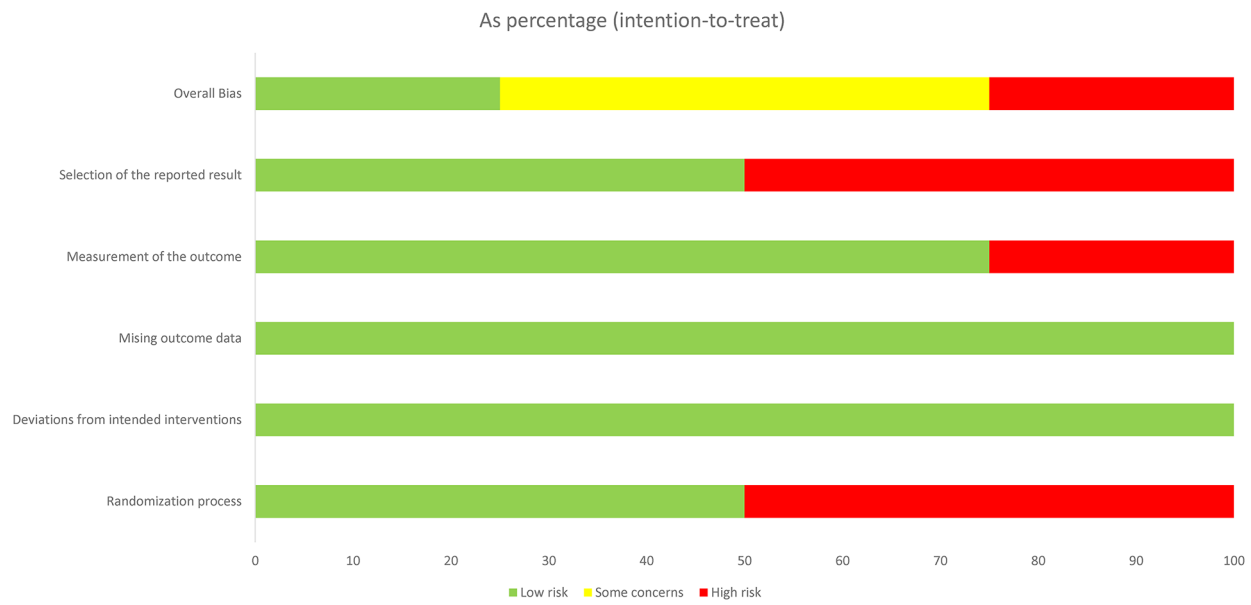

FIGURE 3
Risk of bias graph of each domain presented as percentages across all RCT included in the review.

Study	Bias due to confounding	Bias in selection of participants into the study	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported result	Overall Bias
Morgan et al 2020	Moderate	Low	Low	Low	Moderate	Moderate	Low	Moderate
Morgan et al 2020	Moderate	Low	Low	Low	Moderate	Moderate	Moderate	Moderate
Morgan et al 2020	Moderate	Low	Low	Low	Moderate	Moderate	Low	Moderate
Morgan et al 2020	Moderate	Low	Low	Low	Moderate	Moderate	Low	Moderate
Fikrae et al 2017	Serious	Low	Low	Low	Low	Moderate	Moderate	Serious
Fikrae et al 2018	Serious	Critical	Low	Low	NI	Low	Low	Critical
Brooks et al 2019	Moderate	Low	Low	Low	Low	Moderate	Low	Moderate
Rosenberg et al 2018	Moderate	Low	Low	Low	Low	Moderate	Low	Moderate
Ahmed et al 2020	Moderate	Low	Low	Low	Low	Moderate	Low	Moderate
Oberth et al 2020	Moderate	Moderate	Low	Low	Low	Low	Low	Moderate
Oberth et al 2020	Moderate	Moderate	Low	Low	Low	Low	Low	Moderate
Almeida et al 2020	Moderate	Low	Low	Low	Low	Low	Low	Moderate
Gaughran et al 2014	Moderate	Low	Low	Low	Low	Low	Low	Moderate
Gaughran et al 2014	Moderate	Low	Low	Low	Low	Low	Low	Moderate
Wolf et al 2017	Moderate	Low	Low	Low	Serious	Low	Moderate	Serious
Annor et al 2021	Moderate	Low	Low	Low	Low	Moderate	Moderate	Moderate
Makenzius et al 2023	Serious	Low	Low	Low	Moderate	Moderate	Moderate	Serious
Sserwanja et al 2022 a	Moderate	Low	Moderate	Low	Low	Moderate	Low	Moderate
Akuiyibo et al 2021	Serious	Low	Low	Low	Low	Low	Serious	Serious
Bhushan et al 2021 a	Moderate	Moderate	Low	Low	Moderate	Moderate	Low	Moderate
Bhushan etal 2021 b	Moderate	Moderate	Low	Low	Moderate	Moderate	Low	Moderate
Bhushan et al 2021 c	Moderate	Moderate	Low	Low	Moderate	Moderate	Low	Moderate
Sserwanja et al 2022 b	Moderate	Low	Moderate	Low	Low	Low	Low	Moderate
Levy et al 2021	Serious	Low	Low	Low	Low	Moderate	Serious	Serious
Chimbindi et al 2023	Moderate	Moderate	Moderate	Low	Moderate	Moderate	Low	Moderate
Sharm et al 2022	Moderate	Low	Low	Low	Moderate	Low	Low	Moderate

FIGURE 4
Quality assessment of quantitative non-randomised controlled studies included in the systematic review.

2021, reported that peer counselling improved modern contraceptives acceptance and dispelled myths and misconceptions about modern contraceptives among adolescent girls aged 15–19 years (57). Furthermore, 8 studies from 5 articles reported that groups or couples counselling only, and counselling combined with different SRH interventions (including CHWs, economic support and YFHS) increased modern family planning services uptake and utilization among young women (34, 36–38, 55) (see Table 2 for details of the counselling multicomponent interventions).

4.5.6 Mobile phone-based interventions (mHealth)

Expansion of mobile phone technology and use in recent years provides an important tool to reach underserved populations in low to middle income countries. Populations with restricted access can be reached despite location and need (58–60). With the increasing popularity of mobile based interventions with young people, they promise to improve SRH services utilisation young people. In the present review, four studies utilised mHealth interventions to improve SRH outcomes (33, 35, 61, 62). Nuwamanya and colleagues, 2020, used an internet based mobile phone application to improve the use of modern contraceptive methods (35). Gichangi and colleague, 2022, reported that there was a statistically significant drop in the average absolute number of contraceptives myths and misconceptions believed by the mHealth intervention arm between baseline and endline (33). Sharma and colleagues 2022, reported that at the endline, an mHealth intervention resulted in higher level of knowledge related to condoms and on wearing condoms correctly (61). According to Macharia and colleagues, (2023), there was a statistically significant difference in the total knowledge scores in the mHealth intervention group compared with the control group. Young people reported gaining knowledge on abstinence and condom use from an mHealth application (62).

4.5.7 Economic support

Gender inequality and economic constrains are central factors limiting young women's urgency regarding their own SRH, and ability to use their preferred contraceptive methods (48, 63). Economic support including cash transfers have been theorised to reduce young women's economic vulnerability and engagement in unsafe or asymmetric transactional sex (48, 64). Moreover, free access to a broad contraceptive method mix could increase contraceptive uptake, reduce unmet need, and increase agency in contraceptive decision-making among young women in resource-limited settings (63). In the present review, Hegdahl and colleagues, (2022), reported that there was no evidence of the effects of economic support on contraceptive use among those ever sexually active. However, the addition of CSE improved modern contraceptive use and knowledge of modern contraceptives compared to economic support alone among those recently sexually active (48). Likewise, Bhushan and colleagues, 2021, reported that cash transfers combined with YFHS and small group counselling increased non-barrier contraception and condom uptake (55). In conclusion, economic support coupled with other SRH interventions improves reproduction health outcomes among young women.

4.5.8 Mass media

Mass media campaigns have the potential to effectively convey SRH messages to a wide population. Due to their ability to reach the masses, these campaigns can specifically target a significant number of and young individuals at a relatively minimal expense. Mass media campaigns typically utilize various platforms such as newspapers, television, radio, magazines, social media, and billboards within sub-Saharan Africa. Additionally, they can also be executed through cinema or emerging digital media channels, which encompass websites, pop-up and banner advertisements, codes, and viral marketing (65). Despite previous research highlighting that mass media campaigns can influence SRH (41, 66–68), there have been few attempts to synthesise evidence across young people's reproduction SRH outcomes. Similar to the review by Stead and colleagues, 2019, this study reported mixed evidence of the effect of mass media campaigns on SRH outcomes (65). After adjusting for covariates, Sserwanja and colleagues, 2022, reported that hearing family planning messages on radio and reading texts on mobile phones were statistically associated with increased modern contraceptives uptake among young people in Sierra Leone (69). They further reported that young women who had exposure to family planning messages on radio and mobile phones were more likely to use modern contraceptives when compared to their counterparts without the same mass media exposure. In a different study conducted in Zambia, Sserwanja (67), reported that adolescent girls who had daily access to magazines or newspapers, or internet were less likely to be pregnant or to have had a pregnancy compared with those without the same mass media exposure. After adjusting for HIV-prevention, intervention-exposure, age, education, socioeconomic status, Ahmed and colleagues, 2020, reported that MTVShuga-DS exposure was associated with increased modern contraceptives uptake and consistent condom use among young Ethiopians (66). However, Ahmed and colleagues, 2020, reported that there was no statistically significant association between young women exposed to mass media family planning messages and modern contraceptives uptake in rural areas.

5 Discussion

According to the review, a variety of comprehensive interventions aimed at promoting and providing consistent birth control methods, sexual health education, counselling, and other related services may be able to prevent and control the negative effects associated with risky sexual behaviour among young people in sub-Saharan Africa. It has been demonstrated that raising awareness of SRH and the use of contraceptives lowers the number of unintended births among people. Our findings align with previous assessments that assess the efficacy of different treatments in enhancing teenage self-reported health, and integrate several interventions under a more comprehensive framework to assess their combined effectiveness. A combination of educational and contraceptive interventions may help reduce the rate of unintended pregnancies among adolescents, according to a Cochrane review on primary prevention interventions (school-based, community or home-based, clinic-based, and faith-based). On the other hand, the data from that study showed conflicting results for secondary outcomes, such as the onset of sexual activity, the use of birth control, abortion, childbirth, and STIs (70). Group-based comprehensive risk reduction intervention was found to be an effective technique to lower adolescent pregnancy, HIV, and STIs (71).

Thus, it is essential to raise knowledge of the advantages of contraceptive services and empower young people to make their

own decisions about taking contraceptives (72). Combining educational programs in communities and schools with YFHS, health centre outreach initiatives, and media campaigns are examples of interventions with supporting data (73). Reproductive health services are more likely to be accessed when initiatives to increase service quality are combined with community outreach to encourage young people SRH (19). Regarding services, a number of program evaluations have detailed challenges that many teenagers encounter, including judgmental provider attitudes, a lack of anonymity, a dearth of alternatives for contraception, and a lack of rules and procedures to safeguard teenagers' rights to information and services (21). Approximately one out of every five nations in the world has official rules that restrict access to contraceptive services: Among the most prevalent limitations, parental consent requirements are in place in 9% of the 186 countries for which data is available; limits based on a minimum age or marital status are in place in 5% of nations (74). Nevertheless, teenagers continue to experience provider prejudice in a variety of ways even in nations without official limits. Because of erroneous concerns that hormone treatments might interfere with a young person's ability to conceive, physicians might not advise hormonal treatments to them, or they might discriminate against single youth because they think they shouldn't engage in sexual activity (75). Recent guidelines for self-care treatments, such over-the-counter oral contraceptive tablets and self-administered injectables, may be able to assist young people in overcoming some of these fundamental obstacles (76).

5.1 Limitations and recommendations

Despite providing a broad overview of the impact of SRH interventions on reproductive health outcomes among young people in sub-Saharan Africa, the focus on a scoping review limited our ability to examine the impacts of interventions in detail and statistically. Statistical synthesis was not possible due to considerable heterogeneity across the large numerous articles and studies included in the review, and the SRH outcomes and interventions reported. To perform a meta-analysis, we recommend that future reviews should focus on one SRH outcome and one intervention.

Practice of medicine and public health interventions supported by mobile devices are effective strategies for improving reproductive health outcomes among young people as they promote SRH services utilization (33, 35, 61, 62). This is partly due to their popularity among young people, privacy, and ability to reach populations with restricted access to direct SRH services (58–60). Mass media campaigns can be utilized to communicate SRH information in mass populations and results from this review highlights that they can improve reproductive health outcomes. Since they are delivered at population level, mass media campaigns can target numerous numbers of young people at relatively low costs (65, 77, 78). Harnessing the advantages of both mHealth and mass media intervention could result in development of low cost, easily accessible, convenient, and age-appropriate strategies for widespread dissemination of SRH information (79). Therefore, it is highly recommended to integrate both mHealth and mass media campaigns in future SRH interventions targeting young people with access to mobile devices.

Despite different PROGRESS-Plus factors being reported to influence the effect of SRH interventions, studies in the review did not include all PROGRESS-Plus factors in their analysis which might have resulted in over estimation or underestimation of the impact of the interventions. Therefore, we recommend future studies with rigorous designs and longer-term follow-up to use all PROGRESS-Plus factors as control variables to measure the impact of SRH interventions and maximize applicability of results.

5.2 Contribution of the findings to the field of study

Young people make up a big proportion of the population in Africa's developing economies, with approximately 20% of the population aged 15–24 years. Despite increased attention to family planning, young people in this region continue to face numerous SRH challenges. The review findings could guide future strategies to improve SRH services' access and utilization among young people in sub-Saharan Africa thereby protecting them from unintended pregnancies and unsafe abortions. The review suggests that community-based programs, mHealth, SRH education, counselling, community health workers' visits and youth friendly health service interventions generally had a positive effect on child spacing, modern contraceptive knowledge, modern contraceptive use, adolescent sexual abstinence, pregnancy and myths and misperceptions of modern contraception. Evidence from the review has shown that bringing awareness of the benefits of modern contraceptives and enabling young people to make their own decisions regarding contraceptive services is vital. Several studies reported that mHealth is effective in promoting SRH services utilization. Therefore, future SRH strategies could utilise mHealth to improve knowledge, access and uptake of SRH services. Due to their ability to ensure privacy and reach underserved populations, incorporating mobile devices into SRH interventions among young people and utilizing mass media campaigns to reach a wider audience are recommended strategies. Combining these two components in future national SRH interventions has the potential to improve outcomes, positively impacting reproductive health on a larger scale, at relatively lower costs.

6 Conclusion

Community-based programs, mHealth, SRH education, counselling, CHWs, YFHS, economic support and mass media interventions generally had a positive effect on childbirth spacing, modern contraceptive knowledge, modern contraceptive use, adolescent sexual abstinence, pregnancy and myths and misperceptions of modern contraception. This scoping review could inform administrators, managers, and policymakers on the different SRH interventions to implement in different settings.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

Author contributions

IC: Conceptualization, Data curation, Formal Analysis, Methodology, Resources, Writing – original draft, Writing – review & editing. SS: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Supervision, Writing – original draft, Writing – review & editing. BH: Conceptualization, Data curation, Formal Analysis, Methodology, Supervision, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fgwh.2024.1344135/full#supplementary-material.

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Priorities for contraceptive method and service delivery attributes among adolescent girls and young women in Kenya: a qualitative study

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Introduction: Despite increasing global commitment to meeting the family planning needs of adolescent girls and young women (AGYW), there is limited research on how they prioritize contraceptive method and service delivery characteristics. In this qualitative study, we examine the specific elements that drive the contraceptive choices of Kenyan AGYW, and apply our findings to the development of attributes and levels for a discrete choice experiment (DCE).
Methods: Our four-stage approach included data collection, data reduction, removing inappropriate attributes, and optimizing wording. Between June-October 2021, we conducted in-depth interviews with 30 sexually-active 15–24 year-old AGYW in Kisumu county, Kenya who were non-pregnant and desired to delay pregnancy. Interviews focused on priorities for contraceptive attributes, how AGYW make trade-offs between among these attributes, and the influences of preferences on contraceptive choice. Translated transcripts were qualitatively coded and analyzed with a constant comparative approach to identify key concepts. We developed and iteratively revised a list of attributes and levels, and pre-tested draft DCE choice tasks using cognitive interviews with an additional 15 AGYW to optimize comprehension and relevance.
Results: In-depth interview participants' median age was 18, 70% were current students, and 93% had a primary sexual partner. AGYW named a variety of priorities and preferences related to choosing and accessing contraceptive methods, which we distilled into six key themes: side effects; effectiveness; user control; privacy; source of services; and cost. Bleeding pattern was top of mind for participants; amenorrhea was generally considered an intolerable side effect. Many participants felt more strongly about privacy than effectiveness, though some prioritized duration of use and minimizing chance of pregnancy above other contraceptive characteristics. Most AGYW preferred a clinic setting for access, as they desired contraceptive counseling from a provider, but pharmacies were considered preferable for reasons of privacy. We selected, refined, and pre-tested 7 DCE attributes, each with 2–4 levels.

Conclusions: Identifying AGYW preferences for contraceptive method and service delivery characteristics is essential to developing innovative strategies to meet their unique SRH needs. DCE methods may provide valuable quantitative perspectives to guide and tailor contraceptive counseling and service delivery interventions for AGYW who want to use contraception.

KEYWORDS

adolescent, sexual and reproductive health, family planning, contraception, adolescent-centered, contraceptive preferences, discrete choice experiment

1 Introduction

As many countries make and carry out FP2030 commitments, improving adolescent and youth contraceptive access and use is increasingly emphasized in country-level family planning (FP) programming (1). Policy documents and published research frequently cite disproportionately high levels of unmet need for contraception among young people (2, 3), and describe the myriad barriers to meeting their contraceptive needs, such as stigma, biased treatment from health providers, beliefs that contraception is harmful, and restrictive SRH policies (3–5). Despite this wealth of data and widely-acknowledged need to provide youth-friendly and tailored SRH services for adolescents and youth, detailed data on contraceptive characteristics and factors that drive choice and promote method satisfaction among young people are relatively lacking, limiting progress toward improving access to quality, person-centered FP care for underserved youth. Choice of contraceptive method—a preference-sensitive decision (6)—is influenced by one's social context and norms (7, 8), and requires making tradeoffs between more and less desired method and service delivery characteristics. Understanding how adolescent girls and young women (AGYW) prioritize the various elements of method choice, and the tradeoffs they are willing to make, could inform novel approaches to delivering contraceptive care that are grounded in a person-centered framework (9), referring to "care that is respectful of, and responsive to, individual patient preferences, needs, and values." (10).

Discrete choice experiments (DCE) are being increasingly used in health and policy contexts to elicit stakeholder preferences for health-related programs (11). In a DCE, participants are presented with a series of choice tasks in which they are asked to choose between hypothetical alternatives defined by a set of features, or attributes, which are further characterized by variations called levels (12). Responses are then used to quantitatively evaluate the relative importance of the attributes, and the tradeoffs participants are willing to make among the attributes. While DCEs have been used extensively to evaluate user preferences for multi-purpose HIV and pregnancy-prevention technology (13), their application to adolescent and youth SRH has focused on contraceptive development and provider preferences (14–16).

Attribute and level selection is a critical step in DCE design (17), as DCE validity depends on how the complex landscape of options are encoded into a limited number of attributes and levels (18). To avoid biased results, attributes should include all attributes important to decision-making; be non-overlapping without a dominant impact on the decision; and be plausible, relevant, and capable of being traded in the study context (17). Qualitative research is considered a critical element in attribute selection and overall DCE development (19). In response to poor reporting and a lack of rigor in describing the attribute selection process (20), Helter & Boehler describe a more systematic approach to attribute development consisting of four stages: data collection, data reduction, removal of inappropriate attributes, and optimizing wording (21). In this paper, we explore contraceptive method and service delivery preferences among Kenyan AGYW using qualitative methods, and apply our findings to the development of attributes and levels for a DCE.

2 Materials and methods

2.1 Study design and setting

The data described in this analysis were collected as part of a larger multi-method qualitative study exploring constructs of sexual and reproductive empowerment among female Kenyan adolescents and young adults (22). Data collection incorporated the present paper's focus area on contraceptive preferences, experiences, and decision-making, which were designed *a priori* to inform DCE attribute and level selection. We drew on Helter & Boehler's four stages of attribute development (data collection, data reduction, removal of inappropriate attributes, wording) (21) to provide a structural framework for our methods.

Our approach to the data collection and reduction stages was guided by Brofenbrenner's social ecological theory (23, 24), which is particularly apt in conceptualizing how interpersonal, community, and societal/policy contexts reinforce and influence, and are influenced by, individual-level contraceptive preferences and behaviors. We drew on the social ecological model to create a conceptual map of AGYW contraceptive preferences and their multifaceted influences (Figure 1), which was used to inform the interview guide and eventually to contextualize initial candidate attributes (Supplementary Table). We used qualitative in-depth interviews to gather rich narrative data, followed by structured cognitive interviews for DCE pre-testing and iterative revision.

This study was conducted in urban and peri-urban Kisumu, which is Kenya's third-largest city, bordering Lake Victoria. The predominant ethnic group in the region is the Luo people, and Dholuo and Kiswahili are widely spoken, as is English. We chose

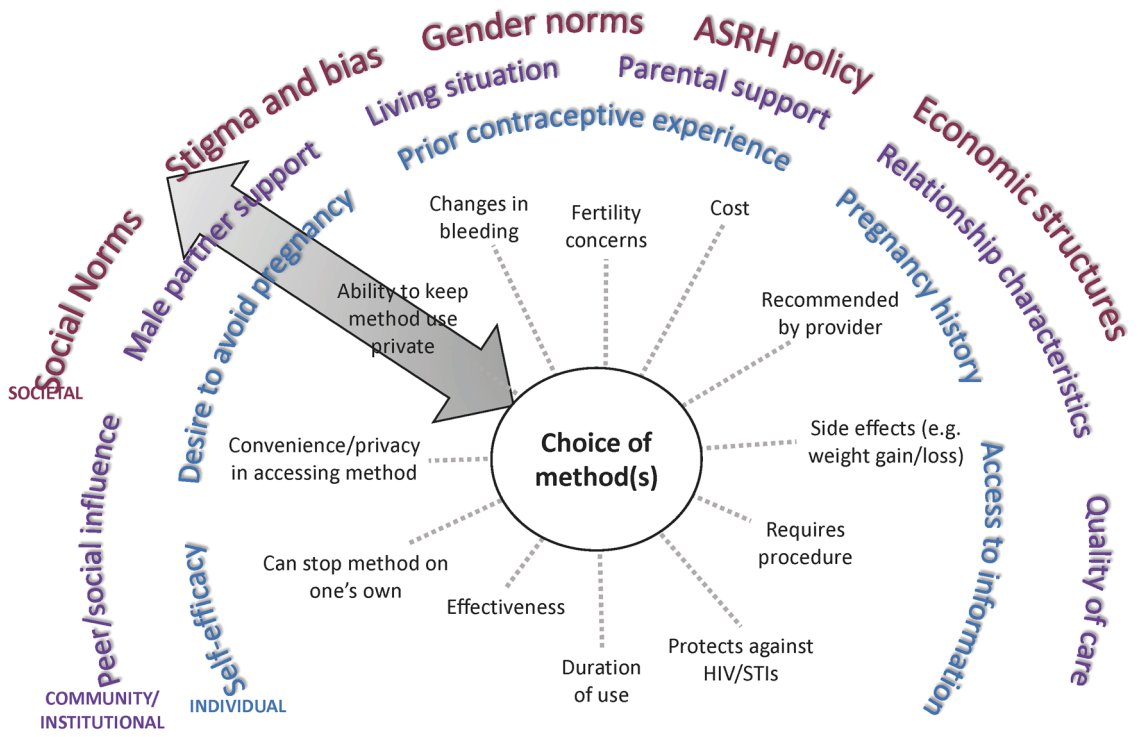

FIGURE 1
Conceptual map of multi-level influences on contraceptive choice among AGYW. ASRH, Adolescent sexual and reproductive health.

to situate the study in Kisumu county for two reasons: (1) our research collaboration's long-term commitment to improving SRH in the region, and (2) as a natural extension of our prior qualitative work in Kisumu and nearby counties indicating a critical need for person-centered contraceptive programs to better serve AGYW within their life contexts (7).

2.2 Ethics approval and consent to participate

The study was approved by the Kenya Medical Research Institute (KEMRI) Scientific Ethics Review Unit (P00152/4,193), the Kenya National Commission for Science, Technology, and Innovation (NACOSTI/P/21/10,896), and the University of Washington Human Subjects Division (STUDY001172). Given the overall low risk of the cross-sectional survey procedures and potential invasion of privacy with parental involvement, a waiver of parental permission was approved. Written informed consent (age 18–23) or assent (age 15–17) was obtained for in-depth interview participants; verbal consent was obtained for cognitive interviews. All participants received 500 Kenyan Shillings (approximately USD$4) in appreciation of their time.

2.3 Sampling

In-depth interviews: Female AGYW were purposively sampled for maximal variation with quotas for age (50% or more age 15–19 years) and prior contraceptive experience (50% or more with prior contraceptive use). Participants were eligible if they were 15–23 years old; spoke Dholuo, Kiswahili, or English; were sexually active in the last year; had the capacity for pregnancy (not currently pregnant or sterilized); and stated a desire to avoid pregnancy for the next 6 months. Eligible participants were recruited in-person in equal numbers from community venues (youth program meetings, markets, informal gathering spaces) and from an ongoing clinical trial cohort based at KEMRI research clinics (25).

Cognitive interviews: We used convenience sampling to recruit participants using the above eligibility criteria at KEMRI research clinics.

Sample size: The in-depth interview sample size was determined based on research team judgment that 30 interviews would be adequate to generate thematic saturation (26) based on the specific study population and research questions, in line with published guidance (27). Cognitive interview sample size was selected as a reasonable estimate of the number needed to iteratively revise the draft DCE instrument and materials. In-depth interview respondents were not eligible to participate in cognitive interviews.

2.4 In-depth interviews *(data collection)*

The research team developed a semi-structured interview guide (Supplementary Material) to explore contraceptive perceptions, desires and preferences, experiences, and decision-making among

AGYW, as well as the people and factors at various levels that influence their contraceptive priorities and choices. Interviewers attended a comprehensive training, which included material on research ethics, building rapport with adolescent research participants, research standard operating procedures, and one-on-one practice with the interview guide. We did not conduct pilot testing of the guide, but did iteratively revise the guide throughout the study. Interviewers did not have a prior relationship with participants, and the recruitment and consent/assent processes clearly delineated the researchers and institutions involved, and the goals of the research. Each participant was asked open-ended questions such as: "When you think about choosing a family planning method, what comes to mind for you? What are the most important factors for you when you think about choosing a family planning method?" Subsequently, participants were asked follow-up questions and specific questions relating to candidate attributes (Supplementary Table). All interviews ($n = 30$) were conducted in Dholuo, Kiswahili, and/or English by two Kenyan trilingual interview team members with extensive qualitative data collection experience (including AD). Each interview of 60–75 min' duration was digitally recorded, transcribed, and translated by the interview team.

2.5 Data analysis and attribute selection (data reduction, removal of inappropriate attributes)

Data collection and analysis were conducted concurrently. The analytic team (EKH, OC, SK) developed an initial codebook based on topics and concepts in the interview guide and an initial read of several raw transcripts. All transcripts were triple-coded, and the coding team met regularly to revise the codebook with data-specific concepts, review and resolve coding differences, and discuss emerging concepts. The data were analyzed with an inductive, constant-comparative approach (28) to continuously compare and contrast thematic elements within and between participants. Codes were distilled into analytic categories, and the analytic team summarized these categories, or themes, and the relationships between them in memos. Data were coded and managed in Dedoose software (29).

During and subsequent to data analysis, we iteratively revised the candidate attributes and levels in response to our findings. Based on general guidance in the DCE literature, we aimed to include 8 or fewer attributes with 2–4 levels each to avoid respondent fatigue and to follow recommendations for DCE sample size estimation (30). Attributes that were less relevant to participants' lived experiences and contraceptive decisions were removed. The research team then reviewed, discussed, and revised a final attribute and level table.

2.6 DCE pre-testing *(wording)*

The research team drafted language explaining the structure of each DCE question, or choice task, and introducing each attribute and level in Dholuo, Kiswahili, and English. A graphic was chosen to represent each attribute level. We then recruited 15 female AGYW meeting eligibility criteria from KEMRI research clinics to participate in structured cognitive interviews. Interviews focused on comprehension and relevance of introductory material, instructions, and attribute and level wording. Participants completed 2–4 draft choice tasks and provided feedback on the structure and graphics. The interview team took detailed notes to record participant perceptions and feedback, which were summarized in debrief reports. The research team iteratively revised the wording and graphics of the final attributes and levels, as well as the introductory language throughout pre-testing (Supplementary Table).

2.7 Reflexivity statement

Our binational (Kenya and the United States) team brought a variety of skillsets and perspectives to the current research. The two-person interview team (including AD) who collected all study data are cisgender Kenyan women, trilingual, and have 5–10 years of qualitative data collection and transcription/translation experience. The interview team had no pre-existing relationship with the participants prior to the study. The analytic team included two Kenyan researchers (OC, SK) with Kiswahili fluency and extensive familiarity with the social, economic, and health systems factors that impact Kenyan AGYW. The primary author (EKH) has collaborated on qualitative reproductive health research in western Kenya since 2008, and the second author (BH) is a health economist with extensive experiencing designing and conducting DCEs; both are based in the United States.

3 Results

Participant characteristics are summarized in Table 1. In-depth interview participants ($n = 30$) ranged in age from 16–23, with a median age of 18 (IQR 17–19), and 80% were 19 or younger. The majority (70%) were currently attending school, were currently romantically partnered (93%), and had been sexually active in the last month (60%). About half had been pregnant before (53%). The median score on the Desire to Avoid Pregnancy Scale was 3.5 (maximum possible score is 4). All but one participant had ever used a contraceptive method, and 21/30 (70%) reported using a method in the last month. The most frequently used methods were male condoms (11/21) and contraceptive implants (9/21).

3.1 Contraceptive priorities: Key themes

Participants named a variety of priorities and preferences related to choosing and accessing contraceptive methods, and described a variety of interpersonal and community-level influences on the factors that were most important to them. In

TABLE 1 Participant characteristics.

Characteristic, $n = 30$	n or median (IQR)
Age, years	18 (17–19), range 16–23
Age group, years	
15–17	13
18–19	11
20–23	6
Educational achievement	
Primary school or less	4
Secondary school incomplete	15
Secondary complete or above	11
Currently a student	21
Currently has romantic partner	28
Age of current partner, years ($n = 27$)	22 (20–26), range 18–38
Source of financial support	
Self	4
Parent/guardian	23
Romantic partner	16
Employment status	
No employment	24
Formal sector employment	4
Informal sector employment	2
Age at sexual debut	15.5 (14–16), range 13–19
Nulligravid	16
Desire to Avoid Pregnancy Scale* score	3.5 (3.1–3.8), range 1.8–4
Ever contraceptive use	29
Used contraceptive method in last month	21
Method used in the last month (can select multiple)	
Oral contraception	4
Injectable contraception	2
Implant	9
Intrauterine device (IUD)	2
Emergency contraception	1
Condoms	11
Condoms plus another method	5

the following results, we distill the themes into six categories: side effects; effectiveness; user control; privacy; source of services; and cost.

3.1.1 Side effects

Participants cited side effects, particularly related to bleeding pattern, as a major factor in their contraceptive decision-making. Most participants, including several currently using progestin-only methods like injectable contraception and contraceptive implants, described personal or peer experiences of unscheduled or irregular bleeding—frequently referred to as "over bleeding"—as a key factor driving method choice, satisfaction, and discontinuation. When asked to clarify a comment on regular bleeding as a must-have characteristic in a method, a 19 year-old participant who is currently using an implant explained:

> *"I would feel bad about it [irregular bleeding], in fact I would have removed this method [implant] by now. It irritates to wear the sanitary towels all the time. You are not clean, and wet all the time…I don't even like it when I have my normal menses, I hate it so much. When I was still schooling I would experience over bleeding especially during rainy seasons and I was so moody, and so I don't like it." (Interview 24, 1 child, non-student)*

A minority of participants, while they didn't prefer irregular bleeding to regular periods, expressed feeling reassured about their health and fertility by experiencing bleeding and being like their peers. For them, lack of bleeding was far more off-putting or concerning than irregular bleeding. Amenorrhea was referred to as "the thing I really dread" (*Interview 20, age 17, no child*)—even worse than difficult to predict bleeding that could affect sexual relationships. As one 19 year-old participant who had recently stopped injectable contraception in favor of condoms and EC put it,

> *"Yeah, I think the bleeding is… let's say you are bleeding and you have family planning, I think that is better because with that you are sure you have had your periods. You know if you have the family planning you get worried, maybe it can block you from having babies. So, if you see the bleeding at least you know you can still get pregnant." (Interview 19, no child, non-student)*

Preferences around bleeding patterns were further probed by interviewers, who asked all participants if their perspectives would change if a trusted provider explained that it was healthy and normal to have irregular, heavier, or no bleeding while using a particular method. This line of questioning prompted a variety of responses, though more than half stated they would still not find the undesired bleeding pattern acceptable.

Fertility concerns associated with injectable contraception and implants were particularly prevalent in AGYW's communities, sometimes leading to a preference for other methods that were shorter-acting, like condoms, pills, and EC. For example, a 17 year-old secondary school student who discontinued the injectable due to side effects and is now using pills explained how her 24 year-old partner has influenced her method choice:

> *"At times [my partner] sits and looks at [my] arm to see if there is something; they [men] like looking at people's arms to confirm if you have a method. Then he asks, "you haven't gone for family planning"? When I ask why he…tells me that he doesn't want me to go for it, he says it will make me fail to have children in future." (Interview 29, no child, student)*

3.1.2 Effectiveness

Multiple AGYW prioritized how well a method works to prevent pregnancy, in other words, its effectiveness, over other aspects of contraceptive methods. Other participants had limited awareness that effectiveness differs between methods or demonstrated prioritization of other contraceptive characteristics—especially privacy/discreetness. Tradeoffs between effectiveness and side effects were mentioned several times, as described by this 17 year-old participant who is referring to her use, and dissatisfaction with, a contraceptive implant:

> *"I used to bleed a lot and suffer from abdominal pains….[Interviewer asks why she still has the implant despite these side effects] I still just don't want to remove it… (Chuckles)…I just don't want to remove it because I was told that I can never get pregnant with it." (Interview 5, 1 child, non-student)*

Participants frequently equated higher effectiveness with longer duration of use. A 22 year-old woman narrated her experience of an undesired pregnancy after emergency contraception (EC) failed, explaining why she chose to get an intrauterine device (IUD) after procuring an abortion:

> *"I feel that it [EC] is not as effective as we are made to believe and that is why I conceived after taking it…I want a method that goes for a long period of time like the coil [IUD], Yeah, I prefer that…I just trust it more. The fact that it is meant to last a longer period means that it is more effective." (Interview 13, no child, student)*

3.1.3 User control: duration of use and ease of discontinuation

While most participants considered duration of use when describing their rationale for preferring a particular contraceptive method or methods, ease of discontinuation as a factor rarely spontaneously came up. For a few AGYW, though, their method choice was strongly related to avoiding fertility or side effect concerns associated with longer-acting methods and methods for which discontinuation requires provider assistance (IUD, implant). Furthermore, perception that choosing a long-acting reversible contraceptive (LARC) method committed one to using the method for as long as its effective life came up multiple times in interviews. Several participants mentioned preferring the "3-year" implant (e.g., Nexplanon) to the "5-year" implant (e.g., Jadelle), both of which are typically available in the region, or preferring a shorter-acting method for this reason:

> *"Okay what comes to my mind first, I would prefer Depo [injectable] because I just use it for the time being, then when I am ready to get a child, I can just leave it. If I inject the one at the arm [implant] and maybe I am ready and he wants a child [so] it will be difficult, because maybe you have inserted the five years method [referring to implant with 5 year duration of use] then after one year you want a baby… [you] will have to wait for five years to have a child. So I prefer Depo." (Interview 19, age 19, no child, non-student)*

Concerns about delayed fertility after discontinuing the method were influential for several participants, including a 21 year-old woman who had recently experienced an undesired pregnancy. After having an abortion, she chose to start pills due to concerns that a longer-acting method like the injectable would make it difficult to get pregnant in the future. She also summarized many participants' reasoning for not wanting to rely on a male-controlled method like male condoms or a method you have to use every time you have sex:

> *"Condom is a good idea but then it depends with the partner you are having. In a case when your partner needs a child and you are not of the idea, you know there is no way you are going to convince him to use a condom. Using a condom will depend if you can cooperate with your partner but knowing the partner I have is not going to cooperate—that is why I use pills." (Interview 27, age 21, no child, student)*

Several participants, particularly those who had chosen a LARC method, cited a preference for longer duration of use >1 year due to convenience, lower cost over time, and peace of mind:

> *"…so that I am never worried of the future and I am always sure that I have the method in my body all the time." (Interview 10, age 19, 1 child, non-student)*

3.1.4 Privacy

The ability to conceal contraceptive use from parents, romantic partners, peers, and other community members was a critical consideration in method choice for all but a few AGYW. The adolescent-specific concern of maintaining privacy in the boarding school setting came up multiple times among participants who were still attending secondary school as a factor that influenced their contraceptive preferences:

> *"I chose IUD because for example with pills, I can't carry them to school because you have to take after every 24 h, what if someone sees me taking them, rumors can spread that I am having an abortion so that is also an embarrassment that I didn't want to affect me." (Interview 21, age 19, no child, student)*

The methods AGYW perceived as the most private differed somewhat between individuals, but overall, the contraceptive implant and oral contraception were viewed as less private than injectable contraception and IUD. Many AGYW discussed their worry that the implant would be seen or felt by partners or parents. A 19 year-old woman (*Interview 9, no child, student*) described her experience accessing contraception on a school break, and how she "settled for Depo [injectable]" because she was wearing a short-sleeved dress and knew that others would see the bandage and incision site on her arm if she had an implant placed. This concern outweighed another concern she had, that she would not be able to get subsequent injections on time due to her school schedule. Another participant, a student who lives with her parents and recently discontinued the injectable in favor of oral contraceptives due to bleeding pattern changes, described her priorities in contraceptive decision-making:

> *"For [the] implant I feared the pain. But the main reason I didn't go for an implant was because I didn't want anybody to see, because you know there are some parents who will*

> *notice, so I didn't want to be in that situation." (Interview 27, age 21, no child, student)*

While several AGYW portrayed their male partners as supportive of or indifferent to their contraceptive choices, many indicated a preference to keep method use private from partners, as well as detailing experiences of contraceptive coercion:

> *"I had already told him [my partner] that I had a method [implant]. He did not like it, he even told me to go have it removed it because if not, then he would terminate the relationship. I then asked him what was that for and yet he also did not want to use condoms each time that he had sex with me…I later told him that I had removed the method. Currently he is not aware that I use. So I always have to try to hide that spot on my body that was used to insert the family planning because he might touch it and that would make us have conflict." (Interview 15, age 17, 1 child, student)*

3.1.5 Sources of information and services

When they were specifically asked about their preferred sources of contraceptive information and services, AGYW discussed their reasons for choosing a private sector pharmacy or a clinic facility. Among several AGYW who preferred the pharmacy, perceived privacy was top priority, often superseding cost, which was noted to be higher in pharmacies than public facilities.

> *"Pharmacy is a bit [more] private because…you just tell them to inject you and they will inject you. But for clinic, if you go to the clinic, you will meet so many people there (laughs) so even if you want to get a family planning and they are there, people will just know that you are going to be injected. But pharmacy once you are inside, people will not know that you have gone for family planning; obviously pharmacy is a place to buy drugs, so I prefer pharmacy." (Interview 19, age 19, no child, non-student)*

More than half of participants stated a preference for a clinic, mainly due to a desire for contraceptive counseling, but also related to perceived higher quality of care including trained, more trustworthy providers and non-expired contraceptive methods, availability of female providers, and access to other services like HIV and pregnancy testing. In general, AGYW wanted to receive information about recommended methods and potential risks and side effects from a qualified provider prior to initiating a method:

> *"I prefer hospitals because they are like careful with what they are doing and they are like they will advise you before you do anything, clinics and chemists [pharmacies] are just there because of money they don't screen you, they don't give you advice, they just insert it." (Interview 23, age 16, no child, student, using implant)*

> Another participant expressed concerns that people working in the pharmacies are not "qualified…They are just there for money and they won't advise you health-wise." *(Interview 27, age 21, no child, student)*

AGYW's preferred sources of information influencing their contraceptive choices were health providers, but many relied on parents, other family members, and peers for advice as well. Several participants mentioned learning about various methods' risks and benefits from online sources, such as videos:

> *"I decided to use the implant because the way I was getting…the advice, it was better because I love watching encouraging videos, so many people were preferring this and even doctors were preferring this. So I was very comfortable…" (Interview 23, age 16, no child, student)*

3.1.6 Cost

Method cost factored into participants' decision-making, but it was mentioned far less often than side effects, effectiveness, and privacy. Most commonly, cost influenced decision-making in the direction of desiring longer acting methods that would be cheaper over time. Several AGYW contrasted the lower cost of LARC methods with EC, which is often referred to as "P2":

> *"Implant is good, I chose implant because it won't bother me several times when I don't have money, I will not buy P2, you know P2 you have to buy it like that morning I could not also afford. I am using an implant because it is always there." (Interview 23, age 16, no child, student)*

Similarly, other AGYW commented on the need for follow up visits with use of shorter-acting methods, which cost money and time opportunity cost. A 23 year-old who supports herself as a domestic worker explained,

> *"One thing that influenced my decision is that…sometimes you don't have the money for the TCAs [referring to follow up visits for injection] and end up getting pregnant, that is why I like this one [implant] because it stays for long." (Interview 16, non-student, 6 children)*

3.2 Attribute selection and construction of choice tasks

Concurrent data collection and analysis allowed the study team to iteratively assess the most relevant aspects of AGYW contraceptive decision-making and priorities. To minimize cognitive burden to DCE respondents and optimize the precision of preference estimates, our goal was to select fewer than 8 attributes (31). After completing qualitative data analysis, we selected 7 final attributes (Table 2) and removed the other, less appropriate, attributes using a process that combined findings from our qualitative work and multidisciplinary team consensus-building. First, we identified the attributes that were most

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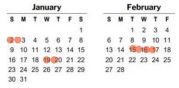
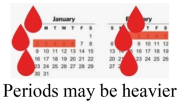
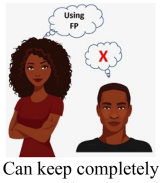
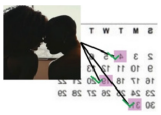
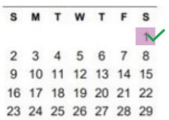
TABLE 2 Final attributes and levels.

Attribute	Level 1	Level 2	Level 3	Level 4
How your periods may change	 Periods stay the same	 Periods are irregular, but with less bleeding	 Periods may be heavier	 Periods stop
Chance of pregnancy in 1 year	 1/100	 10/100	 20/100	
Ability to keep a method private	 Difficult to keep private	 Can keep somewhat private	 Can keep completely private	
How long a method will last	 Use during or after sex every time	 Use method every day	 Method lasts 3 months	 Method lasts a year
How you will get information about your options	 Face to face with provider	 Phone-based app	 Phone-based app + option for text messaging follow up	
Location	 Clinic	 Pharmacy		
Cost	0 KSH (No Cost) 0 KSH (no cost)	 50 KSH	 200 KSH	 500 KSH

relevant to AGYW's priorities and experiences, based on the key themes that emerged from the in-depth interviews. In tandem, we dropped 2 attributes (ability to stop method on your own, privacy during method access) that represented concepts or priorities that the majority of participants said were less important to them or were infrequently spontaneously introduced by participants; we also removed an attribute (timing of return to fertility) that overlapped conceptually with another (how long method will last). We chose to include cost in order to allow for calculation of willingness-to-pay. Attribute levels were also iteratively revised during the analytic process, guided by participant perspectives and team discussion.

After attribute selection, we drew on published guidance (11) to develop the structure of the choice tasks. Choice tasks include two full profiles (labeled "Option A" and "Option B"), meaning that all 7 attributes are represented in each profile, and an opt-out option. We defined the opt-out as "no method" in order to allow participants to indicate they would rather use no method and a higher risk of becoming pregnant than use either hypothetical contraceptive profile A or B. Our qualitative findings provided a rationale for including an opt-out: some participants, despite a strong desire to delay pregnancy, found the tradeoffs associated with contraceptive use unacceptable. Figure 2 presents a sample choice task.

3.3 Pre-testing and iterative revision

Participants in cognitive interviews ($n = 15$) had a median age of 21 (IQR 19–23); no other demographic data were collected.

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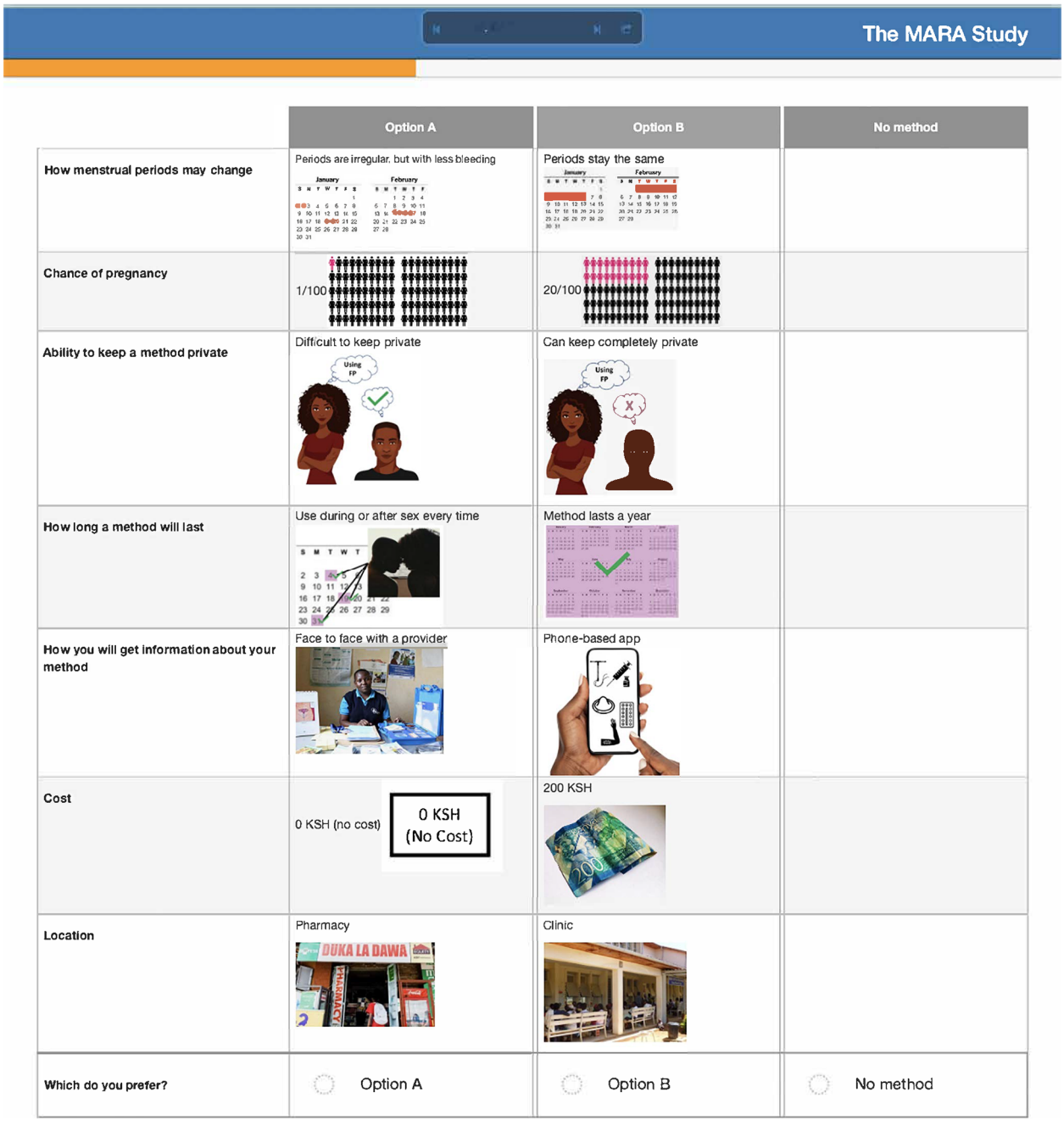

FIGURE 2
Sample choice task.

Interviewers presented the participants with mock-up introductory material (5 in each language) and 4 example choice tasks, and assessed their understanding of the instructions, eliciting feedback on the clarity of language and translations, initial thoughts related to the images chosen to represent the attribute levels, and comprehension related to how to answer the questions. In response to participant comments and detailed interviewer notes, the team iteratively revised the introductory language, the wording of attributes and levels, and the images. For example, the lowest attribute level for cost was initially labeled as "free", and the image used was a colorful red shape with the word "FREE" in it. AGYW explained that they chose the option with the "free" image in part because they liked how it looked; to avoid distracting survey participants and introducing bias, we removed the image and labeled that attribute level "0 KSH" (Kenyan shillings). Additionally, we received feedback that the image of a male partner used in the initial sample survey questions was distracting, as AGYW tended to interpret his facial expression as upset or suspicious. This image was replaced with one where the male partner's expression was perceived as more

neutral. Finally, we used the cognitive interviews to assess AGYW's reaction to the various attribute levels for cost to establish the most appropriate upper limit of cost. AGYW were willing to choose the profile that cost 500 KSH when the other attribute levels in that profile were favorable, indicating that participants found it reasonable under specific conditions.

4 Discussion

This study used qualitative methods to explore what is most important to Kenyan adolescent girls and young women in choosing a contraceptive method, contributing to the limited literature focused on understanding preferences for available contraceptive method and service delivery characteristics in the region. We highlight the factors and tradeoffs that are most influential to these young women's contraceptive choices in the context of their lives and relationships, and apply these qualitative findings to the systematic, iterative process of developing attributes and levels for a DCE. We selected, refined, and pre-tested 7 attributes, each with 2–4 levels, in order to quantitatively evaluate contraceptive method and care preferences and tradeoffs in an upcoming DCE.

Family planning clinicians and programs have frequently emphasized method effectiveness over other features of contraceptive methods, especially for adolescents (32). Globally, there is increasing recognition that directive counseling toward LARC methods can be coercive (33, 34), and that some people value other aspects of a method above its effectiveness—for example, user control or non-contraceptive benefits (9). Our data highlights that minimizing the chance of pregnancy was the primary factor driving some AGYW's method choices, but that many expressed additional priorities that were as or more important—such as bleeding pattern, peer and provider recommendation, and ability to maintain privacy.

Contrary to our expectations, user control, referring to the ability to initiate or discontinue a method on one's own, did not emerge as a key priority for AGYW in this study. The rapid scale-up of contraceptive implants in Kenya and many other countries in Africa over the past decade has significantly altered the method mix (35), and recent data suggest that many implant users face challenges and delays with respect to accessing timely and quality implant removal (36, 37). While AGYW did not focus on concerns about autonomy related to discontinuation, and thus we chose to not select "ability to stop a method on your own" as an attribute, the related concept of duration of use was considered very important. Many AGYW spoke of preferring the "3 year" over the "5 year" method and several believed the method had to remain in place for its entire useful life. This could be due to community-level experiences and narratives of provider reluctance or refusal to remove implants on request. It is also possible that perspectives on the importance of being able to self-discontinue a method would differ among AGYW living in remote rural areas where access to LARC removal is more limited.

Bleeding side effects and changes to menstrual bleeding patterns emerged as a critical element of AGYW's experience influencing method choice, method (dis)satisfaction, and discontinuation. Consistent with other studies from East and Southern Africa (38, 39), amenorrhea was viewed negatively, with irregular or prolonged bleeding undesired, but often tolerated. Prior studies have described how concerns about future fertility are a major deterrent of contraceptive use among many young women (40, 41); our data shows that for some, the presence of bleeding, even if it is irregular, may allay worries that methods will cause infertility.

The decision to not use contraception may be an informed choice (42, 43); additionally, non-use may be related to partner coercion, constraints on access, or other factors, such as feelings of indifference or ambivalence regarding pregnancy. In this study, participants were only eligible if they stated a desire to delay pregnancy for at least 6 months; their median score on the DAP Scale (44) was 3.5 (maximum possible is 4), suggesting a strong desire to avoid pregnancy. However, about a third were not currently using a contraceptive method despite being at risk for pregnancy. In response, and acknowledging increasing interest in understanding the context around non-use, we designed the structure of the choice tasks for the upcoming DCE to include "no method" as an alternative to the two contraceptive method profiles. Including the opt-out option signifies non-use as a reasonable option, even when one does not want to become pregnant at that time, as the choice to use a method relates to the tradeoffs one is willing to make.

Private sector community pharmacies are a critical point of contraceptive access among AGYW in Kenya, often for reasons of privacy and convenience (45, 46). Our findings, consistent with a recent study by Calhoun et al. on young Kenyan women's contraceptive decision-making (47), suggest a high demand for provider contraceptive counseling among AGYW, which steers many to public sector clinics—despite their co-existing needs for privacy and after-hours access. The demand for contraceptive counseling in settings where trained clinicians may not consistently available requires innovative strategies to deliver desired information and advice, which may include pharmacy worker training and digital health interventions. While DCE methods can help elucidate the tradeoffs AGYW are willing to make to get their desired location and services, further implementation research is needed to understand how contraceptive care can be optimized and adapted for more accessible, community-based settings like pharmacies.

A strength of this analysis is the balance we strike in what Coast & Horrocks (2007) refer to as the inherent "tension" between inductive, exploratory qualitative research and the "reductiveness needed to encapsulate the different aspects of a service within a minimum number of attributes" (20). Our findings independently contribute to the limited understanding of AGYW contraceptive priorities, and informed the selection of attributes that reflect the lived realities of the populations this research ultimately aims to benefit. This study also has limitations. While the selected attributes represent the most salient considerations in AGYW's method choices, we recognize that missing key attributes can result in biased DCE findings (17). While our iterative selection process follows published best practices (19, 48),

we did remove some candidate attributes or may have missed other factors, which for some AGYW may be important to decision-making. Furthermore, our geographic reach was limited to a single county in Kenya, and like all research using purposive sampling, is not designed to be directly applied to other settings.

5 Conclusions

In conclusion, identifying AGYW preferences for contraceptive method and service delivery characteristics is essential to developing innovative strategies to meet their unique SRH needs. Our findings directly informed the design of a DCE, which could provide valuable quantitative perspectives to guide and tailor contraceptive counseling and service delivery interventions for AGYW who want to use contraception. As the global FP community increasingly recognizes the need to shift focus from contraceptive use to contraceptive autonomy, more research is needed to understand how health systems and programs can better support AGYW in making contraceptive decisions that align with their preferences, take into account bleeding pattern and other side effect concerns, and consider their privacy needs, while reaching AGYW with quality care in accessible settings.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Kenya Medical Research Institute Scientific Ethics Review Unit and the University of Washington Human Subjects Division. The study was conducted in accordance with the local legislation and institutional requirements. Written informed consent was required for in-depth interview participants 18 and older, with the exception of anonymous cognitive interviews, for which verbal consent was obtained. For 15/17 year-olds, written assent was required. A waiver of parental permission was received for participants under 18 after assessments of the potential risks and benefits of involving parents.

Author contributions

EH: Conceptualization, Formal Analysis, Funding acquisition, Methodology, Visualization, Writing – original draft, Writing – review & editing. BH: Conceptualization, Methodology, Supervision, Writing – review & editing. DO: Writing – review & editing. SK: Formal Analysis, Methodology, Writing – review & editing. AD: Investigation, Writing – review & editing. MO: Resources, Supervision, Writing – review & editing. EB: Conceptualization, Funding acquisition, Resources, Supervision, Writing – review & editing.

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Conflict of interest

BH is director of Pfizer, Inc.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/frph.2024.1360390/full#supplementary-material

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Adolescent utilization of sexual and reproductive health services in Gamo Zone, Southern Ethiopia. Insights from multilevel and latent class analysis

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Introduction: Adolescents face unique challenges related to their sexual and reproductive health (SRH), with access to timely services being critical for positive outcomes. However, SRH service utilization among adolescents remains low. This study aimed to identify factors influencing SRH service use among adolescents in Gamo Zone, Ethiopia.

Methods: A community-based cross-sectional study involved 1172 adolescents selected through stratified sampling. Structured face-to-face interviews were employed for data collection. Multilevel mixed logistic regression was fitted to identify factors and latent class analysis was conducted to understand population heterogeneity.

Results: The findings of this study reveal that 198 (16.89%) adolescents (95% CI: 14.8%-19.2%) utilized SRH services within the past 12 months. Factors significantly associated with SRH service utilization included good knowledge about SRH rights (AOR = 4.65; 95% CI: 2.68, 8.07), belonging to one-parent families (AOR = 4.13; 95% CI: 2.39, 7.12), engaging in parental discussions regarding SRH issues (AOR = 3.17; 95% CI: 1.89, 5.29), high family support (AOR = 1.96; 95% CI: 1.09, 3.51), and enrolling in school (AOR = 0.19; 95% CI: 0.11, 0.33). Additionally, access to social media was associated with increased SRH service utilization among adolescents (AOR = 1.98; 95% CI: 1.25, 3.15). Latent class analysis identified four groups: rural school-enrolled adolescents living with parents, urban school-enrolled adolescents with both parents, urban disadvantaged female adolescents, and early adolescents with limited social media access.

Conclusions: In conclusion, our study sheds light on the utilization of SRH services among adolescents, revealing that 16.89% of the participants accessed these services within the past year. Significant factors associated with SRH service utilization included good knowledge about SRH rights, belonging to one-parent families, engaging in parental discussions regarding SRH issues, high family support, and enrollment in school. Interestingly, access to social media was also linked to increased utilization of SRH services among adolescents. Furthermore, our latent class analysis identified four distinct classes of adolescents based on socio-demographic indicators, highlighting

Abbreviations
AIDS, acquired immune deficiency syndrome; AOR, adjusted odd ratio; SD, standard deviation; sexual and reproductive health; SRS, simple random sampling; SSA, Sub-Saharan Africa; SRH, sexual and reproductive health; STI, sexually transmitted infections; WHO, World Health Organization.

the heterogeneity within this population. These findings underscore the importance of tailored interventions and targeted approaches to address the diverse needs of adolescents in accessing and utilizing SRH services.

KEYWORDS

adolescent health, sexual and reproductive health services, utilization, multilevel analysis, latent class analysis, health services access, Gamo Zone, Southern Ethiopia

Introduction

Adolescent sexual and reproductive health (SRH) remains a critical area of concern globally, particularly in low- and middle-income countries where access to comprehensive SRH services is limited (1, 2). Each year, approximately 12 million adolescent girls aged 15–19 years give birth (2). Many adolescents engage in risky behaviors such as substance use, violence, and unsafe sexual practices, which heighten the risk of sexually transmitted infections (STIs), including HIV/AIDS (3–6). For instance, UNICEF reported that 160,000 adolescents worldwide were newly infected with HIV in 2021. Timely access to SRH services is crucial for adolescents health and wellbeing (7).

SRH services should be acceptable, accessible, appropriate, equitable, and effective for adolescents (8). The Guttmacher-Lancet Commission identifies key components of SRH services, including maternal and newborn care, contraceptive services, STI prevention and treatment, safe abortion services, sexual well-being counseling and support, gender-based violence prevention and counseling, and treatment for infertility and cervical cancer (9). The Nairobi Summit (ICPD + 25) emphasized the importance of these essential services in ensuring SRH choices and rights for all (10).

Despite global and national efforts, the utilization of SRH services among adolescents remaines lows (8, 11–15). In Ethiopia, like many low- and middle-income countries, SRH service utilization remains low, ranging from 8.6% to 39.5% (11, 16–20), despite the government's commitment to improving adolescent health and aligning with the Nairobi Summit's goals to ensure universal access to SRH services (21, 22).

Understanding the factors influencing adolescents' utilization of SRH services is essential for developing effective interventions and policies tailored to their needs (7, 23, 24). While previous studies on SRH service utilization among adolescents have primarily focused on individual-level factors such as age, gender, place of residence, sexual history, and SRH knowledge (11, 14, 25–27). These studies often overlook the specific contexts in which adolescents live, including family environment (family structure, support, parental monitoring, and discussions about SRH) and community-level factors like access to social media.

Moreover, existing research on adolescent SRH has predominantly focused on specific subsets of adolescents such as those residing in urban areas or enrolled in school, as well as female adolescents (11, 13, 18, 19, 28, 29). Additionally, many prior studies have tended to analyze individual components of SRH services in isolation, rather than adopting a comprehensive and integrated approach (13, 29). While these studies have provided valuable insights into particular demographic segments or services, they often fail to capture the diverse experiences and needs of all adolescents. This gap in the literature is concerning as it hinders the development of holistic and inclusive health interventions and policies that do not inadvertently exclude any group. A holistic approach can provide a broad overview of adolescent health and wellbeing, which is essential for comprehensive policy planning. Failure to address the varied needs of adolescents from different backgrounds not only perpetuates health disparities but also limits the effectiveness of interventions aimed at promoting adolescent well-being and preventing health issues later in life. To address this gap, comprehensive research considering diverse family and community-level factors is needed, as these significantly impact adolescents' behaviors and decisions regarding their SRH (3, 30–33). Moreover, there is a critical need for studies that encompass the full spectrum of adolescent experiences to inform more inclusive and effective public health strategies.

Therefore, this study employs a multilevel mixed effects analysis to investigate the utilization of SRH services among adolescents in the Gamo Zone, South Regional State of Ethiopia. By examining both individual and contextual factors, including family and community-level influences, this study aims to provide a comprehensive understanding of the determinants of SRH services utilization among adolescents. The findings of this study will contribute valuable insights to the existing literature on adolescent SRH in Ethiopia, informing the development of targeted interventions and policies to improve access to and utilization of SRH services. Ultimately, addressing the unique needs of adolescents in the Gamo Zone and similar regions is crucial for promoting their health and well-being and achieving broader public health objectives.

Research question

This study is designed to address the following key research questions:

1. What is the magnitude of adolescent utilization of SRH services in the Gamo Zone?
2. What are the multilevel factors at the individual, household, and community levels that significantly influence the utilization of SRH services among adolescents in the Gamo Zone?

3. What are the distinct subgroups or patterns of sexual and reproductive health services utilization among adolescents?

Materials and methods

Study design and period

A community-based cross-sectional study was undertaken from March 2 to April 9, 2023.

Study setting

This study was conducted in *the Gamo Zone*, one of the zones in the Southern Regional State of Ethiopia. Administratively Ethiopia is divided into 4 levels: the first level (*regions*), the second (*zones*), the third (*woredas*), and *kebeles* (the lowest administrative level) (34). *Each region* is divided into *zones*. Each *zone* is then divided into *woredas* (districts), and each district is divided into *kebeles* (the smallest administrative unit with 3,000–5,000 inhabitants). The *Gamo zone* borders the Wolayta and Gofa zones to the north, Lake Abaya to the northeast, the Amaro and Dirashe special woreda to the southeast, and the *South Omo* zone to the southwest. Arba Minch town is the administrative center of this Zone. This town is located 431 km from the Ethiopian capital city (Addis Ababa). Six town administrations and 14 rural districts with 306 *kebeles* were found in the Gamo zone. The total population in this zone is 1,643,205 of those 805,205 are male and 838,034 are female (35). There are currently 363 public health facilities providing preventive and curative services to the community. Of these, five are primary hospitals, one general hospital, 59 health centers, and 297 health posts. In addition, there are 251 private healthcare facilities. Of these, one primary hospital, 190 private clinics, 56 private pharmacies, and four drug stores. According to the 2023 performance report of the Health Department of Gamo Zone, family planning coverage was 78% of those 6.09% were adolescents aged 10–19 years. HIV testing coverage was 75%, ANC coverage 98%, and institutional delivery coverage was 73% (35).

Sources and study population

The source population comprises adolescents residing in the Gamo Zone, ranging from ages 10 to 19 years old. The study population comprised all randomly selected adolescents within the selected study area during the selected study period who met the inclusion criteria.

Inclusion and exclusion criteria

Inclusion criteria

The inclusion criteria for this study comprised adolescents aged 10–19 years residing in the Gamo Zone, South Regional State of Ethiopia. To ensure a comprehensive representation of adolescent experiences, individuals from both urban and rural areas within the Gamo Zone were included. Additionally, both male and female adolescents were encompassed in the study to account for gender diversity. This approach aimed to capture the diverse socio-economic and environmental contexts that adolescents navigate within the specified geographic area, thereby providing a holistic understanding of adolescent experiences related to the study's objectives.

Exclusion criteria

Participants who do not provide informed consent to participate in the study. Those adolescents with known hearing or mental impairments and/or those who were seriously ill at the time of data collection were excluded from the study. This exclusion criterion was implemented to maintain the integrity of the data collected and to focus on adolescents who could reliably participate in the study procedures.

Sample size determination

To determine the sample size required for this study, Open Epi software version 3.01 was employed under the following assumptions: a confidence level of 95%, an absolute precision of 4% ($d = 0.04$), a power of 80%, and a proportion of adolescent SRH service use of 33.8%, as indicated by a previous study in central Ethiopia (21). The calculated sample size was 537. However, due to the utilization of a stratified sampling technique, it was necessary to adjust the sample size to accommodate for the design effect to address sampling variance and within-group differences among adolescents (36, 37). Thus, a design effect of two was applied, resulting in the multiplication of the primary sample size by two, yielding a required sample size of 1,074 participants. Considering a non-response rate of 10% due to the sensitive nature of the questionnaires, the final sample size was adjusted accordingly, resulting in a total of 1,181 participants.

Sampling technique

A multistage stratified sampling technique was used to select a representative sample of adolescents. In the first stage, the Gamo zone was stratified into urban and rural administrative strata. To ensure the precision of the survey in each stratum (urban vs. rural), an equal number of samples (primary sampling unit) were selected. This approach is commonly used in demographic surveys in Ethiopia (38). The use of implicit stratification and proportional allocation was achieved at each lower administrative level (*Kebele*) by sorting the sampling frame within each sampling stratum before sample selection (38). Three of the fourteen rural districts and three of the six town administrations were selected by lottery. In the second stage, 36 *kebeles* (11 urban *kebeles* and 25 rural *kebeles*) were selected with probability proportional to the *kebeles* in each stratum and with independent selection from each sampling stratum. Households with eligible participants (adolescents) were the third-stage sampling units sampled from the selected *kebeles*. Then the sample size was

proportionally distributed among each of the selected *kebeles*. With the assistance of a health extension worker, sampling frames were created for each selected *kebele* using the family logbook. Then households who had eligible adolescents were selected using a simple random sampling technique. Finally, adolescents (10–19 years old) who were present in the household at the time of the visit and agreed to participate were interviewed. If there is, more than one eligible adolescent in the selected household, one was selected by lottery method (Figure 1).

Variables of study

Dependent variable

Sexual and reproductive health services utilization among adolescents.

Independent variables

Individual, family/household and community-level factors were considered as independent variables in this study.

- **The individual-level** variables included in the study were age (10–14, 15–19), schooling status (enrolled and not enrolled), and knowledge about SRH right.
- **The family/ household level** variables included in the study were family structure (two-parent families, one-parent families, and Neither-parent families), adolescent-to-parental discussions regarding SRH issues (Yes, No), perceived parental monitoring, and family support.
- **Community-level** variables included in the study were residence (urban, rural), perceived social norm (approval or disapproval of receiving SRH services), and exposure to social media.
- All these variables were considered based on their theoretical and practical relevance to SRH service utilization

Measurement and operational definition

Urban residences are characterized by high population density and typically include large cities with significant numbers of inhabitants living in relatively small geographic areas. These areas have greater access to essential services and infrastructure, such as healthcare facilities, schools, electricity, clean water, and transportation networks. Urban regions often feature well-developed road systems, public transportation, and communication networks. There is also a higher prevalence of businesses, offices, factories, and commercial establishments. Urban areas are often officially designated by the government and include regional capitals, major cities, and towns recognized for their administrative, commercial, or industrial importance (34).

Rural residences are characterized by low population density, encompassing villages and small settlements where inhabitants are spread out over larger geographic areas. Residents in rural areas typically have limited access to essential services and infrastructure. Healthcare facilities, schools, electricity, and clean water supply may be scarce or of lower quality compared to urban areas. Additionally, transportation networks are less developed, and public services are often less accessible. The economy in rural areas is predominantly agricultural, with most residents engaged in farming, livestock rearing, and related activities. Rural areas are often managed at the local or village level and may include traditional and community-based structures (34).

Sexual and reproductive health services utilization refers to the utilization of the essential service package such as modern contraceptive services, HIV testing and counseling (VCT) services, maternal and newborn care services, safe abortion and post-abortion care services, and STI diagnosis and treatment services within the last 12 months. This essential service package is based on the Nairobi Summit Recommendation (ICPD + 25) on essential packages of SRH services for adolescents using the life course approach (10). Adolescents were asked whether they had used SRH services in the past 12 months. The response was measured on a binary scale as "yes" for those who used the services and "no" for those who did not use the services. To confirm a positive answer ("yes"), adolescents were also asked about the type of SRH services they had used and the names of the facilities they had last visited.

Parents: This study refers to all individuals who hold significant influence in an adolescent's life and offer unpaid care, irrespective of being biologically related. This encompasses not only biological parents (both mother and father) but also grandparents, older relatives, and other caregivers who provide support without financial compensation (39).

Family structures are about cohabitation with biological parents. The family structure variable is obtained from the questionnaire that assesses the living arrangements of adolescents. Adolescents were asked, "With whom have they been living during the last 12 months?" The responses were re-coded as "1" if they lived with two parents' families, "2" if they lived with single-parent families (with either mother or father), and "3" with neither parent family (21, 40).

Parent-adolescent communication: It was assessed the following using eight yes or no questions by asking the adolescents if they discussed SRH components with their parent/ guardian. The key SRH components include (condom use, STIs /HIV/AIDS, sexual intercourse, menstruation, unwanted pregnancy, contraception, changes during puberty, and choice of sexual friends) with their parents in the last 12 months (21, 41). The response was coded as "1" if they discussed at least two SRH topics in the previous 12 months (21, 41). In this study, the reported Cronbach's alpha of the whole scale was 0.8628

Paternal monitoring: was measured using the following five questions: "How often do their parents know what they do in their free time, where they go in the evenings, who their friends are, how they spend their money, and where they go to school". These Questions were adapted from the previous study conducted in Ethiopia (42). The response was "not at all" (coded as 1) to "always" (coded as 4). To obtain a total score, each item was summed. The score ranges from 5 to 20. Higher values

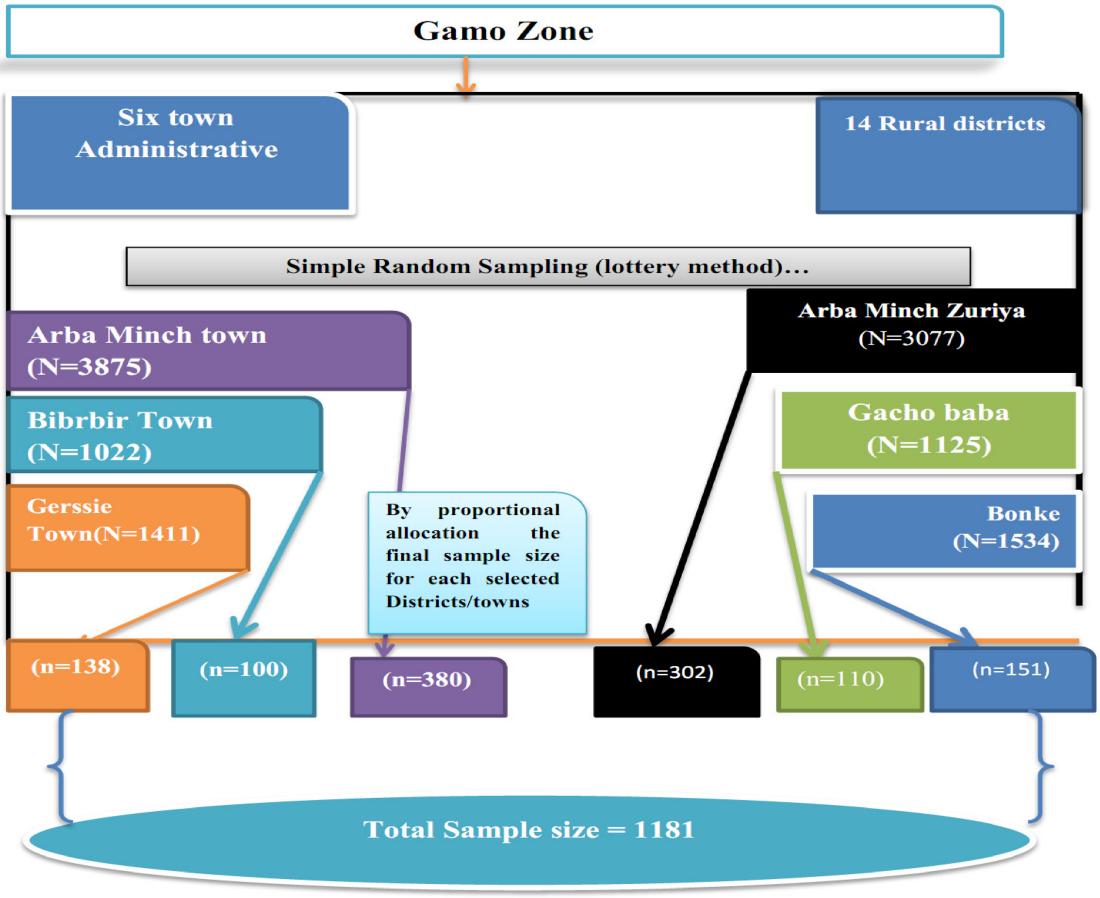

FIGURE 1
Diagrammatic presentation of sampling technique for the study on adolescent sexual and reproductive health services utilization in Gamo Zone, South Regional State of Ethiopia, 2023.

indicate higher levels of parental monitoring. The overall Cronbach's alpha value reported in this study was 0.9022.

Perceived Social norm: It was assessed by using single questions. The adolescent was asked whether adolescents are allowed to access SRH services in the community (43). Response Coded 1 if said "Yes", 0 if not.

Knowledge of SRH rights: was measured using 24 items that assessed participants' understanding of SRH rights with Yes = 1 (correct) or No = 0 (incorrect) responses. The total score was determined by summing all 24 items. Responses were then dichotomized based on the mean score: adolescents scoring equal to or higher than the mean were categorized as having "good knowledge," while those scoring below were categorized as having "poor knowledge" (44, 45).

Exposure to social media: Adolescents were asked about their use of social media (e.g., Facebook, Twitter, WhatsApp, Instagram, and TikTok) in the last 12 months. The information was collected as multiple responses from the participants. Based on these responses, we constructed a binary variable where participants who used any social media platforms were considered to have exposure to social media (coded "1") and (coded as "0") otherwise (21).

Data collection and management

Data were collected by twelve trained health professionals with experience in data collection using KoBoToolbox software were selected as data collectors. They were closely supervised by three supervisors who had greater experience in data collection. When selecting data collectors and supervisors, their ability to communicate in the local language and data collection experiences were used as a criterion. The principal investigator provides a two-day extensive training for supervisors and data collectors. The focus of the training is on administering the questionnaire, maintaining confidentiality and privacy, and neutrality during interviews on sensitive topics. After the two-day training, a pilot study was conducted with 5% (60 adolescents) in Chencha District, Gamo Zone, who was not selected for final data collection. After the pilot study, content, and face validation, necessary changes were made, such as removing confusing and unnecessary questions. The final version of the questionnaire was then uploaded to the KoBoToolbox software.

A structured questionnaire was used to collect the data. This tool (questionnaire) was created after reviewing previous studies (11, 13–15, 26, 42). Some of the questionnaires were adapted from the Global Early Adolescent Interview Surveys (46) and the WHO

Illustrative Questionnaire (47). The questionnaire was originally developed in English and translated into the local language (Amharic). The data collection tool was face and content validated by reproductive health experts before actual data collection. Data on adolescents' SRH services, individual characteristics, and family environment variables were collected using an interviewer-administered structured questionnaire. Less sensitive questions were asked before the more sensitive ones as recommended for developing a tool for sexual surveys. Each time we visited a village, we revisited the house to get previously absent adolescents to maximize participation rates. The principal investigator and supervisors oversaw the entire data collection process and checked the data for completeness daily. Before the data collectors send the collected data to the center supervisors check the completeness of the questionnaires. In addition, the principal investigator regularly reviewed the files sent to the center by each data collector.

Data analysis and management

The collected data were cleaned, processed, and analyzed using statistical software STATA version 14.0. Descriptive statistics, such as frequencies, percentages, means, and standard deviations, were calculated and presented through detailed text narratives, graphs, and tables. The reliability of the measurements was assessed using Cronbach's alpha for each composite variable. A Cronbach's alpha score above 0.70 indicates a high level of internal consistency (48).

The dependent variable in this analysis was SRH services utilization (coded 1 = used SRH services and otherwise 0). Two-level multilevel binary logistic regression models were fitted to evaluate factors linked to SRH services utilization at both individual/family and community levels. Since adolescents/households were nested within *Kebeles*, *and Kebeles* nested within districts. Districts were considered random effects to account for unexplained variability at the community level. To assess variability in SRH services use across communities or districts, random effect measures such as the Intra-class Correlation Coefficient (ICC), Median Odds Ratio (MOR), and Proportional Change in Variance (PCV) were calculated. Four models were fitted during multilevel analysis: Null Model (Model 0): Includes only the outcome variable (SRH services use) without predictor variables, serving as a baseline to quantify variability attributable to clustering at the community level. Model I: Incorporates individual/family-level variables as predictors of SRH services use while accounting for community-level effects. Model II: Includes only community-level variables as predictors of SRH services use. Model III: includes both individual/family and community level variables as predictors of SRH services use.

These models were fitted by a Stata command "logit" to identify predictors with the outcome variable. The best-fitting model was selected using log-likelihood ratio (LLR), Akaike Information Criteria (AIC), and Schwarz's Bayesian Information Criteria (BIC). According to the principle of log-likelihood, the higher the better. According to the principle of information criteria (AIC and BIC), the lower the better (49). The model with the highest log-likelihood and lowest AIC was chosen. Finally, crude odds ratio (COR) and adjusted odds ratio (AOR) with 95% confidence intervals were calculated and reported. Variables with p-values below 0.05 in the best-fitted model were declared statistically significant.

We employed latent class analysis methods to identify homogeneous groups of adolescents with shared characteristics. This approach helped us better understand the heterogeneity within the adolescent population. We conducted the analysis in two main steps. First, we performed a latent class analysis (LCA) to identify meaningful latent classes of adolescents based on seven sociodemographic indicators. This statistical method used to uncover underlying subgroups of individuals with shared characteristics that are mutually exclusive and exhaustive. Given that the number of latent classes is unknown *a priori*, we estimated a series of models with two to six latent classes. The appropriate number of classes was determined using the Akaike Information Criterion (AIC) and the Bayes Information Criterion (BIC), where lower values indicate a better model fit.

Results

Socio-demographic and economic characteristics of adolescents

Out of 1,181 adolescents, 1,172 took part in the study, resulting in a response rate of 99.24%. Among these adolescents, 497 (42.41%) were aged between 10 and 14 years. The average age of respondents was 15.01 years with a standard deviation of 2.69 years. A majority of the participants (56.31%) were female, and 689 (58.79%) lived in urban areas. Regarding school enrollment, 150 (12.80%) adolescents were not attending school during the study period. Additionally, almost half (49.66%) of the adolescents had good knowledge about SRH rights, and 451 (38.48%) reported ever using social media (refer to Table 1).

Family or household characteristics of adolescents

Concerning family structure, approximately 871 (74.32%) of the adolescents resided with both parents, while 128 (10.92%) lived with a single parent, and 173 (14.76%) did not live with their biological parents. The majority, 816 (69.62%), of adolescents did not engage in discussions about SRH issues with their parents. The average perceived parental monitoring score among adolescents was 15.01 (±3.57), and the average perceived family connectedness score was 6.66 (±2.25). In terms of family support, approximately 502 (42.83%), 407 (34.73%), and 263 (22.44%) of adolescents reported high, moderate, and low levels of family support, respectively. Moreover, 912 (80.2%) adolescents expressed the belief that the utilization of SRH services by unmarried adolescents was unacceptable in their community (refer to Table 2).

Adolescent sexual and reproductive health service utilization

The findings of this study reveal that 198 (16.89%) adolescents (95% CI: 14.8%–19.2%) utilized SRH services within the past 12

TABLE 1 Socio-demographic and economic characteristics of adolescents in Gamo Zone, South Regional State of Ethiopia, 2023.

Variables	Category	Frequency	Percentage
Age (in years)	Late adolescents (15–19 years)	641	56.4
	Early adolescents (10–14 years)	497	42.41
Sex of respondent	Male	512	43.69
	Female	660	56.31
Residence	Urban	689	58.79
	Rural	483	41.21
School enrolment status	School enrolled	1,022	87.20
	Not enrolled in school	150	12.80
Religion of respondent	Orthodox	660	51.19
	Protestant	529	45.14
	Muslim	38	3.24
	Other[a]	5	0.43
Attendance at religious services	At least once a week	905	77.22
	Every day	170	14.51
	At least once a month	82	7.00
	Never	15	1.28
Knowledge about SRH right	Good knowledge	582	49.66
	Poor knowledge	590	50.34
Social media exposure	Yes	451	38.48
	No	721	61.52

[a]Other (Catholic, Apostolic, Adventists, Joba).

TABLE 2 Family environment-related characteristics of adolescents in Gamo Zone, South Regional State of Ethiopia, 2023.

Variables	Category	Frequency	Percentage
Family structure	Two-parent families	871	74.32
	One-parent families	128	10.92
	Neither-parent families	173	14.76
Adolescent-to-parental discussions regarding SRH issues	Yes	356	30.38
	No	816	69.62
Perceived parental monitoring	(mean ± SD)	(15.01 ± 3.57)	
Perceived family connectedness	(mean ± SD)	(6.66 ± 2.25)	
Perceived social norm	Yes	246	20.99
	No	926	79.01
Family support	Low support	263	22.44
	Moderate support	407	34.73
	High support	502	42.83
Perceived household economic status	Average	850	72.03
	Poor	221	18.86
	Wealthy	101	8.62
Do you know your mother/ caregivers use any form of family planning methods?	Yes I know	421	35.92
	No, I did not know	751	64.08

months. In terms of gender distribution among SRH service users, more than half (59.59%) were female, and 156 (78.79%) of them were from the older adolescent age group. As for their place of residence, over half (57.58%) of the service users resided in urban areas. Modern contraceptive services ($n = 133$) emerged as the most frequently utilized SRH service type, followed by VCT services ($n = 98$). Conversely, the least utilized SRH service types included STI diagnosis and treatment services ($n = 29$), maternal and newborn care services ($n = 19$), and safe abortion and post-abortion care services ($n = 13$). The maximum and minimum frequency with which adolescents visited health facilities to receive SRH services was six and one time, respectively. In terms of where they obtained information about SRH services, over half (60.40%) of the respondents heard about SRH services from healthcare providers, while 304 (50.58%) heard about the services from their peers. The primary reasons cited by young individuals for not utilizing SRH services included not feeling ill (742 or 76.18%), lack of awareness about SRH services (494 or 50.72%), fear of costs for services (172 or 17.66%), and apprehensions about familial or relational reactions (162 or 16.63%), which were the most commonly mentioned reasons (refer to Table 3).

Factors associated with SRH services use among adolescents

Random effects analysis

We conducted two-level mixed-effects multivariable logistic regression that is aimed at identifying individual-level and community-level factors associated with SRH services used by adolescents in Gamo Zone. During the analysis, four separate models were fitted to reach the full model. The first level was the null model (empty model without variables), which was used to test the random effect of between and within-cluster variability which is determined by using intra-cluster correlation (ICC). The higher the ICC, the more relevant the community characteristics for understanding individual variation in the outcome variable. In model 0 (empty model), the ICC indicated that 34.06% of the total variability for SRH services use was due to differences between districts while the remaining unexplained 65.94% of the total variability of SRH services use was attributable to individual differences. The variation between- districts increase to 34.48% in Model I (individual/family level only). The variation between- districts increases to 34.95% at the community level only (Model II), while the ICC increases to 34.69% in the complete model with both the individual/family and community level factors (Model III). A widely used statistic for comparing models in multilevel statistical models is Log-likelihood (Log-LL), Akaike information criteria (AIC), and Bayesian information criteria (BIC). So, the full model (Model IV) had higher Log-likelihood results (−337.255) and a lower score of AIC (AIC = 702.5103). Therefore, the full model (Model III), the complete model with both the selected individual and household/community factors, was chosen for predicting the role of individual and household/community factors.

Furthermore, as shown in the table below, the MOR value was 5.01 in the null model, which indicated that there was variation in SRH use between districts. Those who came from the higher SRH services use districts 5.01 times higher chance of SRH services use as compared to respondents from low SRH services use districts (Table 4).

TABLE 3 Adolescent sexual and reproductive health service utilization in Gamo Zone, South Regional State of Ethiopia, 2023.

Variables	Categories	Frequency	Percentage
Ever heard about SRH services	Yes	601	51.28
	No	571	48.72
Source of information about SRH services ($n = 601$)	Health care provider	363	60.40
	Parents	88	14.64
	Friend/Peer	304	50.58
	Teachers	299	49.75
	Social media	272	45.26
The closest healthcare facilities	Health centres	800	68.26
	Private clinics	183	15.61
	Hospitals	113	9.64
	Health posts	73	6.14
Ever used SRH services in the last 12 months	Yes	198	16.89
	No	974	83.11
Types of SRH services used by adolescents during their last visit ($n = 198$)	Modern family planning services	133	67.17
	VCT service	98	49.49
	STI diagnosis and treatment	29	14.65
	Abortion and post-abortion service	13	6.57
	Maternal and New-born care services	19	9.9
Types of health facilities ($n = 198$)	From public health facilities	151	76.26
	Private health facilities	47	23.74
A need of adolescents for SRH services	I don't need it at all.	319	27.22
	I need it slightly.	349	29.78
	I need it seriously.	504	43.00
Commonly mentioned reasons for not using SRH services ($n = 974$)	Not feeling ill	742	76.18
	Lack of awareness about SRH services	494	50.72
	Fear of costs for services	172	17.66
	Apprehensions about familial or relational reactions	162	16.63

TABLE 4 Random effect analysis for the assessment of individual and community level factors associated with SRH services use among adolescents in Gamo Zone, South Regional State of Ethiopia 2023.

Random effect	Null model	Model-I	Model-II	Model-III
Intra-class correlation (ICC %)	34.06	34.48	34.95	34.69
Median odds ratio	5.01	6.66	6.76	6.72
Proportional change in variance (PCV %)	Reference	13.72%	10.35%	24.86%
Model comparison statistics				
Log-likelihood	−469.228	−342.977	−424.426	−337.255
Akaike information criterion	942.456	707.954	858.853	702.510
Bayesian information criterion	952.589	763.655	884.186	773.441

Fixed effect analysis

After adjusting for individual and community-level factors, adolescents with good knowledge about SRH rights were found to have significantly higher odds of using SRH services than those with poor knowledge (AOR = 4.65: 95% CI: 2.68, 8.07). Conversely, adolescents enrolled in school during the data collection period were 81% (AOR = 0.19; 95% CI: 0.11, 0.33) less likely to use SRH services as compared to their counterparts. Furthermore, adolescents living with a single parent were 4.13 times more likely to use SRH services compared to those living with both biological parents (AOR = 4.13; 95% CI: 2.39, 7.12). Similarly, adolescents who discussed SRH issues with their parents had 3.17 times higher odds of using SRH services as compared to their counterparts(AOR = 3.17; 95% CI: 1.89, 5.29). In terms of family support, adolescents with high family support were nearly twice as likely to use SRH services compared to those with low family support (AOR = 1.96; 95% CI: 1.09, 3.51). Additionally, access to social media significantly influenced the likelihood of SRH services use. Adolescents exposed to social media were almost twice as likely to use SRH services compared to those with no exposure (AOR = 1.98; 95% CI: 1.25, 3.15) (Table 5).

Finding from latent class analysis

In the process of selecting the optimal model for Latent Class Analysis (LCA), we evaluated models with 2–6 latent classes using various statistical criteria: Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), Adjusted Bayesian Information Criterion (ABIC), and Entropy. The goal was to identify the model that best balances fit and complexity.

For the 2-class model, the AIC was 10,078, BIC was 10,164, ABIC was 10,110, and Entropy was 0.76. The 2-class model exhibited the highest Entropy value, indicating clear class separation; however, it might oversimplify the data, as reflected by its relatively high AIC, BIC, and ABIC values. The 3-class model showed improvement with an AIC of 9,942, BIC of 10,073, ABIC of 9,991, and Entropy of 0.717, suggesting a better fit but with slightly reduced classification clarity compared to the 2-class model.

The 4-class model achieved an AIC of 9,889, BIC of 10,067, ABIC of 9,956, and Entropy of 0.702. This model demonstrated the lowest BIC and ABIC values among all models, indicating a favorable balance between model fit and complexity. Although its Entropy was slightly lower than the simpler models, it still provided a reasonable classification quality. The 5-class model had an AIC of 9,898, BIC of 10,121, ABIC of 9,981, and Entropy of 0.704, showing minimal improvement over the 4-class model in terms of AIC and slightly higher BIC and ABIC, suggesting that the added complexity might not significantly enhance the model's explanatory power.

The 6-class model achieved the lowest AIC value of 9,870, indicating the best fit according to this criterion. However, its BIC was 10,138, ABIC was 9,970, and Entropy was 0.745. While the AIC supports the 6-class model for fit, the higher BIC and ABIC compared to the 4-class model, along with only moderate Entropy, suggest that the increased complexity might not be justified.

Considering all criteria, the 4-class model emerges as the most suitable choice. It offers the best balance between fit and parsimony, as indicated by its lowest BIC and ABIC values, along with reasonably high AIC and acceptable Entropy. Therefore, the 4-class model is used to further analysis, providing a robust and interpretable classification of the data while avoiding unnecessary complexity (Table 6).

TABLE 5 Multilevel mixed effect analysis of individual and community level factors associated with SRH services use among adolescents in Gamo Zone, South Regional State of Ethiopia 2023.

Variables	Categories	Odds ratio (95% confidence interval)			
		Null model	Model I	Model II	Model III
Age of respondent	Younger adolescents	Ref	Ref		Ref
	Older adolescents		1.23 (0.75, 2.01)		0.94 (0.55, 1.59)
School enrollment status	School enrolled		0.19 (0.12, 0.33)*		0.19 (0.11, 0.33)***
	Not enrolled in school		Ref		Ref
Knowledge about SRH right	Good knowledge		5.33 (3.10, 9.14)*		4.65 (2.68, 8.07)***
	Poor knowledge		Ref		Ref
Family structure	Two-parent families		Ref		Ref
	One-parent families		3.93 (2.29, 6.73)*		4.13 (2.39, 7.12)***
	Neither-parent families		1.39 (0.77, 2.52)		1.50 (0.82, 2.74)
Parent-adolescent communication	Yes		3.85 (2.38, 6.26)*		3.17 (1.89, 5.29)***
	No		Ref		Ref
Family Support	Low support		Ref		Ref
	Moderate support		1.53 (0.87, 2.69)		1.62 (0.90, 2.89)
	High support		1.89 (1.08, 3.32)*		1.96 (1.09, 3.51)***
Parental Monitoring mean (± SD)			0.93 (0.87, 0.99)*		0.94 (0.88, 1.01)
Community level variables					
Residence	Urban			Ref	Ref
	Rural			0.82 (0.46, 1.45)	1.04 (0.53, 2.01)
Perceived social norm	Yes			2.77 (1.84, 4.16)**	1.48 (0.89, 2.49)
	No			Ref	Ref
Social media use	Yes			3.47 (2.39, 5.02)**	1.98 (1.25, 3.15)***
	No			Ref	Ref

Ref, reference category.
*$p < .05$ at Model I (individual/family level only).
**$p < .05$ at Model II (community-level only).
***$p < .05$ at Model IV (full model).

TABLE 6 Summary of latent class model selection criteria finding from community based cross-sectional survey in Gamo Zone, South Regional State of Ethiopia.

Class	AIC	BIC	ABIC	Entropy
2	10,078	10,164	10,110	0.76
3	9,942	10,073	9,991	0.717
4	9,889	10,067	9,956	0.702
5	9,898	10,121	9,981	0.704
6	9,870	10,138	9,970	0.745

Class profile

Based on seven socio-demographic indicators of SRH service utilization, the four-class model demonstrated optimal fit. The classes were defined as follows: Class 1: "Rural school-enrolled adolescents living with both parents", Class 2: "Urban school-enrolled adolescents living with both parents", Class 3: "Vulnerable adolescents with low SRH service utilization", and Class 4: "Urban disadvantaged female adolescents".

Class 1 (16.19%): rural school-enrolled adolescents living with both parents

Profile: This class comprises late adolescents who are enrolled in school, live in rural areas, and reside with both parents. Despite having access to social media, they exhibit poor knowledge about sexual and reproductive health (SRH) rights. The stability of living with both parents and the rural setting are significant features of this group. This group represents a significant minority of the adolescent population, indicating a need for targeted interventions in rural areas to improve SRH knowledge. Programs tailored to leverage social media for SRH education could be particularly effective for this group.

Class 2 (33.55%): urban school-enrolled adolescents living with both parents

Profile: Class 2 consists of late adolescent females who are currently enrolled in school. They reside in urban areas and have access to social media platforms. Additionally, they possess good knowledge about sexual and reproductive health (SRH) rights. Moreover, they live with both parents, indicating a stable family structure and potentially supportive home environment. This group represents a segment of late adolescent female who are actively engaged in education, have access to information through social media, and benefit from a nurturing family environment. Their urban residence suggests exposure to diverse social opportunities and resources, which may contribute to their overall well-being and development. As they are the second-largest group, these adolescents already possess good SRH knowledge. Efforts should focus on maintaining and enhancing existing education programs.

Class 3 (7.16%): urban disadvantaged female adolescent

Profile: Class 3 comprises late adolescent females who are not currently enrolled in school. They reside in urban areas and do not have access to social media platforms. Additionally, they lack

adequate knowledge about sexual and reproductive health (SRH) rights. Furthermore, they do not live with both parents. This group represents vulnerable segment of late adolescent females who may face barriers to education, lack of access to information about SRH rights, and potentially unstable family environments. This is the smallest group but represents a highly vulnerable population due to their poor SRH knowledge and lack of access to social media. Intensive support services, including alternative education and community-based outreach, are critical for this group to improve their SRH outcomes.

Class 4 (43.11%): early adolescents with restricted social media access

Profile: This class comprises younger adolescents who are enrolled in school and reside with their biological parents. They do not have access to social media platforms. This group represents a segment of younger individuals who are actively engaged in education but are not connected to social media platforms, possibly due to parental restrictions or personal choice. Their living situation with biological parents implies a stable family environment, which may play a significant role in their upbringing and development. Those are the largest group; interventions targeting this class can have a widespread impact. School-based SRH education programs and early intervention initiatives are essential to improve their knowledge and promote healthy behaviors (Table 7).

Discussion

The purpose of this study was to analyze the individual/family and community-level factors impacting the utilization of SRH services among adolescents in the Gamo Zone, Southern Regional State of Ethiopia. The findings of this study highlighted the multifaceted nature of factors influencing adolescent SRH service utilization. They emphasized the importance of holistic, tailored interventions that address individual, familial, and community-level factors. Key findings underscored in this study were adolescents' knowledge of SRH rights, access to social media, family support, parent-adolescent communication, and school enrollment status. These findings offer valuable insights into avenues for improving SRH outcomes within this demographic, highlighting the interconnected nature of various influences on adolescent SRH behavior.

The findings of this study reveal that SRH services utilization among adolescents in the past 12 months was notably low (16.89%, 95% CI: 14.8%–19.2%). In comparison to previous studies conducted in different settings such as Southern Ethiopia (32.8%) (11), Dire Dawa City (39.5% (50), Eastern Ethiopia (23.5%) (7), Nigeria (23.4%) (22), and Bhaktapur district, Nepal (24.7%) (51), the SRH services utilization observed in our study is lower. Further analysis from our quantitative study indicates that the utilization of SRH services was lower among adolescents residing in rural areas, younger adolescents, and boys compared to those living in urban areas, older adolescents, and girls. This pattern aligns with findings from previous studies (41, 51). The findings underscore significant concerns regarding the low utilization of SRH services among adolescents, suggesting potential gaps in access and provision. Additionally, the comparison with previous studies conducted in various settings reveals a concerning trend of lower SRH services utilization in the current study, emphasizing the necessity of identifying the root cause to design targeted interventions to improve access and utilization, especially in the study area. Moreover, the disparities in SRH services utilization based on factors such as rural residence, age, and gender underscore the need for tailored approaches to address these inequalities. Efforts should focus on overcoming barriers faced by adolescents in rural areas, younger age groups, and boys to ensure inclusivity and equity in service provision. Overall, these findings emphasize the ongoing need for research and action to enhance SRH services utilization among adolescents to ensure universal access to comprehensive SRH care.

Adolescents with good knowledge about SRH rights exhibited significantly higher odds of utilizing SRH services compared to

TABLE 7 Summary of latent class model class sizes and item response probabilities finding from community based cross-sectional survey in Gamo Zone, South Regional State of Ethiopia.

Latent class	Class 1	Class 2	Class 3	Class 4
Class size Probability	0.1619	0.3355	0.0716	0.4311
Proportion younger adolescents in each class	0.1191	0.064	0.2316	0.8511
Proportion older adolescents in each class	0.881	0.937	0.768	0.149
Proportion of boys in each class	0.497	0.407	0.249	0.469
Proportion of girls in each class	0.503	0.593	0.751	0.531
Proportion of out of school adolescent in each class	0.0468	0.1499	0.8825	0.161
Proportion of school enrolled adolescent in each class	0.953	0.850	0.118	0.984
Proportion of adolescent residing in rural area	0.966	0.162	0.227	0.429
Proportion of adolescent residing in urban area	0.0336	0.8377	0.7731	0.5708
Proportion of adolescents who had poor knowledge about SRH right	0.575	0.154	0.554	0.740
Proportion of adolescents who had good knowledge about SRH right	0.425	0.846	0.446	0.260
Proportion of adolescents who do not have access to social media	0.416	0.239	0.711	0.967
Proportion of adolescents who have access to social media	0.5839	0.7608	0.2893	0.0334
Proportion of adolescents living with both biological parents	0.9025	0.7108	0.0406	0.8214
Proportion of adolescents living with single parents	0.0875	0.1278	0.1354	0.0986
Proportion of adolescents living with neither parent.	0.0100	0.1615	0.8240	0.0800

those with poor knowledge. This observation finds support in research conducted across various regions including western Ethiopia, Nigeria, and Indonesia (52–54). This might be because those adolescents with better knowledge about their SRH rights may feel more empowered to seek out and access SRH services. Moreover, their informed understanding of the benefits of utilizing such services and the potential consequences of abstaining from them could also contribute to this trend. These findings underscore the importance of comprehensive SRH education initiatives aimed at enhancing adolescents' knowledge and awareness of their rights. Such programs hold promise in not only facilitating greater access to SRH services but also in fostering improved health outcomes among adolescents. Consequently, there is a pressing need for longitudinal investigations to establish causal relationships, as well as for the exploration of interventions geared towards augmenting SRH knowledge among adolescents. Furthermore, it is imperative to delve into additional factors that influence the utilization of SRH services among this demographic group.

Adolescents with high levels of family support show nearly double the likelihood of utilizing SRH services compared to those with low family support. These findings echo existing research highlighting the pivotal role family support plays in shaping adolescent SRH behaviors (40, 55–57). It suggests that robust family support fosters an environment conducive to open discussions about SRH topics, thereby enhancing awareness and motivation to seek out essential services. This underscores the critical importance of acknowledging the impact of family support on adolescent SRH behaviors. Furthermore, it underscores the urgency of bolstering family support mechanisms to facilitate adolescents' access to SRH services effectively. This could involve initiatives aimed at equipping parents with resources and guidance to support their children's SRH needs adequately. To gain a deeper understanding of the complex dynamics of family support and its influence on adolescent SRH, there is a clear call for further comprehensive mixed-methods research.

In consideration of family structure, results showed that adolescents from single-parent families (either mother or father) were more likely to use SRH services than adolescents living in families with both parents. This is consistent with previous research in central Ethiopia and eastern Ethiopia, which showed that adolescents living with both biological parents are less likely to utilize SRH services (21, 50). This may be because those who live with both biological parents may have high parental control compared to single-parental families (58). These adolescents from single-parent families (either mother or father) may have more freedom to communicate with relatives and friends about SRH issues (23). To gain a deeper understanding of the complexities of family dynamics and their influence on the SRH of adolescents, the findings underscore the importance of employing mixed methods designs that integrate qualitative techniques. Such approaches can provide richer insights into the intricate interplay between family structure and SRH outcomes among adolescents. Moreover, initiatives focused on engaging parents to enhance access and utilization of SRH services must be tailored to the specific context of the target population. Recognizing the diverse familial and cultural backgrounds of adolescents, interventions should be flexible and responsive to the unique needs and preferences of adolescents. Therefore, designing family-based interventions aimed at developing positive family life skills is important to improve adolescents' uptake of SRH services (59). This family approach is essential for effectively involving parents in promoting adolescent SRH and ensuring the success of SRH programs within communities.

Adolescents who have access to social media are nearly twice as likely to utilize SRH services compared to those without such exposure. These results are consistent with existing literature regarding the impact of social media on adolescent SRH behaviors (60–62). This underscores the significance of acknowledging social media's role in shaping adolescent SRH behaviors (63). This suggests that exposure to SRH-related information and resources on social media platforms may enhance awareness and motivate adolescents to seek out SRH services. Consequently, there is a pressing need to utilize social media platforms as vehicles for promoting SRH awareness and fostering service uptake among adolescents. Potential strategies include implementing targeted informational campaigns and establishing partnerships with influential online influencers (64). These findings underscore the importance of further research and collaborative endeavors to fully harness the potential of social media as a tool for advancing adolescent sexual and reproductive health.

In this study, the open communication between parents and adolescents regarding SRH topics emerged as a significant factor influencing adolescents' utilization of SRH services. Most previous studies consistently underscored the crucial role of parent-adolescent communication in imparting knowledge and sharing experiences concerning SRH issues (21, 41). Parental resistance to discussing sex with adolescents stems from a lack of knowledge and sociocultural norms surrounding sexual communication and fear that communication may promote sexual behavior (65). This creates large gaps in knowledge across multiple generations because experiences are not passed down through the family line (40, 66). To foster responsiveness among adolescents, it is overbearing to embrace change and establish consensus within families regarding the open discussion of SRH issues (67). Thus, bridging the gap within the family on SRH issues will improve the sustainability of positive changes and the transmission of accumulated experiences. Future researchers also need to explore how to bridge the gaps in the family in such culturally sensitive communities.

School enrollment status was statistically significantly associated with adolescents' utilization of SRH services. Those adolescents who were out of school were more likely to use SRH services compared to those adolescents who were enrolled. This finding is supported by prior studies undertaken in eastern Ethiopia, Kenya, and southeastern Nigeria (50, 68, 69). Another study from Ethiopia also shows that adolescents who received SRH information from their school teachers were less likely to use SRH services (20). This may be related to a lack of comprehensive sex education for school-enrolled adolescents and the inconvenience of working hours for school-enrolled adolescents (18). Previous studies also showed that the

inconvenience of working hours was the main reason for school adolescents not to use SRH services; they spent their time at school during regular health facility working hours (18, 20). Another study conducted in eastern Ethiopia also shows that adolescents are more likely to use SRH services if they find that the opening times of SRH service facilities are convenient for working hours (50). This finding implies the need to revise SRH services provision time convenient for adolescents.

Strength and limitation of study

The strength of the study lies in its comprehensive approach to understanding adolescent utilization of SRH services in the Gamo Zone, South Regional State of Ethiopia. Through the utilization of a multilevel mixed effects analysis, the study acknowledges the complex and hierarchical nature of the data, enabling a nuanced examination of both individual and contextual factors influencing service utilization. Furthermore, the incorporation of latent class analysis allows the study to identify distinct subgroups of adolescents based on their patterns of service utilization. This approach provides invaluable insights into the diverse needs and preferences of the target population. By strengthening analytical rigor and enhancing the reliability and validity of the results, the study is well-positioned to inform targeted interventions and policy recommendations aimed at improving access and uptake of services among adolescents.

However, this study has several limitations that should be acknowledged. First, we collected data only from adolescents who participated in the study. The lack of data from their parent's or caregivers' perceptive is another weakness of the study. In addition, this study is a cross-sectional study that does not establish a causal relationship between the dependent variable and the independent variables. There are also many factors this study did not assess, including parental style, parental self-efficacy, parental connectedness, and community influences (neighborhood). Future research may attempt to address these factors into consideration to predict SRH services use among adolescents. In addition, further exploring how to bridge the SRH gaps in the family in such culturally sensitive communities is needed. Another limitation is social desirability bias may occur as responses relate to the use of SRH services they may give inaccurate responses there may be over- or underestimation. To minimize this bias, efforts were made to provide a safe environment like the data collectors and supervisors were young health professionals. Also, clear instruction was given to adolescents about the voluntaries of participation; they have the right to answer all or some of the questions. All personal identifying variables were omitted from the questionnaire.

Conclusions

In conclusion, our study sheds light on the utilization of ASRH services in the Gamo Zone, revealing that 16.89% of the participants accessed these services within the past year. Our findings underscore the significance of timely access to SRH services in addressing distinct challenges faced by adolescents and promoting positive health outcomes. Significant factors associated with SRH service utilization included good knowledge about SRH rights, belonging to one-parent families, engaging in parental discussions regarding SRH issues, high family support, and enrollment in school. It is noteworthy that access to social media was also linked to increased utilization of SRH services among adolescents, emphasizing the evolving role of technology in influencing health-seeking behaviors. Furthermore, our latent class analysis identified four distinct classes of adolescents based on socio-demographic indicators, highlighting the heterogeneity within this population. These classes encompassed a range of characteristics, from rural school-enrolled adolescents living with both parents to urban disadvantaged female adolescents, illustrating the diverse needs and experiences of adolescents in accessing SRH services. These findings underscore the importance of tailored interventions and targeted approaches to address the multifaceted factors influencing SRH service utilization among adolescents. By understanding the individual, familial and community-level factors associated with SRH service utilization, policymakers and healthcare practitioners can develop comprehensive strategies to promote access and utilization of SRH services among adolescents in the Gamo Zone and similar settings.

Implications this finding

The implications of this study extend to various stakeholders involved in adolescent SRH promotion and service provision. For policymakers, the findings underscore the importance of investing in comprehensive SRH education initiatives tailored to adolescents. Recognizing the critical role of education in promoting informed decision-making and access to services, policymakers can prioritize funding and support for age-appropriate, culturally sensitive SRH programs implemented across diverse settings. Healthcare providers can utilize the study's insights to enhance their approach to adolescent SRH care. By recognizing the influence of family support, effective communication, and social media on adolescents' SRH behaviors, healthcare providers can adopt more holistic and patient-centered approaches. This may involve facilitating family-based interventions, improving communication skills, and leveraging social media platforms to disseminate accurate SRH information. Overall, the implications of this study underscore the importance of collaborative efforts among policymakers, healthcare providers, educators, and community leaders to promote adolescent SRH and well-being effectively. By addressing the multifaceted factors influencing adolescent SRH services utilization, stakeholders can work towards ensuring equitable access to SRH services and improving SRH service use among adolescents.

Policy and Practical Implications of finding

The research findings have several implications for existing policies and programs related to adolescent sexual and reproductive health (SRH) in Ethiopia:

1. **Education and Awareness Campaigns:** The significant association between good knowledge about SRH rights and increased SRH service utilization highlights the importance of comprehensive SRH education for adolescents. Existing policies and programs should prioritize the implementation of education and awareness campaigns that provide accurate and age-appropriate information on SRH rights, including access to services and decision-making autonomy.
2. **Parental Involvement in SRH Education:** The research underscores the positive impact of engaging in parental discussions regarding SRH issues on adolescent service utilization. Existing policies and programs should encourage and facilitate open communication between parents and adolescents about SRH topics, emphasizing the importance of parental involvement in SRH education initiatives.
3. **Enhanced Family Support:** High family support was found to be significantly associated with increased SRH service utilization among adolescents. Policymakers should explore strategies to strengthen family support networks, including interventions that promote positive parent-child relationships, foster supportive family environments, and enhance parental guidance and counseling on SRH matters.
4. **School-Based Interventions:** The lower likelihood of SRH service utilization among adolescents enrolled in school highlights the need for targeted interventions within educational settings. Existing school health programs should incorporate comprehensive SRH education and services, including access to counseling, contraceptives, and referral pathways to SRH facilities, to ensure that enrolled adolescents receive adequate support for their SRH needs.
5. **Utilization of Digital Platforms:** The association between access to social media and increased SRH service utilization underscores the potential of digital platforms in promoting adolescent SRH. Policies and programs should leverage social media and other digital technologies to disseminate SRH information, provide online counseling and support services, and facilitate access to SRH facilities for adolescents, especially those with restricted social media access.

The following tailored policy and program interventions are recommended to address the specific needs and circumstances of each class of adolescents:

❖ For Rural School-Enrolled Adolescents Living with Both Parents:
- Policy Intervention: Strengthening Rural Health Infrastructure
  - Allocate resources to improve access to adolescent center sexual and reproductive health services in rural areas, including the establishment of adolescent clinics or satellite clinics in rural schools.
  - Provide incentives for healthcare professionals to work in rural areas and offer specialized training on adolescent SRH to enhance service provision.
- Program Intervention: School-Based Outreach Programs
  - Establish school-based outreach programs targeting rural school-enrolled adolescents living with both parents.
  - Implement comprehensive SRH education programs within rural schools, covering topics such as puberty, contraception, and STI prevention.
  - Conduct outreach activities in collaboration with local schools to provide SRH information and services to adolescents in rural communities, including mobile clinics and community health worker visits.

❖ For Urban School-Enrolled Adolescents Also Living with Both Parents:
- Policy Intervention: Integrating SRH Services into Urban Schools
  - Advocate for policies that mandate the integration of adolescents center SRH services into urban schools, including counseling, contraceptive provision, and STI testing and treatment.
  - Provide funding and technical support to urban schools to establish SRH clinics or designate existing health facilities as adolescent friendly centers.
- Program Intervention: Peer Education and Support Programs
  - Implement peer education and support programs within urban schools, training older students to serve as peer educators and mentors on SRH topics.
  - Establish support groups for adolescents living with both parents, providing a safe space for discussions on SRH issues, peer support, and access to resources and referrals.

❖ For Urban Disadvantaged Female Adolescents:
- Policy Intervention: Targeted Support for Vulnerable Populations
  - Develop targeted policies and programs to address the unique needs of urban disadvantaged female adolescents, including those from low-income households or marginalized communities.
  - Allocate funding for community-based organizations and NGOs to implement outreach and support programs tailored to the needs of this population.
- Program Intervention: Comprehensive SRH Services and Empowerment Programs
  - Deploy community health workers to conduct door-to-door outreach targeting urban disadvantaged female adolescents, offering comprehensive services, including contraception, STI testing and treatment, and gender-based violence support.
  - Provide personalized SRH counseling and support, addressing issues such as family planning, pregnancy prevention, and gender-based violence.
  - Implement empowerment programs focused on building self-esteem, leadership skills, and economic opportunities for disadvantaged female adolescents, enabling them to make informed choices about their SRH and overall well-being.
  - Facilitate access to SRH services through mobile clinics or referral systems, ensuring confidentiality and privacy for adolescents seeking care.

❖ For Early Adolescents with Restricted Social Media Access

- Policy Intervention: Enhancing Digital Literacy and Access

- Develop policies to promote digital literacy and expand access to online resources and information for early adolescents with restricted social media access.
- Invest in initiatives to bridge the digital divide, including providing subsidized or free internet access and digital devices to underserved communities.

- Program Intervention: Peer Education and Support Groups
  - Establish peer support networks for early adolescents with restricted social media access.
  - Train peer support networks to deliver age-appropriate SRH information and facilitate discussions on topics such as puberty, body image, and healthy relationships.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by Ethical approval for this study was obtained from Wolaita Sodo University's Institutional Research Review Committee (IRRC) on February 9, 2023 (project reference number: WSU-IRRC/004/2023). The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Individual and relational dynamics perceived to influence the sexual behaviour of adolescents in Ethiopia: a qualitative study

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Background: There are 1.2 billion adolescents in the world today, more than ever before, making up 16% of the world's population and nearly one-fourth of the total population in Sub-Saharan Africa. Adolescents are facing life-threatening health challenges attributed to sexual and reproductive health issues such as unwanted pregnancies, unsafe abortions, and sexually transmitted infections, including the human immunodeficiency virus, and acquired immunodeficiency syndrome. The aim of this research is to explore the individual and relational levels of factors that drive adolescents to engage in risky sexual behaviour.

Methods: A qualitative phenomenological study design was used from February to June 2020. Adolescents and health professionals were selected purposefully. A total of 12 individual in-depth interviews, five focus group discussions with adolescents, and eight key informant interviews with health professionals were conducted using a semi-structured guide. Data analysis was performed using thematic analysis with ATLAS Ti version 7 software. Credibility, dependability, transferability, and confirmability were used to ensure the trustworthiness of the data.

Results: In this study, two themes were identified; individual level factors such as sexual desire and emotion driven sex, limited knowledge of sexual and reproductive health, and a permissive attitude towards sexual activities drive adolescents to engage in risky sexual behaviour; and relational level factors such as, limited family support and involvement, negative peer pressure and influence, male partner dominance during the partnership, and pressuring females to engage in sexual intercourse were perceived factors influencing adolescents to engage in risky sexual behaviour.

Conclusion: Various individual-level and relational-level factors are influencing adolescents to engage in risky sexual behaviour. Socially and culturally acceptable, comprehensive sexual education should be provided for in-school and out-school adolescents to enhance their knowledge, attitude, and skill about sexual and reproductive health. Interventions at the peer and partner level should be considered to enhance the life skills that enable them to resist pressure from peers and their partners. Child-parent communication on sexual and reproductive health matters should be promoted.

KEYWORDS

adolescents, exploratory, individual level, influence, relational level, sexual behaviours

1 Introduction

Globally, adolescents aged between 10 and 19 account for 1.2 billion (16%) of the world population and nearly one-fourth of the total population in Sub-Saharan Africa (1). In Ethiopia, one-third of the total population were adolescents and youth aged between 10 and 24 years old; approximately half of those were girls (2). Adolescence is the period between childhood and adulthood, and it is an experimental age in which adolescents become vulnerable to different risks that may result in various physical and psychological health problems (3). Adolescents' experiences include physical, hormonal, and cognitive changes (4). Emotionally, they develop a sense of identity during late adolescence; social involvement, peer interaction, and sexual interest, develop in this phase. Different behavioural experimentation is seen in early adolescence, risk taking in middle adolescence, and later adolescents learn to assess their own risk taking (5). Adolescence is the time to explore and understand sexuality. Sexual curiosity in adolescence led to exposure to pornography, indulgence in sexual activities, and increased the vulnerability to sexual abuse (6). Adolescents are somewhat at an increased level of vulnerability for different health problems, including sexually transmitted diseases, when compared to the adult population (7). Risky sexual behaviour is characterized by different dangerous behaviours such as premarital sex, multiple sexual partners, and unprotected sex. Such dangerous sexual behaviours are reported to end up with unpleasant health outcomes from sexually transmitted infections, including, HIV/AIDS, unwanted pregnancies, and unsafe abortions (8, 9).

Worldwide, 2.1 million adolescents aged 10–19 years were living with HIV (Human Immunodeficiency Virus) and 55,000 Acquired Immune Deficiency Syndrome (AIDS) deaths among adolescents in 2016, which is mostly due to risky sexual behaviour (10). Sexually active adolescents aged 15–19 years are at greater risk of acquiring sexually transmitted diseases compared with older adults (11).

Adolescent sexual and reproductive health remains a major public health issue in sub-Saharan Africa, especially for adolescent girls (12). Adolescent girls and young women (AGYW) aged 15–24 years have the highest risk for HIV and STIs across sub-Saharan Africa (13). Similarly, young people in Ethiopia are at risk of various SRH problems, such as sexually transmitted infection, including HIV, unwanted pregnancies and unsafe abortions, and various pregnancy related complications (14). For instance, the pooled estimated prevalence of teenage pregnancy in Ethiopia was 23.59 (15); 44% of pregnancies among adolescents were unintended, of which 46% ended in abortion (16). HIV prevalence among adults with a sexual debut before the age of 15 years (6.8%) was higher than that among those with a sexual debut between ages 20 and 24 years (2.7%). The prevalence of HIV infection was higher for women whose sexual debut was between ages 15 and 19 years or ages 20 and 24 years than for men with the same age of sexual debut (17). According to EDHS, the highest prevalence of HIV (4.8%) was observed in the Gambela regional state, followed by Addis Ababa (18). Evidence in Ethiopia indicates that the prevalence of risky sexual behaviour among adolescents attending school ranges from 13% in Humera, western Tigray (19), to 71.2% in Addis Ababa (20).

Various factors, such as personal, family, peer, school, and community groups, were found to be contributing factors to high-risk sexual behaviour among adolescents (21). In addition to this, individual lifestyle, and structural factors play an important role in influencing sexual behaviour among university students (22). Poor knowledge of sexual and reproductive health is another factor that influences adolescents' health-seeking behaviour (23). Some adolescents were not armed with the required information on sexually transmitted infections (24). Based on the study in Ethiopia, poor social support, living out of the family, experiencing parental neglect, and drinking alcohol were statistically significant risky sexual behaviours (25). Substance abuse, watching pornography, and nightclub visits were associated with risky sexual behaviours among secondary and above educational level students in Ethiopia (26).

Adolescents and youth health (AYH) programs, including those focused on SRH and youth development, have gained traction in Ethiopia to satisfy the requirements of this age group; however, teenagers and young people in Ethiopia still face high rates of morbidity and death due to a variety of issues, including teenage pregnancy, unintended pregnancies, poor nutrition, HIV and STIs, unsafe abortion, early and child marriage, and unmet family planning requirements (27).

Though quantitative study findings done in Addis Ababa indicated that, 20.4%, 70%, and 40.3% of youth and adolescents were engaging in risky in 2015 (28), 2017 (29), and in 2018 (30) respectively, there is no qualitative studies that explore and explain why and how adolescents are engaging in risky sexual behaviour in Addis Ababa. So, the aim of this study is to explore the individual and relational level factors that influence adolescents to engage in risky sexual behaviour.

2 Methods

Reporting adheres to the Consolidated Criteria for Reporting Qualitative Research (COREQ).

2.1 Study setting and period

The study was conducted in urban setting in Addis Ababa, the capital city of Ethiopia from February to June 2020. In Addis Ababa, there are 103 public health centers, 11 public hospitals, 33 private hospitals, and 270 pharmacies (31, 32), and there are a total of 106 functional youth centres (33). Study participants were selected from health centres, hospital, youth centres, and nongovernmental organization namely the Family Guidance Association of Ethiopia (FGAE) in Addis Ababa. FGAE has a mission to deliver comprehensive, integrated, quality, and gender sensitive SRH programs and services focusing on youth and underserved, vulnerable populations (34).

2.2 Study design

A qualitative Phenomenological study design was conducted using in-depth interviews (IDIs), focus group discussions (FGDs), and key informant interviews (KIIs) data collection techniques to achieve the objectives of the study. This design enables the investigator to explore the phenomena from the perspective of the participant being studied (35). We approached the research questions from the perspectives of health care provider and adolescents about sexual behaviours of adolescents based on individual level, and relational factors.

2.3 Population and sampling technique

The data was collected from 51 individuals (8 health professionals and 43 adolescents). The characteristics of qualitative sampling and sample size are determined by the study designs and conceptual requirement than representativeness (36). In qualitative research, participants are selected due to lived experience with the area of interest, purposeful sampling, to get rich and thick data about the phenomenon of interest and data collection continued until data saturation had been reached or no new concept is emerging (37). The researchers used purposeful sampling techniques till saturation had been reached. In a largely deductive approach, saturation may refer to the extent to which predetermined codes or themes are adequately represented in the data whereas inductive approach thematic saturation in related to the non-emergence of new codes or theme (38). So, the sample size was determined by information redundancy or saturation level, which occurred when no new information, theme, or coding emerged from the data. To ensure saturation, the data was reviewed at the end of each interview day for the presence of codes or categories, as well as the necessity for further interviews in a preliminary manner. Furthermore, the researcher ensured that interviews were no longer generating new information since newly conducted interviews tend to be redundant with previously collected data. After several similar responses or ideas, the recorded data no longer generates fresh code. Data saturation was assured after 12 IDIs with adolescents, 8 KIIS with health professionals, and 5 FGDs with adolescents.

The researchers used purposive sampling technique based on eligibility criteria listed below. Adolescents who fulfilled the following criteria were included in the study: Adolescents who receive SRH services in the selected health institution or receive SRH services and other library, and/or recreational services in youth during the data collection period, Adolescents with written consent to participate in the study, Adolescents between the ages of 15 and 19. Health professionals who fulfilled the following criteria were included in the study; age 18 years and above, responsible for any sexual and reproductive health service for adolescents in the selected health institutions and youth centers, working as SRH service provider in the selected health institutions or youth centers for at least 1 year, provided written consent to participate in the study.

2.4 Data collection tool and procedure

A semi-structured interview guide was prepared after reviewing relevant literature (39, 40) and different probing questions were added before and during the data collection process. SGB and GBT carefully crafted the interview guides in English and SGB translated to Amharic languages. The interviewed guid was pretested before actual data collection by two adolescents and two health professionals who were not included in this study. Based on the inputs from the pretest, the interview guide was revised for actual data collection. The principal investigator Semere Gebremariam Baraki (SGB) worked with the Addis Ababa regional health bureau, adolescents and youth case team leader, and the head of selected health care organizations and youth centres. First the principal investigator, in collaboration with head of selected health care organizations and youth centers, purposefully selected various service areas such as voluntary counselling and testing (VCT), Abortion service units, family planning service unit, antiretroviral therapy (ART) clinics, adolescents, and youth outpatient departments. Health professionals working in the selected department and were requested to identify adolescents who met the inclusion criteria. The principal investigator informs adolescents about the purpose, objective, risk, and benefits of the research. The researcher provided "yes" or "no" question on previous history of sexual intercourse to fill individually. Adolescent who said "yes" for previous history of sexual intercourse asked their willingness for participating in the research process in the IDIs.

The principal investigator and the head of youth center selected different service areas, recreation area, clubs, and libraries in the selected youth center and communicated with health professionals to call adolescents for orientation about the research. After giving briefing orientation, the researcher himself identified those who fulfilled the criteria purposefully for the FGDs. In both FGDs and IDIs, assent form was given to adolescents who were willing to participate in the study and Consent form was given to each adolescent for his/her parents to review and determine whether to allow their children to participate in the study the adolescents were found less than 18 years old. Written informed consent was obtain from adolescents' parents/cares before the data collection started. The data collection was conducted immediately after the biographic data filled if the adolescents were found above 18 years old. But the researcher appointed the participants for the convenient time and place for the next time for adolescents who were less than 18 years to secure parents'/care givers' written informed consent.

For the sake of KIIs, the principal investigator met the head of health institution and asked to recommend senior health professionals who have experience with adolescents sexual and reproductive health. He explained the purpose and procedure of study and asked them for voluntary participation. Consent form was secured from health professionals before conducting in-depth interviews. Data collection was carried out by the principal investigator (SGB) and two experienced female research assistants. The two female research assistants were assigned to

take notes during the FGDs after a brief training about the research ethics and process by SGB. The research assistants were fluent in local Amharic language (FGD participants' working language), one has MSc degree and the other has PhD in public health, and both had experience in qualitative research. All the data were collected using face-to-face interviews.

The biographic data was filled in separately; any personal identifiers were not recorded during the interview process. Participants were given all the relevant information relating to the study, which includes the title, purpose of the study, benefits, and any potential risks. Participants have had the opportunity to ask questions freely and without fear. IDIs, FGDs and KII were all audio-recorded after obtaining participants' permission to record. Data collection took place at different locations depending on participants. The FGDs were conducted in youth centers, IDIs were collected in the youth centers and Health care organization, while the KIIs were conducted in their offices, and the clinics. The data collection process lasted on average 40–75, 30–75, and 75–115 min for IDIs, KIIs, and FGDs, respectively.

2.5 Data processing and analysis

All the audio recorded interviews were transcribed verbatim to Amharic by principal investigator immediately after the interview. The principal investigator anonymized the names of the participants during transcriptions; the names of the participants in the FGDs were substituted as participant one (P1), Participant two (P2), and participant three (P3) and so on. The names of adolescents participated in IDIs were also replaced by adolescent one (A1), adolescent two (A2), and adolescent three (A3) etc. Similarity the names of health professionals who involved in the KIIs were anonymized as health professional one (HP1), health professional two (HP2), and health professional three (HP3) and so one. The transcribed data were translated into English. The verbatim transcription and careful translation were used to guarantee the accuracy of the original messages of the interview. In this case the recordings were listened to several times to form a general structure. All 25 transcripts were analysed with ATLAS.ti version 7 software. Thematic analysis was used to identify emerging themes using a six-step approaches: familiarizing with the data, generating initial codes, searching for themes, reviewing themes, defining, and naming themes, and writing the report (41). Thematic analysis was the most ideal approach to capture all aspects of data deductively and inductively. SGB coded the data and GBT comment and approve the coding. After reviewing four transcripts and field notes, he developed a code tree with a list of deductive and inductive codes from the data. The deductive codes came from topics in the interview guide and inductive codes captured new themes that emerged in the data (42). SGB developed a codebook, and this codebook was reviewed by the research supervisor GBT, and revisions were made where necessary till the end of data analysis. Identified discrepancies were discussed, resolved, and reviewed further until consensus was reached. The researchers systematically grouped the sub-categories into categories, and categories into general themes. We organized the findings by major themes, and we discussed minor themes in the manuscript and situated them within the broader literature. Participants' quotations were presented to illustrate themes and findings.

2.6 Trustworthiness

In this study, the constructs of credibility, transferability, dependability, and confirmability were enhanced (43, 44). Prolonged engagement and persistent observation; data, space, time, person, method triangulation; peer debriefing is among of techniques to maintain credibility. So, the principal investigator spent a lot of time in the field with study participants in maintain prolonged relationship and building good rapport, and gain deep understandings of the participants' experiences, and context to earn their trust and familiarize us with them and the data collection site to collect thick and credible data. The supervisor reviewed and approved the preliminary results, or subcategories, categories, and themes. The supervisor's remarks indicate that corrections were made. The data was collected from different sources; hospital, youth centers, and health centers and data were collected by individual interview, focused group discussion. Data was collected from health professionals and adolescents well involved as study participants for the purpose of triangulation techniques we employed.

To maintain dependability, four Study participants (two health professionals and two adolescents) were given raw transcripts by the researchers and inquired whether the transcripts accurately reflected the conversations that took place during the data collection phase. The findings of this study were audited and verified by advisors so that an outside individual can examine the data. Each process was documented, and audio records were used for cross-checking.

To maintain conformability, all data collected from the fieldwork were kept and were frequently checked and rechecked, and agreed upon between the investigators throughout data collection, analysis, and interpretation phase. The interview guide was translated into local languages and the inquiry was conducted in the language of the participant's choice to reduce bias and error.

To maintain transferability, The researchers provide a thorough explanation of the methodology they employed, including the steps involved and duration of the data collection, analysis, and presentation processes. All the audio recordings, transcripts, subcategories, categories, and themes were preserved by the researchers.

2.7 Ethical considerations

Ethical approval was obtained from the University of South Africa, Department of Health Studies, higher degrees committee with the reference number Rec-012714- 039 (NHERC) and from Addis Ababa city administration Public Health Research and Emergency Management Core Process (AACAPHREM) with the reference number of ኦ/ኦ/ጤ/30/703/227. Permission was sought

from the heads of health care organizations and youth centers. Written informed consent was obtained from each participant and/or minors' legal guardian or next of kin before the interview began. The researcher explained that participation was voluntary and that the participants could withdraw from the research at any given time without any repercussions. Minors were only allowed to give assent and participate in the study after written informed parental consent. Participants were assured of strict confidentiality regarding the information collected; that only aggregated data will be made available as part of scientific and public dissemination. Participants were given all the relevant information relating to the study that includes the title, purpose of the study, benefits, and any potential risks. Compensation of $5 was given to all participants for their time. Participants had the opportunity to ask questions freely without any fear. The data were collected from anonymized responses; security techniques were maintained starting from data collection, analysis, and presentation. All the data were protected using a password, and the audio was immediately copied to the computer and saved using a password and deleted from the tape recorder.

TABLE 1 Socio-demographic characteristics of adolescents who participated in individual. In-depth interviews and focus group discussions.

Variable	Category	Frequency	Percentage
Sex	Male	25	58.1
	Female	18	41.9
Data collection type	IDIs participants	12	27.9%
	FGDs participants	31	72.1%
School attendance	In school	30	69.8%
	Drop out of school	13	30.2%
Reason for last visit of health institution/youth center	Voluntary counselling and testing	7	16.3
	Condom uptake	4	9.3
	Sexually transmitted infections	1	2.3
	Recreation	10	23.3
	Library use	8	18.6
	Medical service	6	14.0
	Training	6	14.0
	ART service	1	2.3
Total		43	100%

3 Results

3.1 Participants

The researcher collected data from adolescents, and health professionals; 12 IDIs, 8 KIIs, and five FGDs. Out of the five FGDs, three were conducted with male participants, while two were conducted with female participants. Sociodemographic characteristics such as age, sex, religion, grade, living condition, history of sexual exposure, living situation, and the sub-city were collected during the data collection. The adolescents were represented as P1, P2, P3, etc. Codes during the interview. KII represents the key informant interview, IDI represents the individual in-depth interview, and FGD represents focus group discussion. A total of 43 adolescents participated in the study; out of this, 30 were school attendants, and 13 were out-of-school adolescents (Table 1).

The socio-demographic characteristics of health professionals who participated in the study were also presented. The average age of the study participants in this group was 35.75 years. The oldest was 54 years old, and the youngest was 24 years old. They had an average of 13.50 years of work experience, with a maximum of 32 and a minimum of 4 years of work experience. There were 4 females and 4 males. Regarding their profession, four of the totals were clinical nurses, two were nurse counsellors, and the rest were health officers. All participants were working in a health canter, hospital, NGO, or youth centre (Table 2).

TABLE 2 Socio-demographic characteristics of health professionals participated in KIIs.

Variable	Category	Frequency	Percentage
Sex	Male	4	50%
	Female	4	50%
Profession	Clinical nurse	4	50%
	Nurse counsellor	2	25%
	Health officer	2	25%
Educational background	Diploma	3	37.5%
	Degree	5	62.5%
Marital statues	Single	4	50%
	Married	3	40%
	Divorced	1	10%
Total		8	100%

3.2 Qualitative findings

In this research two themes, 7 categories, and 23 subcategories were identified. Theme one is individual-level factors, and theme two is relational-level factors. The themes, categories, and subcategories are briefly summarized in (Table 3).

3.2.1 Individual level influence

3.2.1.1 Biological factors

Most study participants indicated that adolescents engaged in risky sexual behaviour because of Having sexual desire, and emotion-driven: adolescents fail to use condoms due to discomfort, need for more sexual satisfaction, forgetfulness during high sexual climax, and enjoying their sexual pleasure and without having the plan to have sexual intercourse. Besides, some study adolescents explained that sexual intercourse is a natural desire and difficult to control, and an individual cannot remain a virgin throughout their life; sexual intercourse might be ok if both sexual partners like to satisfy their sexual instincts. They explained that early sexual initiation can help them in their future relationships and develop experience.

> *"The adolescents want to have free sex. They assume that sex using a condom means eating a banana with its rind." (KII, 54 years old, male)*

TABLE 3 Themes, categories, and sub-categories of the analysis.

Themes	Categories	Sub-categories
1. Individual-level Influence	1.1 Biological factors	1.1.1 Having sexual desire
		1.1.2 Emotion driven
2. Relational level influence	1.2 A gap in knowledge and skill of SRH	1.2.1 Limited knowledge about STIs/HIV
		1.2.2 Stereotyping and misjudgement
		1.2.3 Limited knowledge and skill of condom use
	1.3 Attitude on sexual behaviour	1.3.1 Attitude on early sexual initiation
		1.3.2 Attitude on condom use
		1.3.3 Attitude toward multiple sexual partners
	1.4 Behaviour stigmatization and judgemental	1.4.1 Unplanned sexual relationship
		1.4.2 Engaging in substance abuse
		1.4.3 Deceiving behaviour
		1.4.4 Dressing style
		1.4.5 Transactional sex
	2.1 Gap of family involvement in sexual and reproductive health behaviour modelling	2.1.1 Child parent communication about SRH
		2.1.2 Parental control and supervision
		2.1.3 Parenting style
		2.1.4 Child parent conflict
	2.2 Peer related factors	2.2.1 Negative peer norm
		2.2.2 Peer pressure/ influence
		2.2.3 Peer to peer communication
	2.3 Partner and relationship related factors	2.3.1 Failing in relational problem
		2.3.2 Male dominance in deciding condom use
		2.3.3 Pressuring female to sexual activities
		2.3.4 Exposing to sexual violence

> "*Most of the time, adolescents have emotion-driven sex; therefore, they forget to use a condom. The other reason is that they don't have planned sex.*" *(KII, 54 years old, male)*

> "*In my view, if a boy and a girl agree and if they have tested for HIV, there is no problem if they have it (sex). But before that, they must make sure that they are HIV negative.*" *(FGD, 19 years old, female)*

3.2.1.2 A Gap in knowledge and skill on sexual and reproductive health

Participants revealed that adolescents have limited knowledge and skill in sexual and reproductive health. The narratives revealed that adolescents worry more about pregnancy than other sexually transmitted diseases, including HIV, because they lack knowledge of sexually transmitted diseases and have limited knowledge and skill in using condoms. In addition to those, misconceptions and myths about condom use were stated, and there were different types of stereotyping and miss-judgment-based appearances on condom use. Adolescents might not use condoms if their sexual partner looks healthy, does not have any symptoms of disease, is a virgin, is not a commercial sex worker, has decent behaviour and is physically attractive. However, such stereotyping and misjudgement-based physical appearance were explained by a few participants.

> "*If I have sex without a condom suddenly, the first thing that comes to mind is pregnancy. If I have a baby now, what do I do since it was done without the permission of my family?*" *(IDI, 17 years old, female).*

> "*When you see girls who have skin rashes on their faces, you may think that they are HIV positive. But with beautiful girls, a male can lose control, and he can have sex without it (condom).*" *(IDI, 18 years old, male).*

Knowledge and skill of using condoms vary among adolescents. Adolescents who have used a condom explained that they have the knowledge and skill to use condoms. However, there are also adolescents who lack the knowledge and the skill of using condoms. Adolescents explained their concerns about condom use: it can burst, get stuck in the womb, and cannot prevent STIs and HIV/AIDS 100%; they consider it only prevents 90%-95%; and it can cause infection in the sexual organs. Few of them perceive that it cannot prevent pregnancy and some communicable diseases, such as hepatitis.

> "*Most of the time, the cause of unplanned pregnancy and diseases is not knowing how to use a condom.*" *(FGD, 19 years old, male).*

> "*I think it can prevent 90% of diseases or sexually transmitted diseases. I do not think a condom prevents unwanted pregnancy; it can protect me from sexually transmitted disease, but I do not think that it protects me from being pregnant.*" *(FGD, 17 years old, female)*

On the other hand, one female adolescent indicated that adolescents usually fear pregnancy more than HIV/AIDS because they do not have detailed knowledge about the seriousness of the disease. She added that she feared pregnancy and HIV/AIDS when she was younger and had little knowledge. But after she understood the disease, she better feared the disease than pregnancy. On the other hand, adolescents understand the risky severity of HIV as get older, as indicated by one senior health professional from the key informant.

> "*It is terrifying. HIV/AIDS is very terrifying now. Pregnancy is not terrifying. I have never used a condom, but I think I should use it.*" *(IDI, 19 years old, female).*

> *"Let me tell you what I experienced recently. Two lovers (boy and girl) have been together in friendship for the last two years and are planning to get married in 2021. When I asked him, "Have you been tested for HIV/AIDS? he said, 'I haven't.'" And when I asked her, "Have you got tested for HIV/AIDS?" she said, "I haven't." When I asked and said to the guy, "Do you assume that you have never been exposed to the risk? he said to me, I extremely fear the virus. I don't even want its name (HIV) to be mentioned." (KII, 40 years old, female)*

3.2.1.3 Attitude on sexual behaviour

According to most study participants' narratives, adolescents should not start Sexual intercourse at an earlier age. They gave different reasons. They explained that there is limited awareness of the risk of contracting STIs after the early initiation of sex. Participants additionally stated that lack of knowledge can lead to risky sexual behaviours that can lead to the contraction of STIs and unplanned teen pregnancy. Furthermore, this may lead to adolescent girls engaging in unsafe abortions. Most adolescents regret having sexual intercourse, as captured in the extracts. Many adolescents have a positive attitude toward the use of condoms during sexual intercourse. They mentioned the importance of condom use for preventing STIs, including HIV/AIDS, unintended pregnancies, and having sex without any fear or frustration. According to health professionals and some adolescents' narratives, adolescents have a limited level of risk perception of multiple sexual partners, though they participate in it. According to the opinion of adolescents, engaging in multiple sexual partners can expose them to different diseases, including HIV and STIs, and ultimately to poor health outcomes. Adolescents have a limitation on risk awareness, and most of them have a negative attitude towards having multiple sexual partners.

> *"Adolescents face different problems when they have sex at an early age, like unwanted pregnancy, HIV/AIDS, and STIs. Nowadays, we adolescents like to try everything quickly; adolescents want to experience everything." (IDI, 17 years old, female)*

> *"The adolescents are only concerned about unwanted pregnancy. Nobody is concerned about the consequences of having multiple partners. This, I think, is related to a lack of training and knowledge." (KII, 27 years old, male)*

3.2.1.4 Behaviour stigmatization and judgemental

According to the narrative of the participants, adolescent engage in various substance abuse such as alcohol, khat, shisha, and the after the engaged in unsafe and multiple sexual activities. There are conditions such sexual involvement with Sugar mammy and sugar daddy to fitful their financial needs.

> *"After some adolescents finished the Ministry exam, they threw a party, and four guys of the same age had sex with one girl; the girl did not know she had sex with four guys, and the boys were friends and were not aware. As I told you, they get high using hashish; they were all compounded children." (KII, 32 years old, female).*

> *There is what we call PESTL; we use this term as an abbreviation for psychological, economic, social, technological, and legalization. These are five things. To fulfil these five things, they (adolescents) want to meet those who are older than them, fulfil their needs, and engage in transgenerational sex. They may have transgenerational sex with what we call sugar mammy or sugar daddy. They have sex with the one who gives them money (KII, 54 years old, male).*

When adolescents usually need to other place hotel or party for enjoyment, they pretend as if they are going to a birthday party or a ceremony. Participants mentioned that some participants can dress seductively and by so doing, send the wrong message that they are available for sex.

> *"Adolescents usually tell their families that they are going to church, school, or the library and then go to other places that they know their parents would not allow. Not knowing that, at the end, it will hurt them." (IDI, 26 years old, male)*

> *"Their dressing styles have their influence. For example, if a woman comes to you wearing a nightgown, you may not give her attention, or she may not seduce you. She may not arouse your sexual desire. If you see girls wearing miniskirts that highlight the shape of their bodies, many people will be easily aroused. Therefore, the girls' dress has its influence." (KII, 29 years old, female).*

3.2.2 Relational level influence

In this theme, different factors such as family, peer, and partner-related factors are included in the following subcategories.

3.2.2.1 A gap in family involvement in sexual and reproductive health behaviour modelling

According to the narratives, child-parent communication about sexual and reproductive health, such as sex and condoms, was perceived as low because talking about it was considered taboo, and some families also lacked the basic skills and knowledge of SRH. It was perceived that families would suspect that their children are already involved in sexual relations if they talk about sex, condoms, or another SRH-related issue. Adolescents with limited family control and supervision are more likely to engage in risky sexual behaviour. Adolescents who live with a grandmother, or relative or other guardian, live alone, or live with only one biological father or mother were more likely to engage in risky sex than those who grew up with both a biological father and biological mother.

> *"It is very difficult. If you sit and try to talk to your mother about a condom, she will say," "How ill-mannered are you? Stop it." People may say, "She must have started sexual*

> *relations; that is why she is talking about condoms." "They would question your motive to know the usage of condoms." (IDI, 19 years old, female)*

> *"I have a friend who used to live with her grandfather. She gets food and supplies from school. After her grandfather passed away, she became independent. She started spending time in bad places next to our school." (IDI, 17 years old, female)*

The parenting style also matters. Participants in this study also mentioned that parents who are overly strict and controlling make the children rebel, and this leads to adolescents engaging in risky sexual behaviours. On the other hand, failing to control or turning a blind eye has its influence. Therefore, adolescents prefer neither dictatorship nor permissive parenting styles recommending that parenting styles should be democratic with moderate control and open discussion. Besides, if adolescents quarrel with their families, they usually engage in substance abuse, such as drinking alcohol, and finally get involved in risky sexual behaviour.

> *"In my opinion, neither being extremely strict nor careless are good. A family should be strict to some extent. It is also important to have some kind of intimacy. A family should guide children properly. Corporal punishment is not good. There should be a discussion with children." (FGD, 18 years old, female)*

> *"Family influences you. If you go somewhere alone, when you come back, they suspect that you might have had sex. When they think that way, they insult you. They call you 'Bitch.' These things influence the girl to develop bad behaviour. She wants to try the life that they talk about." (IDI, 18 years old, female)*

3.2.2.2 Peer-related factors

Peer influence is when you choose to do something you wouldn't otherwise do, because you want to feel accepted and valued by your friends. It isn't just or always about doing something against your will. The term "peer pressure" is used a lot. But peer influence is a better way to describe how adolescents' behaviour is shaped by wanting to feel they belong to a group of friends or peers. Peer pressure and influence can be positive or negative. For example, adolescents might be influenced to become more assertive, try new activities or get more involved with school or might choose to try things they normally wouldn't be interested in, like risky sexual behaviours. Negative peer norms are predominantly more common among males than females because of the permissive attitude toward sexual intercourse for adolescents stated below:

> *"Even now, what does he say? … When we were in a training session last year, there was a guy who gave us his opinion by saying, 'Virginity means what you should be ashamed of.' Now, the girls and the boys alike are ashamed to say that 'I am a virgin.' Even if he had no sex at all, he would talk and brag by saying, 'I had sex three times or I had sex with three ladies.'" (KII, 27 years old, male)*

> *"There is a saying that 'Tell me your friend and I will tell you who you are'. If a friend of yours has done it (sex), you feel pressured to do it because you feel inferior to your friend. At this age, we cannot think like a mature person.'" (IDI, 19 years old, female)*

Peer-to-peer communication drives adolescents to risky sexual behaviour. The findings of this study also reported that adolescents usually talk about sex, love, and friendship every time and everywhere. They explained that this type of communication repeatedly comes to their mind and try to have a boyfriend or girlfriend when their friend hears about the difference between sex with a condom and sex without a condom, then they want to experience it without a condom. When adolescents talk to each other about sex-related issues, they learn from each other and want to experience what the others have done it.

> *"There is one student who talks about different boys who have relationships with her. There are bars and khat shops around her home. She spends time with such people. She told us about a handsome man that she kissed and had sex with her. Due to this, I decided to say ok to the boy who asked me to be his girlfriend." (IDI, 17 years old, female)*

3.2.2.3 Partner and relationship-related factors

Partners are those who have sexual relations with one another. The sexual partners may be in a committed relationship, either on an exclusive basis or not, or engage in the sexual activity on a casual basis. They may be on intimate terms such as lovers or anonymous. These relationships can involve physical, psychological, or sexual abuse, as well as harassment or stalking. Revenge, failing love, lack of trust, maintaining the relationship, conflict with the partner, long- time relationships were commonly the relational problems, and such issues put adolescents in risky sexual behaviour. If some of the male adolescents expect that their girlfriends are cheating with other boyfriends or if they do not care about their girlfriends, they end up having sex without a condom with them (their girlfriends) by considering this as a revenge. Participants also mentioned that when they no longer trust a girl, they will have sex with her and with others. There is a tendency to refuse to use a condom, especially among males. Though there is a lack of awareness about sexually transmitted diseases, female adolescents want to use condoms to prevent unintended pregnancy.

> *"When he talks to me, he says that it is 'BATAKOYENG' (having an alternative in partnership). If he misses the first one, he can go to the second one. So, he says that it good thing. You will not be hurt. If you quarrel with the first one, you can hang out with the second one." (IDI, 18 years old, male).*

> *"One may want to use condom and the other one may not want to use. This time the male will chose to have sex without condom. Also, if their relationship is real, the males will choose to have sex without condom. But if not, he would rather choose to use condom". (KII, 29 years old, Female.*

> *"Sex without a condom is mainly common among guys. The girls want to use a condom more than most of the boys." (KII, 32 years old, female)*

4 Discussion

This study explored that various biological factors, limited knowledge, and skill of SRH, Stereotyping and misjudgement, permissive attitude on the early initiation of sex and limited skill, a lack of trust, a few misconceptions about condoms, and substance abuse fuel unplanned sexual relationships. Limited child-parent communication on SRH, parenting style and control, and child and parent conflict have contributed to adolescents' sexual behaviour. On the other hand, negative peer norms, peer pressure, male dominance, sexual violence, and pressuring females to sexual intercourse were found perceived factors influencing adolescents to engage in risky sexual behaviour at the peer and partner level factors.

In this study, adolescents were participating in risky sexual behaviour because of their biological needs. This finding is supported by other findings. For instance, physiological needs related to sexual intercourse drive adolescents to follow their emotions and engage in risky sexual behaviours (45, 46).

TAdolescents living in Addis Ababa were found to have limited knowledge about sexual and reproductive health. They feared pregnancy more than STIs and HIV because of their limited knowledge about the severity of the diseases. Besides, some stereotyping and misjudgement were explained about using condoms. Our study was supported by different studies in the world; lack of knowledge and skill on SHR led adolescents to engage in risky sexual behaviour in Morocco (47). Studies done in Ethiopia revealed that comprehensive knowledge of HIV/AIDS among youth was relatively low, at 35% among males and 24% among females, Youth and adolescents who have a low level of sexual and reproductive health knowledge are more likely to practice unsafe sexual practices because of a lack of information and poor negotiation skills (31). This indicates that the responsible bodies should address the SRH knowledge gap by providing comprehensive sexual education. Because education, especially comprehensive sexual education (CSE), has positive effects including increasing young people's knowledge and improving their attitudes related to sexual and reproductive health and behaviours as they move into adulthood (48).

Almost half of the study participants were found with permissive attitudes toward early sexual initiation, and on the other hand, they claimed that they should not have sexual intercourse predominantly fear of pregnancy and few of them due to fear of diseases such as STIs and HIV AIDS. Study participants were found with a positive attitude toward using a condom during sexual intercourse despite their limited knowledge and skill in using a condom. Perceiving the risks of multiple sexual partnerships was explained by study participants. This study supported that adolescent perceived that premarital sex was risky (46). Study participants believed that condoms could protect them from contracting STIs and pregnancy (47). On the other hand, more than 80% of study participants had a favourable attitude towards premarital sex (49). This implies that despite of adolescents has permissive attitude towards early initiation of sex, they have somehow understandings on risky of acquiring STIs including HIV and unwanted pregnancy secondary to unsafe sex and multiple sexual partners.

Our findings revealed that, adolescents were engaging in risky sexual behaviour because of unplanned sexual relationships and substance abuse. Similar studies indicated that substance abuse was found to be the driver of risky sexual behaviour (50, 51). This might be because the level of mental functions gets lowered by the effects of alcohol. This might hinder them to comprehend things that put them at potential risk to engage in risky behaviours. We would also like to suggest that alcohol consumption among adolescents be better controlled, and that people be made aware of the negative side effects of alcohol and other substances.

On the other hand, dressing style and deceiving behaviour were considered as mediators of risky sexual behaviour because, studies indicated that amorous dressing styles seduce males and drive to engage in sexual violence (52), some women intentionally dress sex-typed but inferences about women who wear sexy dress can be misinterpreted and are sometimes negative (53).

Poor child-parent communication about sexual and reproductive health issues is judged to have a great influence on risky sexual behaviour. Various studies have revealed that child-parent communication about sexual and reproductive health is associated with adolescents' sexual behaviour. Poor child-parent communication due to various cultural factors affects the lack of knowledge and skills of rational decision-making, hindering the seeking contraceptives and negotiating safer sex, resulting in lower self-confidence (54–56). This might indicate that parents can improve the chances of communicating with their children about sex by conveying non-judgemental attitudes, using open communication styles with neutral messages, and appearing comfortable at the same time as displaying positive attitudes towards communication around sex and contraceptive use. There should be mechanism to improve SRH knowledge parent and enhance their communication skill how to approach their children.

We found family control, supervision, and parenting style-related issues were perceived as factors related to risky sexual behaviour. Youth and adolescents who were living alone and without parental control were practicing sex with multiple sexual partners (57). Staying alone increases the reliance of adolescents on peers because there would be no parental monitoring (58). Authoritative parenting was the best parenting styles recommended by most of the study participants in this research. Authoritarian, authoritative parenting styles prevent adolescents from engaging in risky sexual behaviour than other types of parenting style in Addis Ababa (59). When the parenting role is not well handled, there is a tendency for delinquency, and permissive and authoritarian parenting styles significantly predict

experimenting with sex, while authoritative parenting styles do not have a significant influence on sex experimentation (60). Authoritative parenting style reduced sexual risk behaviours among adolescents in Ethiopia. So, our findings suggest that the need to address family parenting style focusing authoritative parenting style to enhance healthy SRH behaviours among adolescents (61).

Our study showed that when child-parent conflict occurs, adolescents tend to engage in substance abuse and risky sexual behaviours. It was evident that adolescents who had higher levels of conflict with their parents and lower parental support were predictably at a higher risk of engaging in risky sexual behaviour (62, 63). Result indicated that more rapid increase in mother–adolescent conflict, more rapid decline in father–adolescent closeness, and a more rapid increase in father–adolescent conflict predicted more engagement in sexual behaviours by age 15 (64).

Negative peer norms, peer pressure, and usual peer-to-peer communication about sexually related matters were other important findings associated with risky sexual behaviour. Early initiation of sex and multiple sexual partnerships are considered brave, heroic thinking among peers. Provocative communication leads others to start it. Studies have generally reported in support of our study that adolescents who perceive that their network members approve of sex and sexual practice are more likely to engage in risky sexual behaviour than those who disapprove of sex and sexual practice (65). If participants do not strongly perceive that their peers believe condom use is always a good idea, this perception predicts their intention not to use a condom during sexual intercourse (66). Overall, kinds of literature revealed that peer influence and pressure had an association with risky sexual behaviour (67, 68). A study done in Ethiopia indicated, peer pressure was considering as a major factor that influences secondary and preparatory students towards their first sexual intercourse. Peers had greater influence on the positive and negative behaviour of their friends (69). Therefore, this situation calls up one responsible body should emphasize on promoting peer educators and peer discussion to protect adolescents and youth from risky sexual behaviours.

Failing in love, sexual desire, male dominance of sexual relationships, and pressuring females to sexual activities such as sexual relationships were listed as partner-related factors that predispose adolescents to engage in risky activities. This finding was supported by a study done in Ethiopia showed that students were engaged in risky sexual behaviour with the primary reason of falling in love (70). Nowadays, romantic Relationships are considered as norm despite that their effect are dangers. Adolescents, especially girls who indulge in sexual intercourse before the age of 18 years tend to feel misguided, cheated, and depressed if left by their partner later (71). Therefore, awareness creation programs should be enhanced for adolescents inform them about romantic relationships, the difference between infatuation and love.

According to the narratives of this findings, adolescents are facing problems on safe sexual negotiation skill, shame on buying condom, and some of the female adolescents were enforced to engage sexual violence and unsafe sex dominated by male partners. Similarly, ashamed for asking sexual partner about condom, partner fear of buying condom from shops or pharmacies, lack of interest lack of knowledge to use, and perceived barrier for sexual pleasure were the reasons described for inconsistent or non-condom use among youth and students in Ethiopia (72), It is also conclusive that young girls are pressurized into sexual activities (73), and sexual violence (74), Almost 45% of the study participants had experienced sexual violence in their lifetime, those 15. 5% of them had ever been exposed to rape (75), by neighbours, family members, friends, employers, teachers, and strangers (76). Sexual abuse among males is also a problem in Ethiopia (77).

4.1 Research contribution

TThe study found that biological, Limited knowledge and skill on SRH, dressing style, poor economical statues, substance abuse, permissive attitude on early initiation of sex where factors are driving adolescents to engaged in risky sexual behaviour. The findings also reveal permissive and authoritarian Parenting style, child-parent conflict, negative peer pressure and peer norm, male dominance of sexual relationship and sexual violence influence adolescent to engage in risky sexual behaviour. The study provides a new insight, female adolescents fear to pregnancy than HIV because they have lower knowledge and low perceived severity of HIV/AIDS. These findings are original and contribute to the literature on the effect of individual and relational level factors on risky sexual behaviour, providing insights that can inform policies and practices for improving sexual behaviour of adolescents.

5 Conclusion

Risky sexual behaviour in this study was influenced by various individual and relational-level factors. Generally, the perceived factors that influence adolescents to engage in risky behaviour reported in other studies are like what we found in the perceived factors that influence adolescents to engage in risky behaviour in this study. However, this finding indicated new insight: the gaps in SHR knowledge among adolescents, especially on HIV/AIDS and STIs, influence female adolescents to fear pregnancy more than STIs, including HIV/AIDS. Responsible bodies should introduce socially and culturally acceptable, comprehensive sexual education curricula for in-school and out-school adolescents to enhance SRH knowledge, attitude, and skill. There should be SRH strategies or interventions that will benefit adolescents when interacting with parents, peers, and partners.

6 Strength and limitation

The limitation of this paper is that the topic was a very sensitive one, requiring adolescents to verbalize their experiences and share their thoughts with the researcher. The age of the researcher might have been a limitation too. The study was conducted in one area among homogenous people who have the same experiences and challenges. A richer database could have been

achieved if the study was done in two or three other different regions of the country.

In addition, adolescent sexual behaviours are highly sensitive topics; consequently, talks could have resulted in participants withholding crucial information from the researcher. These constraints tried to be overcome by informing participants that their Candor would be crucial for recommending targeted interventions to prevent adolescent from risky sexual behaviour by assuring their anonymity.

The study was conducted in a familiar place for participants. This created an environment with a friendly atmosphere for developing relationships with one another. The researchers remain sensitive to their own assumptions about adolescents' engagement in risky sexual behaviours to eliminate the researcher's bias. We applied various strategies, such as building rapport, self-disclosure, reciprocity, and appropriate and sensitive use of open questions. In additions to this we were ensuring a comfortable environment and appropriate timing. These measures helped us at to gain trust from our participant and enhance spontaneous exchange of information in a warm and supportive environment. Because talking about an experience in a safe and respectful environment can help with gaining closure and personal control or efficacy over the event or situation.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by University of South Africa, Department of Health Studies, higher degrees committee. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

SB: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. GT-t: Conceptualization, Methodology, Software, Supervision, Validation, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/frph.2024.1348953/full#supplementary-material

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Parent–adolescent communication on sexual and reproductive health issues and associated factors among secondary public-school students in Gondar town, northwest Ethiopia: an institution based cross-sectional study

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Introduction: Effective communication between adolescents and their parents is crucial for reducing sexual health problems. This open dialogue can help address misconceptions, provide accurate information, and foster a supportive environment where adolescents feel comfortable seeking guidance and discussing sensitive issues related to their sexual health. In Ethiopia, with its diverse ethnic and cultural background, effective communication between parents and adolescents about sexual and reproductive health (SRH) is crucial in reducing the likelihood of adolescents engaging in risky sexual behaviors. Despite the importance of such communications, there were no data showing the level of parent–adolescent communication (PAC) in secondary public schools in Gondar town. Therefore, this study aimed to determine the level of parent–adolescent communication on sexual and reproductive health issues along with its influencing factors, among secondary students in Gondar town, northwest Ethiopia.

Methods: We employed an institution-based cross-sectional study design. A total of 424 students were recruited using a systematic random sampling technique, with a 100% response rate. We developed a structured questionnaire from the related literature to collect data from the participants of the study. The data were entered using EpiData version 4.6, and analyzed using SPSS version 25. A binary logistic regression model was fitted to identify associated factors.

Results: The proportion of adolescents who had communicated with their parents was 37.7% (95% CI: 34.65–44.76). In a multivariable analysis at a 95% confidence interval (CI), variables such as being female (adjusted odds ratio

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(AOR) = 2.23; 95% CI: 1.09–7.45), belonging to grades 11–12 (AOR = 1.25; 95% CI: 1.19–6.98), living with parents/caregivers (AOR = 1.26; 95% CI: 1.07–5.66), having a positive attitude toward sexual health (AOR = 2.4; 95% CI: 1.34–7.82), having poor knowledge about SRH issues (AOR = 1.23; 95% CI: 1.04–7.81), and having good knowledge about the puberty period (AOR=1.23; 95% CI:1.04–7.89) were statistically associated with parent–adolescent communication.

Conclusion and recommendations: This study found a low level of communication between parents and adolescents regarding sexual and reproductive health (SRH) issues. To address this challenge, it is crucial to implement evidence-based education on SRH topics, such as consent, healthy relationships, communication skills, STDs, contraception, and interpersonal dynamics. Enhancing parent–adolescent dialogue on SRH can be achieved by implementing peer education among senior students and training teachers in effective communication techniques. The study also recommended conducting qualitative research to explore the specific barriers affecting parent–adolescent communication.

KEYWORDS

parent–adolescent communication, sexual and reproductive health issues, students, secondary schools, Ethiopia

Introduction

Poor communication skills between parents and adolescents regarding sexual and reproductive health (SRH) can lead to misinformation, misunderstandings, and a reluctance to seek help (1–3). The level of parent–adolescent communication on sexual and reproductive health issues varies across different countries in developed regions. For instance, it was reported to be highest in the United States of America at 70.6% and in Mexico at 83.1%. Conversely, lower levels of parent–adolescent communication were observed in Myanmar at 6.8% and in India at 13% (4–7). Similarly, the prevalence of parent–adolescent communication was reported to be lower in African countries. For instance, in Nigeria, it was reported as 37.4% (8), while in Lesotho, the prevalence was 20 % (9). In Ethiopia, the prevalence was reported to be within the range of 25.3% and 36.9% (10). Parent–adolescent communication regarding sexuality is critical in informing young people about risks and protective behaviors, which, in turn, decreases the likelihood of involvement in risky sexual behaviors (11, 12).

Factors that affect parent–adolescent communication concerning sexual and reproductive health (SRH) issues include cultural taboos, embarrassment in discussing sexual matters, lack of communication skills, beliefs about sexuality, and knowledge gaps (13, 14).

Adolescents are often underserved by current health services, which highlights the importance of prioritizing their needs in universal health coverage initiatives after 2015 (15). Many adolescents die prematurely due to preventable or treatable causes, including accidents, suicide, violence, pregnancy complications, and reproductive illnesses (16, 17). According to the WHO reports, 1.3 million young people die each year from preventable causes (18). In sub-Saharan Africa, 82% of the 2.1 million adolescents are affected with HIV, with 58% being female individuals. Comprehensive knowledge about HIV, condom use, testing, and treatment remains low in the poorest countries (16, 18, 19). In addition, approximately 16 million women aged 15–19 years give birth annually, with 95% of these births occurring in low- and middle-income countries (17, 18). Parents who openly discuss sexuality with their young children foster better communication, helping to reduce risky behaviors, such as early sexual initiation, unwanted pregnancies, and other reproductive health problems (13, 15). Effective parent–adolescent communication is important to reduce adolescents' engagement in risky sexual behaviors (13, 14). Discussions between parents and adolescents about sexual and reproductive health enhance awareness, reduce risky behaviors, and promote positive SRH outcomes (20–25). Various studies have indicated that factors such as parents' reluctance to discuss, feelings of shame, cultural taboos, lack of communication skills, limited awareness, and the belief that discussions might encourage sexual activity are key elements that affect parent–adolescent conversations on SRH topics (26–28). In sub-Saharan African countries, including Ethiopia, evidence shows that a lack of parental interest in discussions, feelings of shame, and cultural taboos around discussing sexual matters are factors affecting parent–adolescent communication (29, 30).

In the Ethiopian context of ethnic and cultural diversity, effective parent–adolescent communication is crucial to reduce adolescents' engagement in risky sexual behaviors (10, 31). However, there is limited information on parent–adolescent communication among adolescents attending secondary schools. Hence, the primary objective of this study was to assess the level of parent–adolescent communication and identify associated factors. The research sought to provide valuable insights that could inform strategies to enhance SRH communication, thereby

Abbreviations: AOR, adjusted odds ratio; OR, odds ratio; HIV, human immunodeficiency virus; WHO, World Health Organization; RH, reproductive health; SPSS, statistical package for social science; STIs, sexually transmitted infections; SRH, sexual and reproductive health.

contributing to better health outcomes for adolescents in Gondar town.

Methods and materials

Study design

An institution-based cross-sectional study design was employed.

Study area and period

The study was conducted in secondary public schools located in Gondar town, spanning from 18 August 2023 to 20 September 2023. Gondar town is located approximately 728 km away from Addis Ababa, the nation's capital. In addition, it is situated approximately 180 km away from Bahir Dar, which serves as the capital of the Amhara regional state. Moreover, Gondar town has 22 kebeles and 14 high schools, including 9 government schools and 5 private schools (32).

Source population

The source population comprised all regular students aged 10–19 years who were attending high schools and preparatory schools in Gondar town during 2023. The study population included students who met the specified inclusion criteria.

Inclusion criteria

All regular students aged 10–19 years who were attending secondary schools in Gondar town at the time of data collection were included.

Exclusion criteria

Adolescents who were critically ill or had mental disabilities were excluded from the study.

Sample size determination

The sample size was calculated using a single population proportion formula. This calculation was based on the assumption that the proportion of parent–adolescent communication on sexual and reproductive health issues is 50% (i.e., $p = 0.5$), with a 95% confidence level and a 5% margin of error.

$$\mathbf{n} = \frac{\left(\frac{za}{2}\right) 2^{*}(p^{*}(1-p))}{d2} = \frac{(1.96)^2\ 0.5(1-0.5)}{(0.05)^2} = 384.16 \approx 385(1)$$

Finally, a 10% non-response rate = 39 + 385 = 424 was considered.

Sampling technique and procedure

This study included three public secondary schools (Arezo, Debre Selam, and Shinta). These schools were chosen using a lottery method, and proportional allocation was then applied to each school. To select students for the study, a sampling interval (k) was determined and used for sampling. This interval was calculated by dividing the total number of students in the selected schools (5,642) by the desired sample size (424), which resulted in an interval of 14. Using this sampling interval, we systematically selected every 14th student from the roster books (refer to Figure 1).

Data collection tool and quality procedures

The data were collected using a pretested, structured, interviewer-administered questionnaire. The questionnaire was initially prepared in English, then translated into the local language (Amharic), and subsequently back-translated into English by language experts to ensure consistency in word meanings. It covered sociodemographic characteristics and sexual reproductive health issues. Data collectors received 2 days of training on the study's objectives, sampling procedures, questionnaire administration, and ensuring questionnaire completeness. Confidentiality was maintained by omitting participants' names from the questionnaire.

Study variables

Dependent variables

Parent–adolescent communication (Yes/No).

The study assessed parent–adolescent communication (PAC) regarding sexual and reproductive health (SRH) issues by assessing the following components: condom use, STIs/HIV/AIDS, sexual intercourse, menstruation, unwanted pregnancy, contraception, and physical and psychological changes during puberty. If the students discussed at least two of the SRH topics with their parents/caregivers in the past 12 months, the communication was marked as "yes". If not, it was marked as "no". This approach has been utilized in similar studies (33, 34).

Independent variables

The independent variables included the students' grade level, number of children, attitudes and knowledge about sexual and reproductive health issues, and students' religion.

Operational definitions of the dependent and independent variables

Adolescents

All individuals in the 10–19 year age group were defined as adolescents (35).

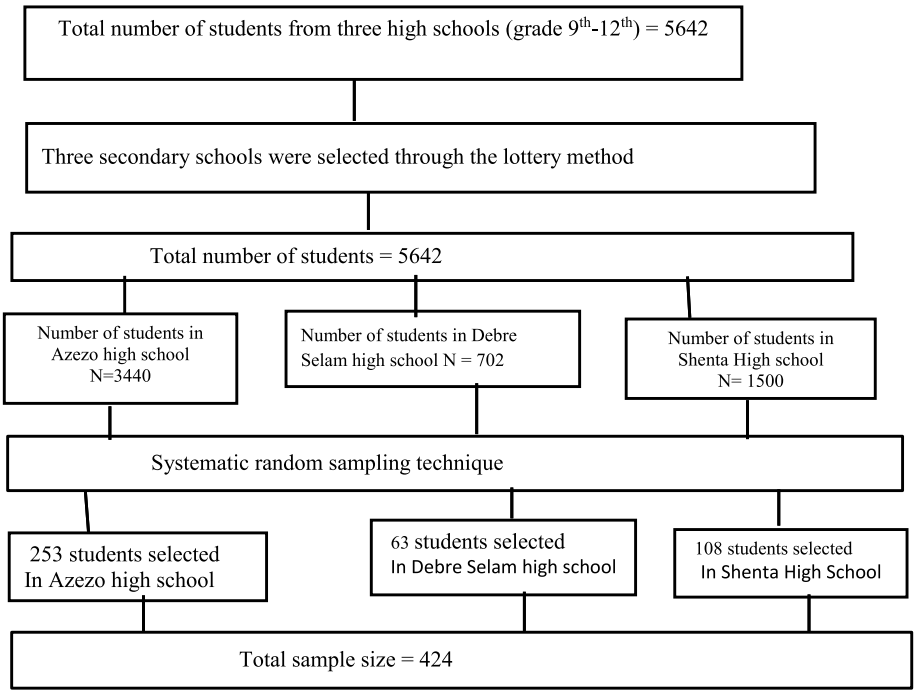

FIGURE 1
Sampling procedure for secondary school students in Gondar, northwest Ethiopia, 2023.

Parents

Parents were defined as individuals who play a significant role in an adolescent's life and provide unpaid care for their work, including biological parents (mother and father), grandparents, older relatives, and other caregivers (36).

Knowledgeable about SRH

Students who scored above the mean score on the knowledge questions regarding sexual and reproductive health (SRH) were categorized as knowledgeable, while those who scored below or equal to the mean score were categorized as not knowledgeable (37, 38).

Perception of students regarding SRH

We assessed the students' perceptions of discussions on sexual and reproductive health using open-ended questions rated on a Likert scale. The perception index was established, ranging from 0 to 11, with a median score of 9. High perception was defined as scores at or above the median score, while low perception was defined as scores below the median score (39, 40).

Data processing and statistical analysis

The collected data were coded and entered into EpiData version. Subsequently, the data were analyzed using IBM SPSS Statistics version 25.0 software. Summary statistics, such as proportions and frequencies, were used to represent the results. Bivariable and multivariable logistic regressions were conducted to identify factors associated with the outcome variable. In the bivariable logistic regression, variables with a $p \leq 0.2$ were included in the multivariable logistic regression model. In this model, variables significantly associated with parent–adolescent communication were identified at a $p \leq 0.05$. The normality of continuous data was assessed using the Shapiro–Wilk test, and the model's fitness was evaluated using the Hosmer–Lemeshow goodness-of-fit test. The validity of the assessment tool was verified using Cronbach's alpha, which yielded a reliability coefficient of 0.75.

Ethical consideration

The study received ethical approval from the Institutional Review Board of the University of Gondar (IRB 416/2023). After the approval of the proposal, an official letter was written to the Gondar town administration to request permission and support. In addition, permission was secured from the school administration and the school parent–teacher committee. Before participation, each individual provided informed verbal consent or assent after receiving a detailed explanation of the study's purpose. The confidentiality of the information was strictly maintained.

Background profile of the study participants

In this study, 424 adolescents were included, with a 100% response rate. The mean age of the adolescents was 16 (±1.73)

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years. A significant portion, comprising 68.4%, were enrolled in grades 9–10. Out of the total adolescents surveyed, nearly half (48.1%) of them identified as orthodox religious followers. Furthermore, the majority (55.7%) of adolescents reported that they live with their parents or other family members (Table 1).

TABLE 1 Sociodemographic Characteristics of the study's participants in Gondar town public secondary schools, northwest Ethiopia, 2023.

Variables	Category	Frequency	Percentage
Sex	Male	244	57.5
	Female	180	42.5
Participant's age (years)	11–15	132	31.4
	16–18	291	68.6
Student's grade	Grade 9–10	290	68.4
	Grade 11–12	134	31.6
Residence	Urban	313	73.8
	Rural	111	26.2
Religion	Orthodox	204	48.1
	Muslim	94	22.2
	Catholic	78	18.4
	Protestant	48	11.3
Living condition	With parents or relatives	237	55.9
	Living alone	187	44.1
Number of parents having male adolescents	Yes	284	67
	No	140	33

Knowledge of the adolescents on sexual and reproductive health issues

Nearly 73% of the study participants correctly identified the typical onset of puberty. Among the female respondents, an impressive 89.4% accurately recognized the onset of the puberty period. More than half of the adults responded correctly regarding the development of secondary sex organs during puberty. The majority of the female respondents, 72%, responded correctly regarding the growth of sexual organs during the puberty period. Approximately two-thirds, i.e., 66%, of the adult study participants correctly acknowledged that experiencing attraction toward the opposite sex during puberty is considered normal. Among the respondents who responded correctly regarding this aspect, approximately 64% were categorized as adult adolescents. Out of all the adolescents surveyed, a significant majority of 72% was aware of the average age at which girls typically begin menstruating. It was astonishing how well-informed the majority of the female respondents were on this issue. Over two-thirds of the adults were knowledgeable about the typical duration of menstrual bleeding. Impressively, approximately 95% of the female respondents were informed about this aspect. Nearly 73% of the students were knowledgeable about contemporary contraception methods, while over 95% of the female respondents were well-informed on the subject.

The majority of the student participants (75%) were acquainted with information about safe abortion practices. Moreover, over 80% of the female respondents demonstrated familiarity with the topic of safe abortion (Table 2).

Frequently perceived barriers by adolescents in communicating about sexual reproductive health with their parents

A significant hindrance to initiating conversations about sexual health with adolescents stems from feelings of shame or embarrassment among parents, as reported by 52.8% of them. Furthermore, adolescents face several challenges when trying to communicate with their parents about sexual and reproductive health (SRH). These obstacles include concerns about social stigma or fear of social rejection (41%), doubts regarding the accuracy of SRH information or a perceived lack of knowledge (44.6%), apprehension that openly discussing SRH issues may encourage sexual activity (46.2%), and the perception of cultural barriers (30.4%) (Table 3).

Factors associated with parental communication regarding sexual and reproductive health with adolescents

These factors included sex, religion, student grade level, number of adolescent children, living arrangements for adolescents, students' knowledge about puberty, students' knowledge about sexual and reproductive health (SRH) issues, attitudes toward SRH, and knowledge about SRH services at health facilities. However, in the multivariable logistic regression analysis, several factors were significantly associated with parent–adolescent communication on SRH issues, with a $p \leq 0.05$. These factors included sex, student grade level, living arrangements, students' knowledge about puberty, students' knowledge about SRH communication, and students' attitudes toward sexual and reproductive health (SRH). The odds of parent–adolescent communication were higher among the female adolescents compared to male adolescents (adjusted odds ratio (AOR) = 1.23; 95% confidence interval (CI): 1.09, 7.45). The students in grades 11–12 had higher odds of engaging in parent–adolescent communication on SRH compared to those in grades 9–10 (AOR = 1.25; 95% CI: 1.19–6.98).

The students who lived with their parents or caregivers had higher odds of having parent–adolescent communication compared to those who lived alone (AOR = 1.26; 95% CI: 1.07, 5.66). The students with good knowledge about puberty had higher odds of engaging in parent–adolescent communication compared to those with poor knowledge (AOR = 1.23; 95% CI: 1.04, 7.89). The students who had positive attitudes toward sexual reproductive health issues were more likely to have

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TABLE 2 Knowledge about sexual and reproductive health issues among the adolescent students in Gondar town government secondary schools, northwest Ethiopia, 2023.

Variables	Correct response		
Knowing the changes that occur on a physical and emotional level during adolescence		N=244	N=180
	Overall	Male *N* (%)	female*N* (%)
Puberty normally begins in boys aged 12–16 years and in girls aged 10–14 years	309 (72.8%)	148 (60.6%)	161 (89.4%)
Growth of sex organs during puberty, including the development of hips and breasts in girls and enlargement of the penis and testicles in boys	230 (54.2%)	100 (41%)	130 (72%)
Both sexes develop pubic and underarm hair during adolescence.	140(33%)	85 (35%)	55 (30.6%)
The body's production of the hormone testosterone encourages men to ejaculate or release sperm and have erections.	145 (34.2)	77 (31.6)	68 (37)
It is normal for adolescents to feel sexually aroused.	270(63.7%)	160 (65.6%)	110(61%)
Attraction toward the opposite sex is normal during puberty	280 (66%)	157 (64.3%)	123 (68.3%)
Adolescents frequently experience wet dreams or nocturnal emissions.	163 (38.4%)	120 (49.2%)	43 (23.9%)
During puberty, glands in the skin of the back, shoulders, and face begin to activate more, producing more oil.	274 (64.6%)	132(54%)	142 (78.9%)
Knowing information about menstruation			
Knowing the average age at which girls begin to menstruate	308 (72.6%)	160 (65.65)	148 (82%)
Knowledge about the typical menstrual bleeding duration	289 (68%)	119 (48.8%)	170 (94.4%)
Knowledge about absorbing products that are best used when a woman is menstruating	270(63.7%)	120 (49.2%)	150(83%)
Girls can go to school during menstruation	268 (63.2%)	109 (44.6%)	159 (88.3%)
Knowing that having a period causes it to smell bad	229 (545)	89 (49.4%)	140 (57.3%)
Knowing that it smells bad when you are menstruating	259 (61%)	134 (55%)	125 (69.4%)
Girls experience menstruation once every 1–4 weeks.	123(295%)	56(23%)	67 (37.2%)
Knowing the items for personal hygiene used during menstruation	178 (72%)	78 (43.3%)	100 (55.6%)
Knowledge about pregnancy prevention, contraceptives, and safe abortion			
Knowledge about the contemporary methods of contraception	308 (72.6%)	136 (55.7%)	172 (95.5%)
Knowledge about the availability of safe abortion	318 (75%)	114(46.7%)	146 (81%)
Using a condom for every act of sexual intercourse prevents pregnancy	276 (65%)	153 (62.75)	123 (68.3%)
Pregnancy can be avoided by refraining from sexual activity during the fertile period.	159 (37.5%)	62 (25%)	97 (53.9%)
Knowledge about sexually transmitted diseases			
Having no sex at all completely prevents STIs.	318 (75%)	209 (85.6%)	109 (60.55%)
STIs can be avoided by using condoms during all sexual activities.	360 (84.9%)	213(87.3%)	149 (82.7%)
Having sex with an infected individual can spread STIs.	289 (68%)	139(57%)	150 (83.3%)
STIs can spread when sharp objects are shared.	271 (64%)	136 (55.7%)	135(75%)
Contaminated blood transfusion can transmit STIs.	304 (71.7%)	189(77.5%)	115 (63.9%)
Having sex with sex workers increases the risk of STIs.	182(42.9%)	110 (45%)	70(38.9%)
Using the restroom together can spread STIs.	290 (44.8%)	166 (68.4%)	124 (68.9)
STIs can be spread by kissing.	289 (68%)	140 (57%)	149(82.8%)

good parent–adolescent communication compared to those with negative attitudes (AOR = 2.4; 95% CI: 1.34–7.82). Furthermore, students with poor knowledge about sexual reproductive health issues were less likely to engage in parent–adolescent communication compared to those with good knowledge about these issues (AOR = 0.21; 95% CI: 0.13, 0.45) (Table 4).

Discussion

Adolescents who engage in risky sexual behaviors have a risk of contracting STIs, unintended pregnancies, and delayed health care. Parent–adolescent communication on sexual and reproductive health helps mitigate these risks. This study assessed communication levels between adolescents and parents on these

TABLE 3 Frequently perceived barriers by adolescents in communicating about sexual reproductive health with their parents in Gondar town government secondary schools, northwest Ethiopia, 2023.

Frequently perceived barriers by adolescents	Correct response
Feeling uncomfortable or embarrassed	224 (52.8%)
Fear of social exclusion or social stigma	174 (41%)
Feelings of cultural barriers	129 (30.4%)
Feeling that the information is incomplete or inaccurate regarding sexual and reproductive health	189 (44.6%)
Risk perception for engaging in sexual activity following candid discussions on sexual and reproductive health issues	196 (46.2%)
Feeling unable to adequately describe the problems with sexual and reproductive health	143 (33.7%)
Adolescents may not want to talk about sexual health	111 (26.2%)

topics and identified associated factors among secondary school students in Gondar town, northwest Ethiopia.

This study found that 37.7% of the adolescents communicated with their parents or caregivers about sexual and reproductive health issues in the past 12 months (95% CI: 34.65–44.76) (Figure 2). This result is consistent with the results from similar investigations carried out in Debre Markos, Northwest Ethiopia (36.9%) (41), Amhara region of Ethiopia (37.5%) (42), and Nepal (40.9%) (43). However, this study's result is lower than the 56.9% reported in Central Ethiopia and Woldia Town (46), and the 56.3% in Dabat Town (46), but higher than the 21.3% found in Assela, Oromia (45). The differences in results stem from socioeconomic factors, cultural norms, and access to sexual and reproductive health (SRH) information. Socioeconomic status affects resources, such as education and healthcare, impacting parental involvement in adolescent health discussions. Cultural beliefs influence attitudes toward discussing SRH, with variations in openness across different cultures. Access to SRH information also varies by region, influencing adolescents' knowledge and comfort level in discussing these topics with parents. Regions with better SRH education tend to have more parent–adolescent communication on these issues (47, 48).

In this study, parent–adolescent communication was significantly associated with several factors: sex, student grade level, living arrangements, students' knowledge about puberty, their understanding of SRH communication, and their attitudes toward sexual and reproductive health (SRH). Female students tended to have higher levels of communication with their parents about SRH compared to male students, which is consistent with the findings from other studies (47, 49, 50). This might be attributed to factors such as female adolescents being generally more open to discussing sensitive topics with their parents and feeling more comfortable seeking guidance and information from their parents regarding SRH concerns (25, 50–53). Moreover, female adolescents often have more opportunities to spend time at home, which could facilitate discussions with their parents on these matters. In addition, parents or caregivers may feel more compelled to communicate with or provide guidance to their daughters regarding SRH topics as a means of preventing premarital sexual activity, unintended pregnancies, and induced abortions among female adolescents. Ultimately, effective and open parent–adolescent communication about SRH issues are equally crucial for both sexes (20, 54, 55).

It was found that the students in grades 11–12 were more likely to discuss sexual and reproductive health (SRH) issues with their parents or caregivers compared to the students in grades 9–10. This finding aligns with the results of a similar study conducted in Woreta, Ethiopia (30). This might be due to the fact that older students are generally more mature and understand the complexities of SRH issues better, which enables them to approach these topics with greater confidence. By grades 11 and 12, they typically receive a more comprehensive education on SRH, which equips them to ask informed questions and seek guidance. Furthermore, as they age, they become more open and less embarrassed about discussing personal matters, making it easier to talk about SRH (25, 42, 47, 56).

The students who lived with their parents or caregivers were more likely to engage in parent–adolescent communication compared to those who lived alone. This finding aligns with the findings from studies conducted in Debre Markos (42, 57). Living with parents or caregivers provides immediate access to familial support and guidance, which fosters regular interactions and conversations about various topics, including sexual and reproductive health (SRH). This closeness builds stronger bonds and encourages open communication, making adolescents feel more comfortable while discussing sensitive topics such as SRH. Parents or caregivers, feeling a greater sense of responsibility for their children's wellbeing, actively engage in SRH discussions to provide accurate information and guidance. Furthermore, living together allows for greater supervision and monitoring of adolescents' activities, which leads to spontaneous conversations about SRH as parents become aware of their children's concerns. Overall, the presence of parents or caregivers creates a supportive environment conducive to effective parent–adolescent communication about SRH, which promotes better-informed decision-making and healthier behaviors among adolescents (42, 57–59).

The students who had a poor understanding of sexual and reproductive health (SRH) topics were less likely to have parent–adolescent communication on these issues compared to the students with good knowledge. This finding is consistent with the findings of research conducted in Myanmar (60) and Eastern Ethiopia (34). This is because students with good knowledge about SRH topics recognize the importance of seeking guidance on potential risks and consequences associated with sexual behaviors. Their confidence in initiating conversations, coupled with parents' receptiveness to their inquiries, fosters productive dialogue within the family. Furthermore, adolescents with good SRH knowledge actively seek opportunities to discuss these topics with their parents, highlighting the value of parental guidance in making informed decisions about their sexual health. Overall, this emphasizes the critical role of education and open communication in promoting healthy behaviors among young people (43, 61, 62).

The students who had positive attitudes toward sexual reproductive health issues were significantly more likely to

TABLE 4 Factors associated with parent–adolescent communication regarding SRH among secondary school students in Gondar town, northwest Ethiopia, 2023.

Variables	Category	Parents' communication regarding SRH		OR (95% CI)	AOR (95% CI)
		Yes	No		
Sex	Female	90 (50%)	90 (50%)	2.42 (1.16–15.44)	2.23 (1.09–7.45)*
	Male	70 (29%)	170 (71%)	1	1
Religion	Orthodox	70 (43.8%)	90 (56.2%)	12.66 (4.22–19.56)	7.42 (0.56–12.33)
	Muslim	50 (41.7%)	70 (58.3%)	7.87 (3.77–16.67)	0.87 (0.12–12.33)
	Protestant	30 (33.3%)	60 (66.7%)	4.76 (1.34–8.67)	1.65 (0.65–7.89)
	Catholic	10 (18.5%)	44 (81.5%)	1	1
Adolescents' grade	Grade 9–10	80 (57.9%)	110 (42.15)	1	1
	Grade 11–12	80 (34.1%)	154 (65.9%)	1.40 (1.06–6.87)	1.25 (1.19–6.98)*
Adolescents' living conditions	Living with parents	100(40%)	148 (60%)	1.3(1.05–8.45)	1.26 (1.07–5.66)*
	Living alone	60(34%)	116 (66%)	1	1
Students' knowledge about the puberty period	Good	104(41%)	150 (59%)	1.41 (1.02–8.76)	1.23 (1.04–7.89)*
	Poor	56 (32.9%)	114 (67.1%)	1	1
Students' knowledge about SRH communication	Good	54 (28.6%)	135 (55.4%)	1	1
	Poor	106 (55.5%)	60 (60.8%)	0.24 (0.08–0.87)	0.21 (0.13–0.45)*
Students' attitude toward SRH	Positive	130 (47.3%)	145 (52.7%)	3.55 (1.35–12.45)	2.4 (1.34–7.82)*
	Negative	30 (20%)	119 (80%)	1	1
Adolescents' knowledge about SRH services at health facilities	Ye	98 (37%)	168 (63%)	1	1
	No	62 (39%)	96 (61%)	0.94 (0.032–0.99)	0.76(0.08–1.89)

*p-value < 0.05. SRH, sexual reproductive health.

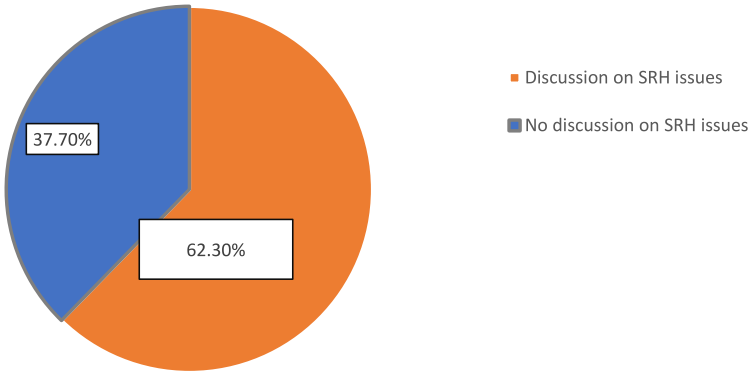

FIGURE 2
Distribution of parent–adolescent communication on SRH issues in Gondar town, northwest Ethiopia, 2023 (n = 424).

have good parent–adolescent communication compared to those with negative attitudes. This finding is similar to the finding of a study conducted in Asella, Ethiopia (44). This could be attributed to the willingness of adolescents to engage in open and honest discussions about sensitive topics related to sexual health. Positive attitudes may indicate a level of comfort and acceptance regarding discussing these issues, which, in turn, fosters effective communication between parents and adolescents. Furthermore, adolescents with positive attitudes may actively seek out information and support from their parents, leading to more frequent and meaningful conversations about sexual reproductive health (44, 63, 64).

Limitations of the study

The limitations of this study include recall bias and the inability to establish cause-and-effect relationships due to its cross-sectional design. Self-reporting may have been influenced by social desirability bias, especially given the sensitivity of the topic. It is also important to note that not all discussions assumed positive outcomes, as negative and harmful conversations could occur. Furthermore, the study primarily interviewed adults, overlooking valuable perspectives of adolescents that could align or diverge with parental views.

Conclusion and recommendations

This study revealed a low level of communication between parents and adolescents regarding sexual and reproductive health (SRH). Evidence-based education focusing on SRH topics, such as consent, healthy relationships, communication skills, STDs, contraception, and interpersonal dynamics, is crucial for addressing the low level of communication between parents and adolescents. Implementing peer education among senior students and training teachers in effective communication techniques can enhance parent–adolescent dialogue on SRH. Qualitative research on SRH topics and communication barriers can provide valuable insights for developing interventions.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Ethical Review Board of University of Gondar (ref. no. 416/2023). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

MM: Writing – original draft, Conceptualization. DE: Conceptualization, Investigation, Writing – original draft. TS: Writing – review & editing. YW: Conceptualization, Methodology, Writing – original draft. JA: Validation, Conceptualization, Writing – original draft. BM: Supervision, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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Sexual and reproductive health service utilization and associated factors among high school students in Ethiopia: systematic review and meta-analysis

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Introduction: Several studies have been done on the utilization of sexual and reproductive health services by high school students in Ethiopia, but they have yielded inconsistent results. This study aimed to evaluate the extent to which high school students in Ethiopia are using sexual and reproductive health services by conducting a systematic review and meta-analysis.
Methods: Various electronic databases such as PubMed, Cochrane Library, AJOL, Google Scholar, and Grey Literature were used to search for relevant articles. Preferred Reporting Items for Systematic Reviews and Meta-Analysis Guidelines were followed for this review and meta-analysis. Heterogeneity was assessed using I^2 and Cochrane Q statistical tests, and data analysis was done with STATA 17 software. Random effect meta-analyses were used to determine the overall utilization rate of sexual and reproductive health services.
Result: This review included 20 studies with 12, 215 study participants. The pooled magnitude of sexual and reproductive health service utilization among high school students in Ethiopia was 29.79% (95% CI: 25.14, 34.43). Students with grades 11–12 (AOR = 2.33, 95% CI: 1.39, 3.90), aged between 20 and 24 years (AOR = 2.61; 95% CI: 1.79–3.81), having higher level of knowledge towards sexual and reproductive health issues (AOR = 3.10; 95% CI: 1.67–5.77), previous history of sexual intercourse (AOR = 4.18; 95% CI: 2.59–6.75), previous history of sexually transmitted infection (AOR = 3.74; 95% CI: 2.22–6.31), presence of a reproductive health service facility in the school (AOR = 2.55; 95% CI: 1.72–3.77), and ever-discussed reproductive health issues (AOR = 4.04; 95% CI: 1.62–10.03) were more likely to utilize sexual and reproductive health services.

Abbreviations
AIDS, acquired immuno deficiency syndrome; AOR, adjusted odds ratio; CI, confidence interval; HIV, human immunodeficiency virus; PRISMA, preferred reporting items for systematic reviews and meta-analysis; SRH, sexual and reproductive health; SDG, sustainable development goal; STI, sexually transmitted infection; VCT, voluntary counselling and testing; WHO, World Health Organization.

Conclusions: The overall utilization of sexual and reproductive services among high school students in Ethiopia was found to be low as compared to SDG 3.7. Older individuals with higher education levels and knowledge about sexual and reproductive health services, as well as those who have had previous sexual experiences or discussions about sexual health, are more likely to utilize reproductive health services. To increase utilization, the Ministry of Health and the Ministry of Education should prioritize these factors.

KEYWORDS

sexual and reproductive health, utilization, high school, students, Ethiopia, meta-analysis

Introduction

Sexual and reproductive health (SRH) refers to all conditions relating to the reproductive system's physical, mental, and social well-being and goes beyond simply being free from disease or infirmity (1). It includes the ability to be free from unwanted pregnancy, unsafe abortion, sexually transmitted infections, including HIV and AIDS, and all forms of sexual violence and coercion (1). SRH services include access to information and services in prevention, diagnosis, advice, treatment, and care, and ensure that all people can access services safely without having to travel long distances (2).

According to the World Health Organization, adolescents are considered to be between the ages of 10 and 19, while youth are between 15 and 24. The term "young people" encompasses individuals aged 10–24 (3). Approximately 1.2 billion of the world's total population are young people, and more than half of this population lives in developing countries (4). Sub-Saharan Africa (SSA) is a region where 23% of the total population (1.06 billion people) are adolescents (5). In Ethiopia, a SSA member state with a rapidly growing youth population, youth make up 33.8% of its estimated total population of 90 million (6). At this age, one of life's most rapid and complex stages occurs, characterized by significant physical, cognitive, behavioral, social, and psychological changes (7). Most people become sexually active during adolescence. Therefore, they will be exposed to a variety of SRH problems (1) due to poor decisions and actions (8). Young people are considered the country's greatest hope for the future, but their immaturity exposes them to certain risks, including unwanted pregnancies, sexually transmitted infections (STIs) such as HIV, and unsafe abortions (9). Based on a previous systematic review and meta-analysis conducted in Ethiopia revealed that the prevalence of risky sexual behavior among high school students was 28.13% (10).

According to the 2018 report of the Interagency Task Force on Reproductive Health, AIDS-related deaths among adolescents nearly tripled from 21,000 in 2000 to 60,000 in 2014, and AIDS-related deaths among women 1 in 4 gives birth before the age of 18, and 3.9 million people aged 15–19 undergo unsafe abortions each year (11). The 2016 Ethiopian Demographic and Health Survey (EDHS) National Report found that the adolescent birth rate was 80 per 1000 (6). According to the 2019 Performance Monitoring Action Survey, results from Ethiopia also revealed that the average age of the first sex is 16.4 years (12). Moreover, the 2019 Mini-EDHS found that only 36.4% of young women aged 15–19 years were using modern contraceptives (13). Despite the legal age of marriage in Ethiopia being 18, women typically marry at a much younger age than men. The median age for women to marry for the first time is 16.5 years, while for men it is 23.1 years. A large majority of women (58%) marry before they turn 18, compared to only 9% of men (14, 15). In this country, 13% of married teenagers between the ages of 15 and 19 have already started having children. Furthermore, the prevalence of HIV and AIDS among youth ages 15–24 is 0.34% in Harar (16).

A survey conducted at an Ethiopian higher education institution found that one-third of university students have had a previous history of sexual intercourse. Almost two-thirds of them were found to have already had a previous history of sexual intercourse before entering university, suggesting that SRH problems appear early and require intervention in early adolescence (17). SRH service utilization among high school students in Ethiopia varies widely across the country, from 18.4% (18) to 64.3% (19). Low utilization of sexual and reproductive health services affects adolescent health, impairs adolescent educational outcomes, increases dependency, and reduces a country's economic potential (20). Many social norms and practices that prevent sexually active youth from accessing contraceptives, maternity care, and other services based on age or gender pose challenges to effective service delivery (21, 22). The community was intolerant of premarital sex among adolescents and did not support the use of SRH or communication with unmarried adolescents (23). Both parents and teenagers view premarital sex as shameful and against their religious beliefs, particularly for girls as it could impact their future. Moreover, discussions about sexual health with unmarried teenagers are rare due to cultural taboos and fears of promoting sexual activity. The use of contraception is also frowned upon due to religious beliefs (23). Lack of sexual knowledge, lack of awareness of services, feelings of shyness and shame, fear of parents finding out about service use, and lack of confidentiality were associated factors for utilization of sexual and reproductive health services utilization (24).The National Adolescent and Youth Health Strategy (2021–2025) envisions achieving the following indicators by 2025: This includes reducing adolescent pregnancy rates from 12.5 to 7 and lowering the pregnancy-related mortality rate for those in the 15–19 age range from 0.39 to 0.29. It is also planned to increase the median age of first sex from 16.4 to 17 years, the

median age for first marriages from 17.8 to 18 years, and the HIV prevalence among those aged 15–24 from 0.34% to 0.1% (16). Moreover, the World Health Organization's Sustainable Development Goal target 3.7 aimed to ensure that everyone has access to sexual and reproductive health-care services, including family planning, information, and education, and to incorporate reproductive health into national strategies and programs by 2030 (25). Despite initiatives, the prevalence of STIs, including HIV and AIDS (19.5%) is increasing, and abortion rates among students were 65 per 1,000 women, which is three times the national average for Ethiopia (26, 27). To facilitate the physiological, cognitive, emotional, and social transition of adolescents into adulthood, it is necessary to provide them with high-quality, reasonably priced SRH services. Particularly in underdeveloped nations, teenagers' SRH requirements are frequently neglected and do not currently receive enough attention (28). Improving the utilization of sexual and reproductive health services is the main strategy that lowers and prevents risks and issues related to adolescent reproductive health.

Although several studies were conducted on the magnitude and associated factors of sexual and reproductive health service utilization among high school students in Ethiopia, there was still no consistent evidence on the magnitude of sexual and reproductive health service utilization among high school students in Ethiopia. To make decisions in health programs, systematic review and meta-analysis studies are crucial with a high level of evidence. Therefore, this systematic review and meta-analysis were conducted to assess the magnitude and determinants of SRH service utilization among high school students in Ethiopia. This review will provide the first data regarding the pooled magnitude of SRH service among high school students in Ethiopia. The results of this review will close the evidence gap regarding the magnitude and contributing factors of SRH service among high school students in the nation. Thus, the review's findings will provide health policy planners and researchers with current data to aid in the development of suitable action plans aimed at enhancing the nation's sexual and reproductive health service utilization among high school students.

Methods and materials

This review examines the literature on the extent and associated factors of sexual and reproductive health service utilization among secondary school students in Ethiopia. Therefore, the research questions for this review were: (i) "What is the overall utilization rate of sexual and reproductive health services among high school students in Ethiopia?" (ii) "What factors are associated with sexual and reproductive health services?"

Information sources and search strategy

This systematic review and meta-analysis was conducted by the Prospective Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA-2020) (29). PubMed, Cochrane Library, AJOL, Google Scholar, and Direct Google were used to search for articles. The search was conducted using search terms related to sexual and reproductive health services among high school students in Ethiopia. These were "secondary school", "high school", "preparatory school", "grade 9–10", "students", "sexual and reproductive health service", "youth-friendly", "utilization", "uptake", "service", "determinant", "risk" and "associated factors" as well as "Ethiopia". A comprehensive database search used the Boolean operators "OR", "AND", and MeSH terms.

Eligibility

All original full-text English language research articles conducted in Ethiopia from December 2013 to December 2023 and published in peer-reviewed journals on sexual and reproductive health service utilization among Ethiopian high school students were included in this review. In addition, observational studies (cross-sectional, case-control, or cohort studies) were also included. In contrast, qualitative studies, surveys, editorials, reports, preprints, and studies that did not assess rates of SRH service utilization and associated factors were excluded from this study. Papers are screened for inclusion based on title, abstract, and other relevant information and then undergo a thorough evaluation before being included in the final review.

Operational definitions

Sexual and reproductive health service use was defined as the use of any of the following SRH services: Sexual and reproductive health information, education and guidance, contraceptive services, pregnancy testing and care, voluntary counseling and testing (VCT), sexually transmitted infection (STI) screening, diagnostic and treatment services, and safe abortion care (30). Furthermore, from 9th grade to or his 12th grade, she or he is considered a high school student (31).

Data extraction

After searching in relevant databases, the study was imported into Endnote version 20 and duplicates were removed. Then, three reviewers (AMD, MGT, ETF) downloaded the abstracts and screened them for eligibility. If reviewers disagreed about whether a search result was relevant to the study, it was included for retrieval. The relevance of the article was then assessed based on the article's title, topic, purpose, and methodology listed in the abstract. Abstracts were also assessed for compliance with the inclusion criteria. At this point, papers deemed irrelevant or outside the scope of the study were removed, the full texts of the remaining papers were downloaded for further analysis, and full-text reviews were excluded for reasons. Finally, after applying inclusion and exclusion criteria, eligible studies were exported to

TABLE 1 Methodological quality assessment of included studies using the JBI critical appraisal checklist.

Study	Inclusion in the sample clearly defined	Study subjects and the setting described in detail	Exposure measured in a valid and reliable way	Objective, standard criteria for measurement of the condition?	Confounding factors identified	Strategies to deal with confounding factors stated	Outcomes measured in a valid and reliable way	Was appropriate statistical analysis used?	Total score
Binu et al.	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7
Abate et al.	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	7
Teferi et al.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8
Aragie et al.	Yes	Yes	Yes	Yes	Yes	No	Yes	No	6
Abdurahman et al.	Yes	Yes	Yes	Yes	Yes	Yes	Not	Yes	7
Sertsu et al.	No	Yes	Yes	Yes	Yes	Yes	No	Yes	6
Tsegaw et al.	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	7
Yonas et al.	Yes	Yes	Yes	No	Yes	Yes	No	Yes	6
Demeke et al.	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8
Simegn et al.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8
Gurara et al.	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7
Fikadu et al.	Yes	Yes	Yes	No	Yes	Yes	No	Yes	6
Abebe et al.	Yes	Yes	No	No	Yes	Yes	No	Yes	5
Helamo et al.	Yes	Yes	No	No	Yes	Yes	No	Yes	5
Haile et al.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8
Bogale et al.	No	No	Yes	Yes	Yes	Yes	Yes	Yes	6
Wakjira et al.	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	8
Dina et al.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8
Bilal et al.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8
Geremew et al.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8

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Microsoft Excel version 2019 using a standardized data extraction checklist. The following data were extracted: authors, year of publication, study design, study population, study setting, sample size, response rate, magnitude of SRHS utilization in percentage, and effect sizes of associated factors with the magnitude of SRHS utilization.

Data quality assessment

The Joanna Briggs Institute (JBI) critical appraisal checklist was used to assess the quality of the studies. Using this tool as a protocol, reviewers (EKB, TFA, DE) assessed the quality of the original papers using a blind review approach. The average of ratings from three independent reviewers was used to decide whether an article should be included. Discrepancies in quality assessment results were resolved by another reviewer (OA), whenever appropriate. Those studies with scores of 5 or more in JBI criteria were considered to have good quality and were included in the review (32). Articles whose JBI criteria quality scores were less than 5; those studies that had methodological flaws, or incomplete reporting of results; or those for which full text was not available were excluded from the final analysis. Study researchers made two separate attempts to contact article authors whenever additional study information was needed (Table 1).

Data analysis

Information on study characteristics from Microsoft Excel was exported to Stata software version 17 for further statistical analysis. Data were summarized by statistical tables, figures, and forest plots. A meta-analysis was conducted to determine the pooled extent of SRHS use and identify associated factors. The heterogeneity of study results was assessed using the I^2 statistics (33) and Cochrane Q statistics (34). We used funnel plot asymmetry, Egger's, and Begg-Mazumdar Rank correlation tests to check for publication bias (35). In addition, we conducted subgroup analyses based on region and sample size. Sensitivity analyses were also conducted to detect the influence of each study on the overall pooled magnitude of SRHS utilization by excluding one study at a time.

Results

Through our initial database search, 1,503 records were located. 1,189 records were excluded due to duplicates, 231 articles out of 314 that were examined by title and abstract were removed since the study's area was outside of its acceptable limits and the people who participated in the study weren't secondary school students. For the full-text review, 83

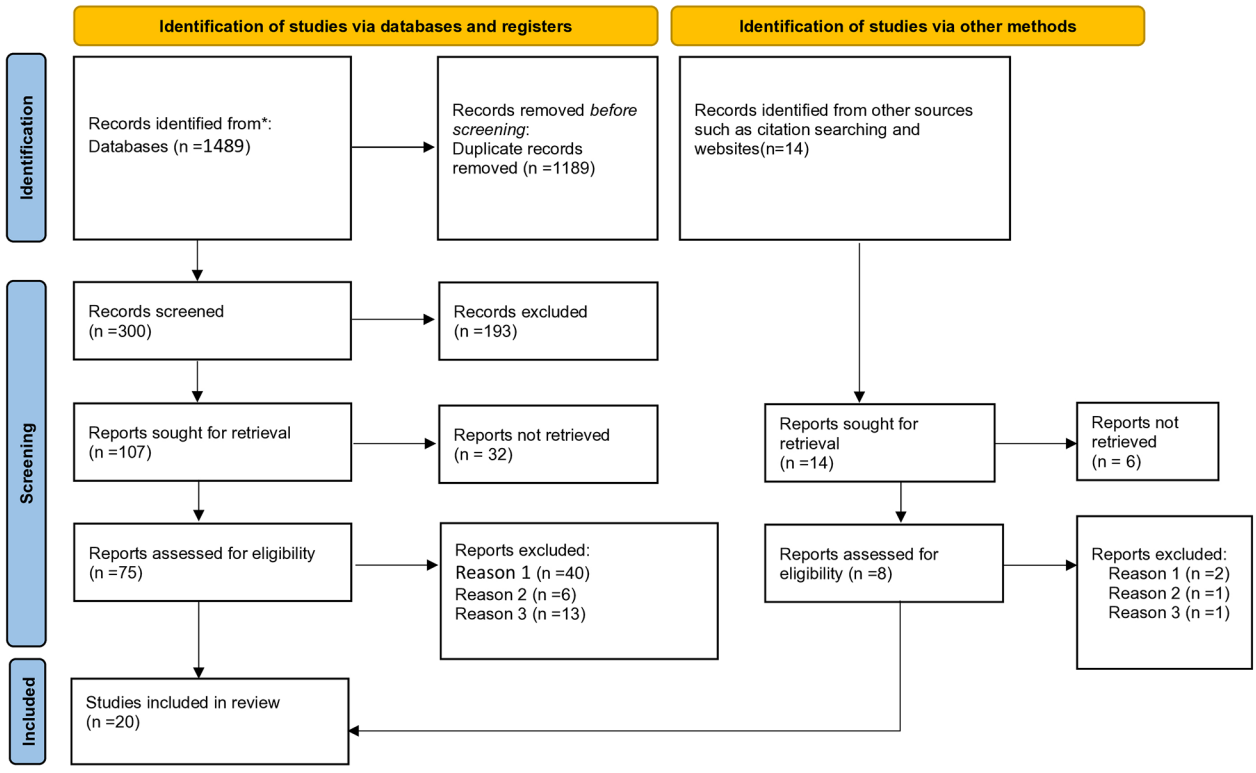

FIGURE 1
PRISM flow diagram of study selection of sexual and reproductive health service utilization among high school students in Ethiopia.

TABLE 2 Summary of characteristics of included articles for systematic review for youth-friendly SRH service utilization among high school students in Ethiopia.

Serial number	Author with references	Publication year	Region	Study design	Study area	Study Population	Sample Size	Response Rate (%)	SRH service utilization (%)
1.	Binu et al. (30)	2018	Oromia	Cross-sectional	Nekemete town	Grade 9–12 students	768	96	21.2
2.	Abate et al. (48)	2019	Amhara	Cross-sectional	Woreta town	Grade 9–12 students	376	94	24.6
3.	Teferi et al. (38)	2022	SNNP	Cross-Sectional	Areka town	Grade 9–12 students	572	95.3	44.2
4.	Aragie et al. (46)	2021	Amhara	Cross-sectional	Woldia town	Grade 9–10	420	100	64.3
5.	Abdurahman et al. (47)	2022	Oromia	Cross-sectional	Haramia District	Grade 9–12 students	642	92.7	23.5
6.	Sertsu, et al. (40)	2023	Harari	Cross-sectional	Harari region	Grade 9–12 students	1275	97.6	25.3
7.	Tsegaw et al. (37)	2022	Amhara	Cross-sectional	East Belesa District	Grade 9–12 students	346	99.8	28.9
8.	Yonas et al. (36)	2022	SNNP	Cross-sectional	Dawro zone	Grade 9–12 students	835	98.8	26
9.	Demeke et al. (52)	2022	Amhara	Cross-sectional with qualitative inquiry	North Showa zone	Grade 11–12 students	596	98.5	32.7
10.	Simegn et al. (39)	2020	Amhara	Cross-sectional	Debretabor town	Grade 9–12 students	690	99.1%	28.8
11.	Gurara et al. (42)	2020	Oromia	Cross-sectional	Adama town	Grade 9–12 students	359	97.8	34
12.	Fikadu et al. (43)	2020	Oromia	Cross-sectional	Ambo town	Grade 9–12 students	376	100	20.7
13.	Abebe et al. (21)	2014	Amhara	Cross-sectional	Bahirdar city	Grade 9th and 11th students	818	100	32.2
14.	Helamo et al. (41)	2018	SNNP	Cross-sectional	Hadiya Zone	Grade 9–12 students	634	90.3	38.5
15.	Haile et al. (53)	2020	SNNP	Comparative cross-sectional	South Omo Zone	Grade 9–12 students	458	426	21.83
16.	Bogale et al. (44)	2020	Oromia	Cross-sectional	East Shewa zone	Grade 9–12 students	362	360	34.4
17.	Wakjira et al. (49)	2022	Oromia	Cross-sectional	Arsi Zone	Grade 9–12 students	800	96.74	26.1
18.	Dina et al. (50)	2021	Benishangul Gumuz	Cross-sectional	Assosa Zone	Grade 9–12 students	375	93.75	32.0
19.	Bilal et al. (51)	2014	Tigray	Cross-sectional	Mekelle- town	Grade 9–12 students	1,042	100	21.59
20.	Geremew et al. (18)	2018	Amhara	Cross-sectional	Mecha district	Grade 11–12 students	565	98.43	18.4

NB, note bene; SNNP, South Nations Nationalities Peoples of Ethiopia; SRH, sexual and reproductive health.

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articles were included. Finally, after applying inclusion and exclusion criteria, 20 studies were added to the final review (Figure 1).

Study characteristics

In the current meta-analysis, 20 articles were included. A total of 12,215 high school students were involved to determine the pooled magnitude and associated factors of sexual and reproductive health utilization. Of 20 included studies; 18 used cross-sectional study design (18, 21, 36–51), 1 used cross-sectional study design complemented with qualitative inquiry (52) and the remaining 1 study used comparative cross-sectional study design (53). All of the included articles in this review were published between 2014 and 2023. The 20 studies were conducted in Tigray region ($n = 1$), Amhara region ($n = 7$), Oromia region ($n = 5$), Southern Nations, Nationalities, and Peoples' region ($n = 4$), Harari region ($n = 1$) and Benishangul Gumuz region ($n = 1$) of Ethiopia (Table 2).

The magnitude of sexual and reproductive health service utilization among high school students in Ethiopia

The magnitude of sexual and reproductive health service utilization among high school students in Ethiopia, from included studies in this meta-analysis, ranged between 18.4% (18) to 64.3% (46). Based on the current meta-analysis, the pooled magnitude of SRHU among high school students in Ethiopia was 29.79% (95% CI: 25.14, 34.43). There was high and significant heterogeneity between studies ($I^2 = 96.54\%$; $P < 0.01$indicating great variability in the magnitude of SRHSU across studies; the random-effect model was used to estimate the pooled magnitude of SRHSU among high school students in Ethiopia (Figure 2).

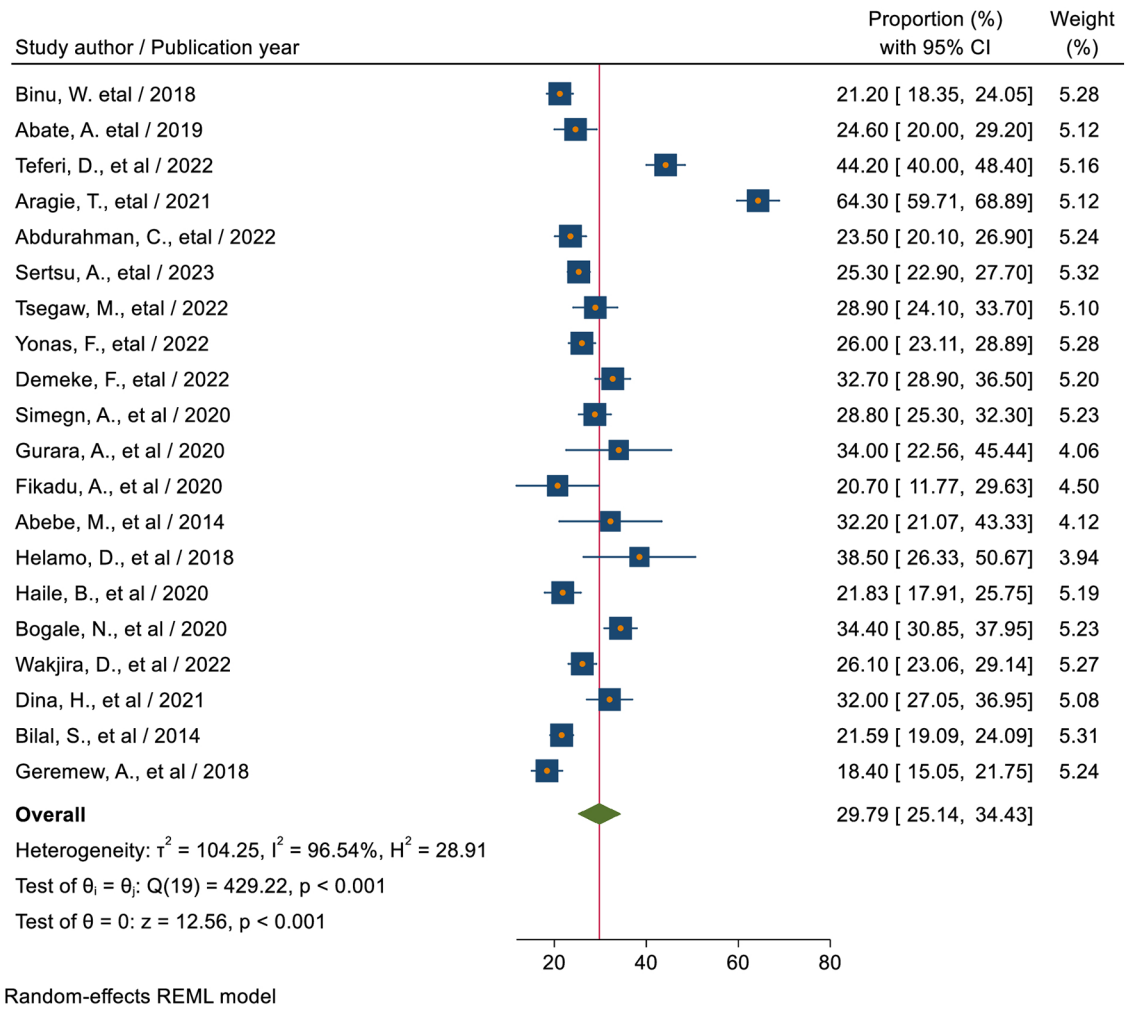

FIGURE 2
Forest plot for the pooled magnitude of sexual and reproductive health service utilization among high school students in Ethiopia.

Subgroup analysis based on region

Subgroup analysis was carried out in this meta-analysis according to the sample size and the country's study region. As a result, the Southern Nations, Nationalities, and Peoples' region had the largest magnitude of SRHSU (32.22%, 95% CI: 21.59, 42.85), followed by the Amhara region, reaching (32.82%, 95% CI: 21.78, 43.87), and the Oromia region (26.41%, 95% CI: 20.44, 32.38), which had the lowest magnitude (Figure 3).

Subgroup analysis based on sample size

In terms of sample size, the included studies were divided into two groups based on their sample size, with the cutoff point set at the median sample size of 584. Accordingly, in studies with a sample size <584, the pooled magnitude of sexual and reproductive health service utilization was 32.38% (95% CI: 23.79, 40.97). In contrast, it was 26.24% (95% CI: 23.63, 28.84) for studies with a sample size ≥584 (Figure 4).

Sensitivity analysis

Sensitivity analysis was conducted to detect each study's effect on the overall prevalence of sexual and reproductive health service utilization among high school students by excluding one study at a time. Based on the findings from sensitivity analysis, no studies in

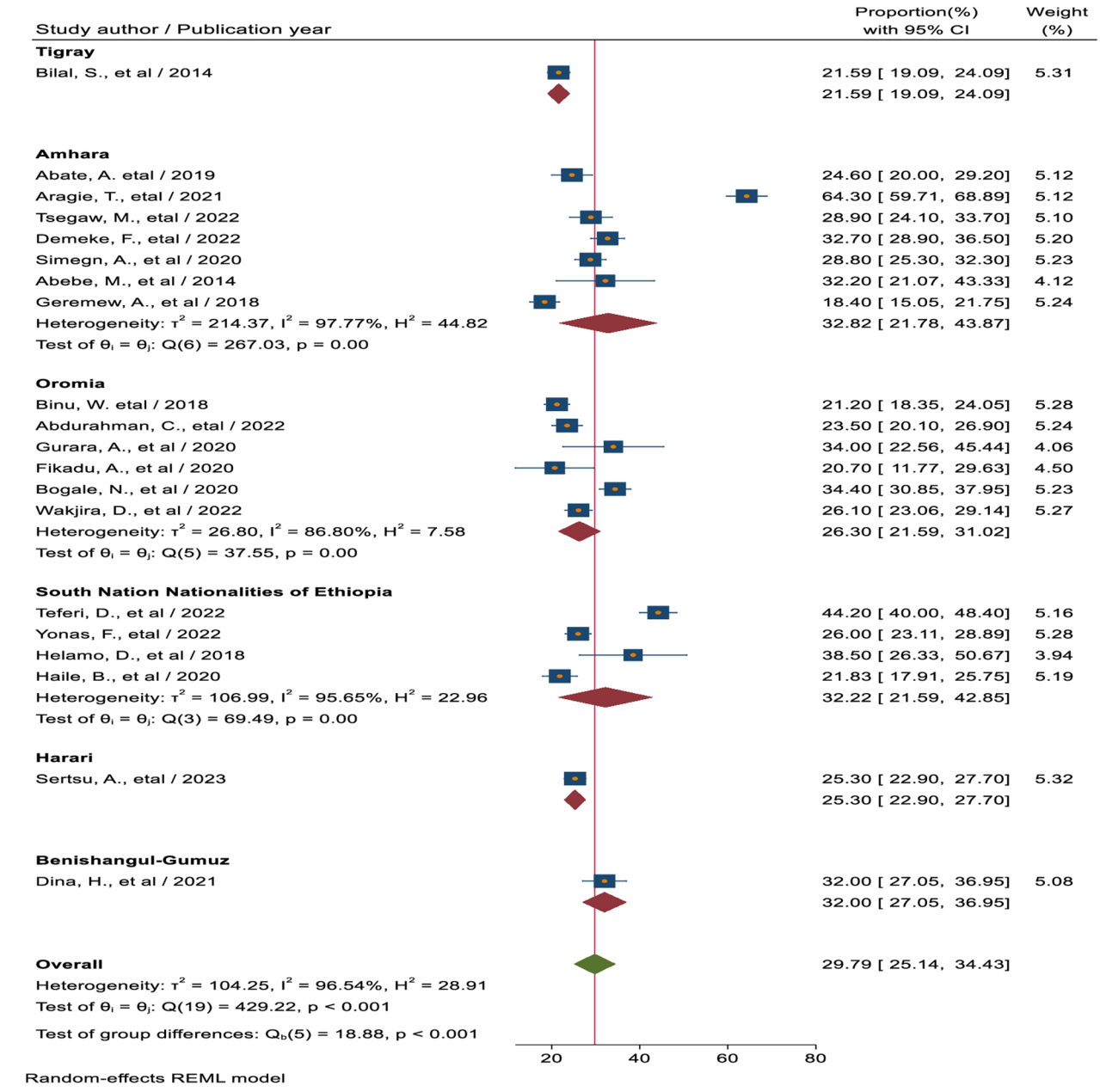

FIGURE 3
Forest plot for the pooled magnitude of sexual and reproductive health service utilization among high school students based on the region in Ethiopia.

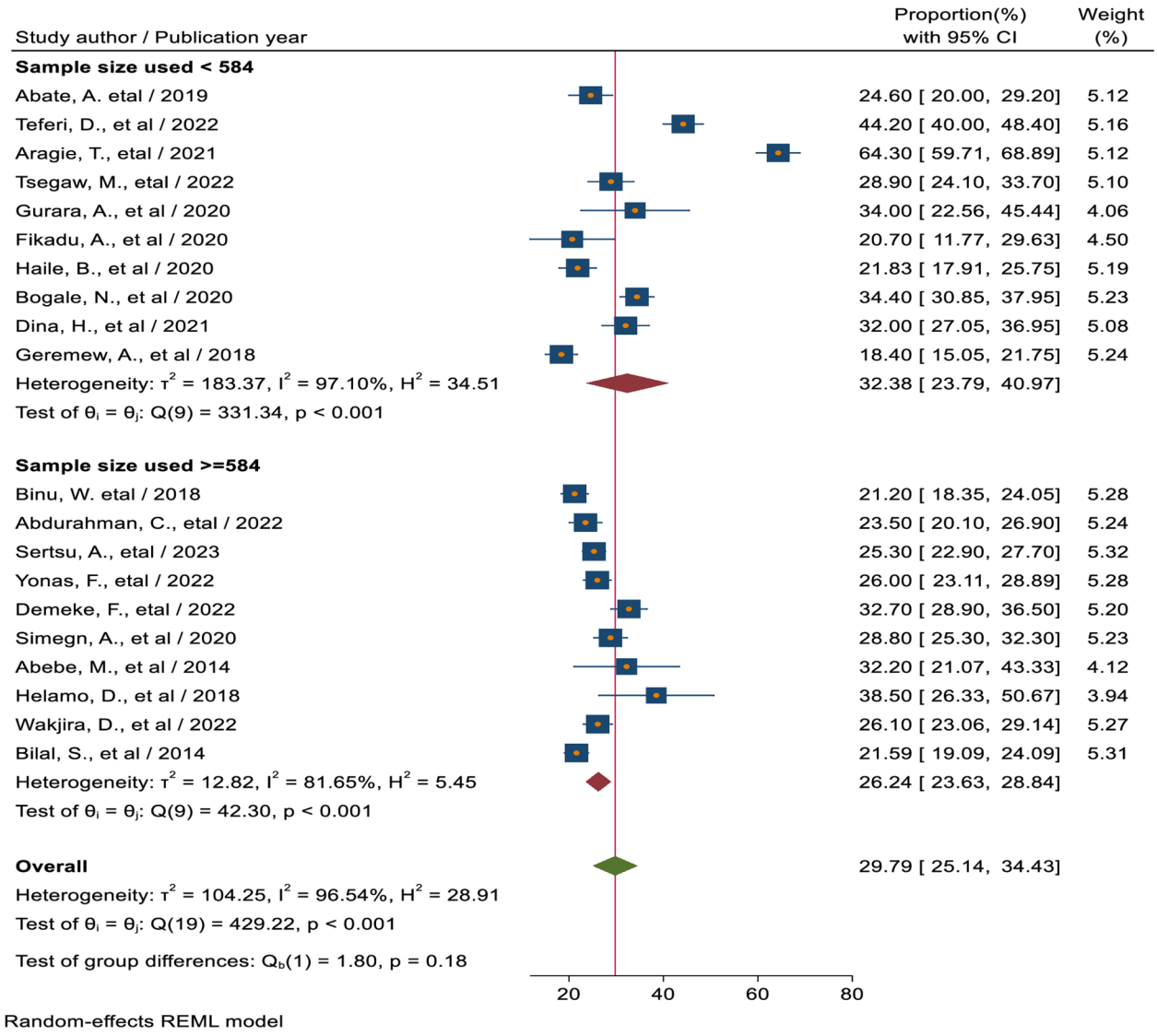

FIGURE 4
Sub group analysis based on sample size of sexual and reproductive health service utilization among high school students in Ethiopia.

the review impacted the pooled level of sexual and reproductive health service utilization among high school students (Figure 5).

Publication bias assessment

A funnel plot (subjectively) and Egger's regression and Begg's test (objectively) assessed publication bias. Based on the funnel plot, the observed proportion of SRHS across 20 studies was nearly symmetrically distributed around the pooled proportion (Figure 6). The *p*-value for regression-based Egger's test was 0.345, indicating the absence of publication bias and the *p*-value for Begg's test was 0.02, indicating the presence of publication bias. We used a trim-and-fill study in the random effects model to reduce the impact of publication bias. The prevalence estimates did not change substantially between the original model and the trim and fill model. Thus, Duval and Tweedie's nonparametric trim and fill analysis did not account for additional studies (Table 3).

Factors associated with reproductive health utilization among secondary school students

Students' grade level, age category, knowledge of SRH issues, previous history of sexual intercourse, history of STI, discussion about sexual and reproductive health, and presence of SRH service facility in the school were statistically significant associations with SRH service utilization of high school students. On the other hand, sex, residence, the presence of reproductive health problems, and the presence of nearby health facilities

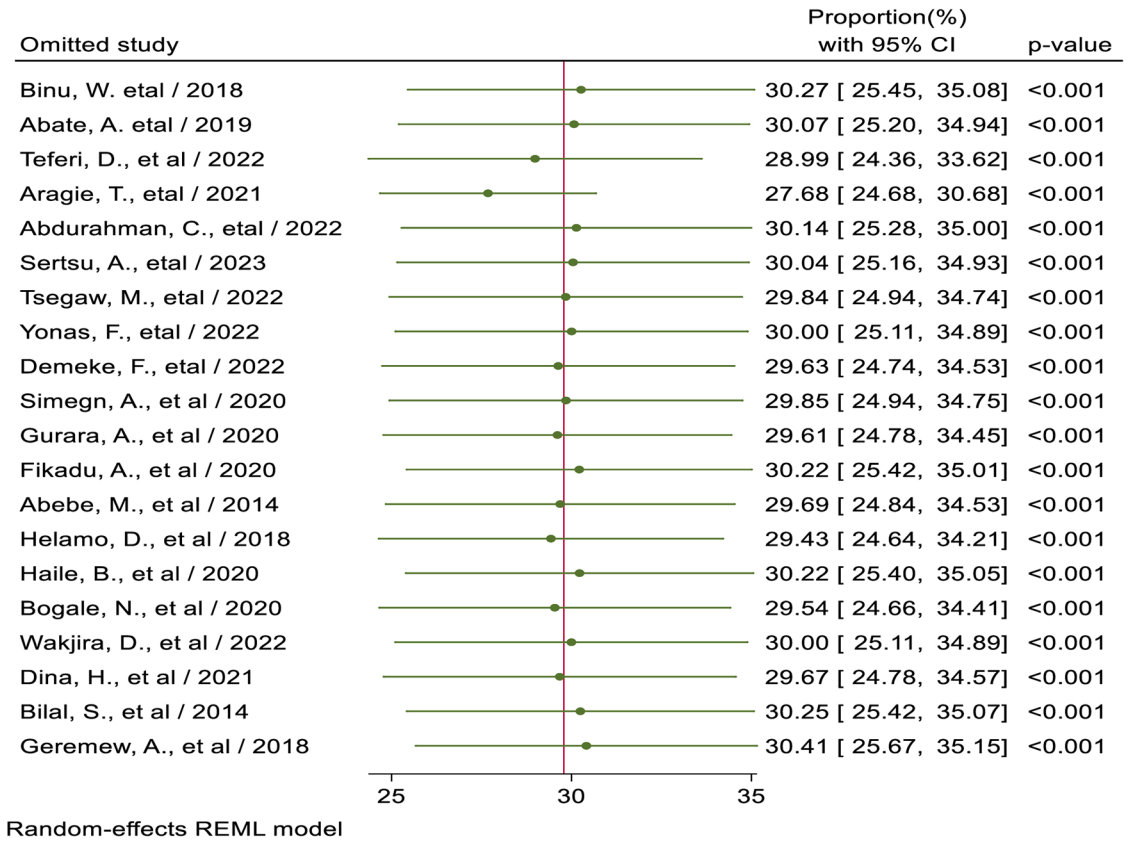

FIGURE 5
Sensitivity analysis for pooled proportion of sexual and reproductive health service utilization among high school students in Ethiopia.

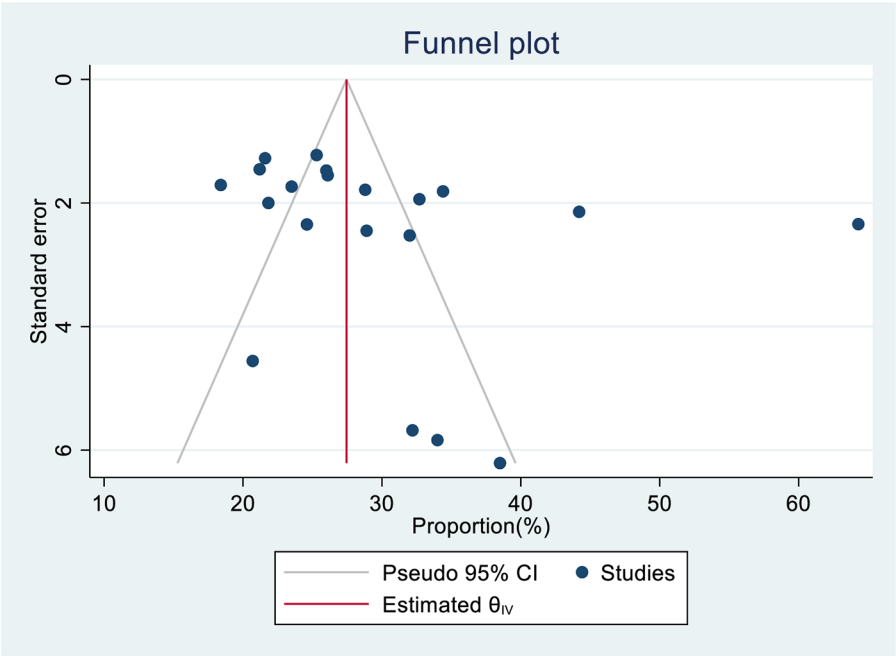

FIGURE 6
Funnel plot of publication bias assessment for the pooled magnitude of sexual and reproductive health service utilization among high school students in Ethiopia.

around their living area had no statistically significant association with SRH service utilization of high school students (Table 4).

Grade level

The pooled estimate of three studies (40, 42, 48) showed that students who were in grades 11 and 12 had a 2.33-times (AOR = 2.33, 95% CI: 1.39, 3.90) more likelihood of using sexual and reproductive health services than students in grades 9 through 10 (Figure 7).

TABLE 3 Non-parametric trim and fill analysis of publication bias assessment pooled proportion of sexual and reproductive health service utilization among high school students in Ethiopia.

Studies	Proportion (%)	95% conf. interval	
		Lower confidence interval	Upper confidence interval
Observed	29.785	25.138	34.432
Observed + Imputed	29.785	25.138	34.432

Age category of respondents

The pooled estimate of three studies (21, 43, 50) revealed that students with an age range of 20–24 years were 2.61 times (AOR = 2.61; 95% CI: 1.79–3.81) more likely to utilize sexual and reproductive health services as compared to students with an age range of 15–19 years (Figure 8).

Knowledge level of students towards sexual and reproductive health

The pooled estimate of six studies (38, 41, 46, 49, 52, 53) showed that students who had higher level of knowledge regarding SRH service were 3.54 times (AOR = 3.54; 95% CI: 1.81–6.94) more likely to utilize sexual and reproductive health services as compared to students who had low level of knowledge (Figure 9).

Previous history of sexual intercourse

The pooled estimate of seven studies (18, 38, 39, 41, 45, 49, 50, 52) revealed that students who had a previous history of sexual intercourse were 4.53 times (AOR = 4.53; 95% CI: 2.59–7.93)

TABLE 4 Factors associated with SRHSU of high school students in Ethiopia.

Factors	Number of studies included	Pooled odds ratio	Lower 95% confidence interval	Upper 95% confidence interval
Age 20–24 years	3	2.61	1.79	4.14
Grades 11 & 12	3	2.33	1.39	3.81
Higher level of knowledge towards SRHS	7	3.10	1.67	5.77
Previous history sexual intercourse	8	4.18	2.59	6.75
History of STI	3	3.74	2.22	6.31
Ever discussion about SRH issues	2	4.04	1.62	10.03
The presence of an RHS facility in the school	2	2.55	1.72	3.77
Sex (male)	5	1.56	0.88	2.77
Residence (urban)	2	1.46	0.18	11.61
Presence of RH problem	2	2.99	0.76	11.77
The presence of a nearby health facility	2	3.16	0.64	15.73

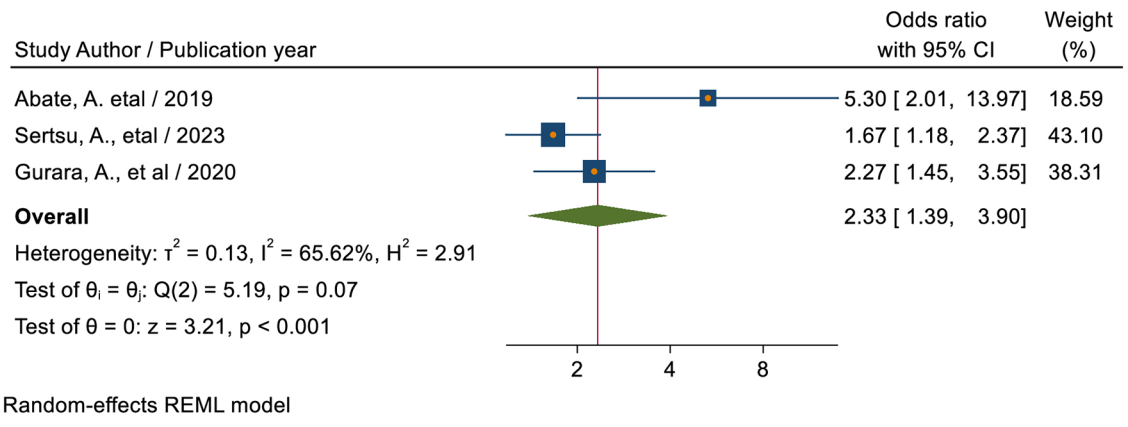

FIGURE 7
Forest plot for the association between grade level of students and sexual and -reproductive service utilization among high school students in Ethiopia.

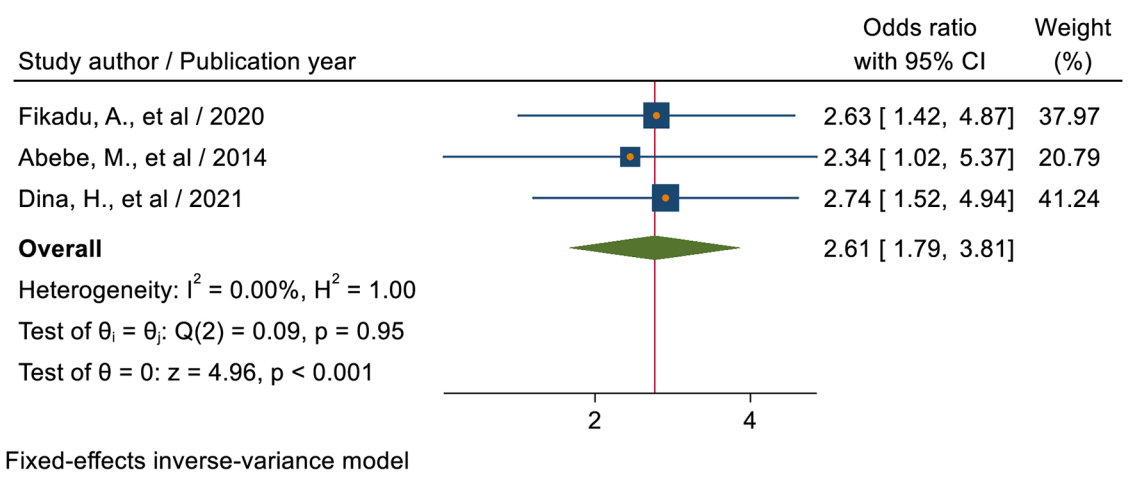

FIGURE 8
Forest plot for the association between the age category of students and sexual and reproductive health service utilization among high school students in Ethiopia.

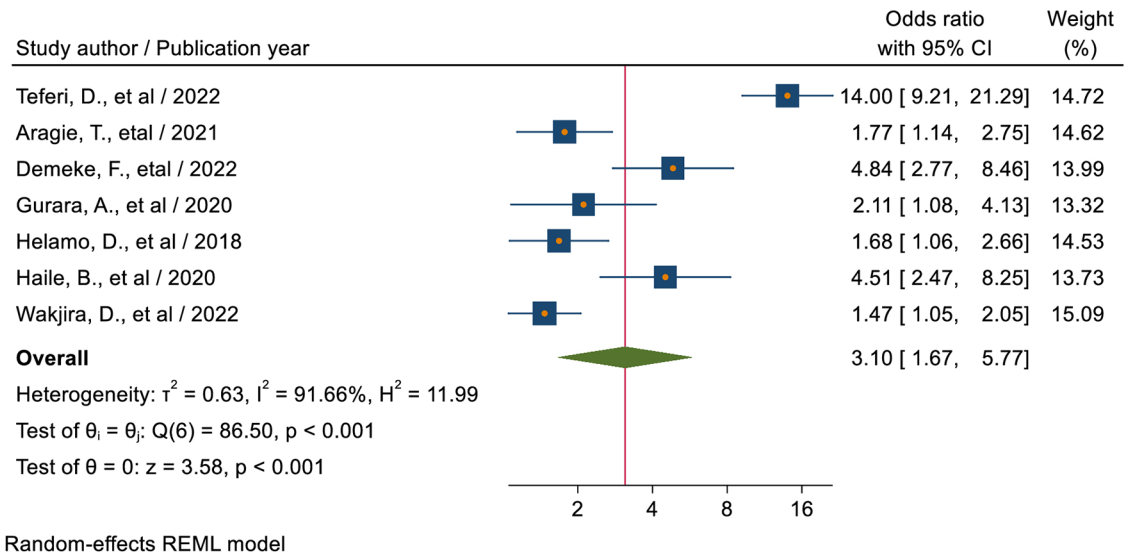

FIGURE 9
Forest plot for the association between knowledge status towards sexual and reproductive health, and sexual and reproductive service utilization among high school students in Ethiopia.

more likely to utilize sexual and reproductive health services as compared to students who had no a previous history of sexual intercourse (Figure 10).

Previous history of sexually transmitted infection

The pooled estimate of three studies (40, 45, 52) showed that students who had a previous history of sexually transmitted infection were 3.74 times (AOR = 3.74; 95% CI: 2.22–6.31) more likely to utilize sexual and reproductive health services as compared to students who had no previous history of sexually transmitted infection (Figure 11).

Presence of SRH service facility in school

The pooled estimate of two studies (37, 46) showed that the odds of utilizing SRHS were 2.55 times (AOR = 2.55; 95% CI: 1.72–3.77) higher among students who had RHS facility in their school as compared to students who had no SRH service facility in their school (Figure 12).

Discussion on SRH issues sexual and reproductive health service

The pooled estimate of two studies (39, 52) showed that students who ever discussed reproductive health issues with

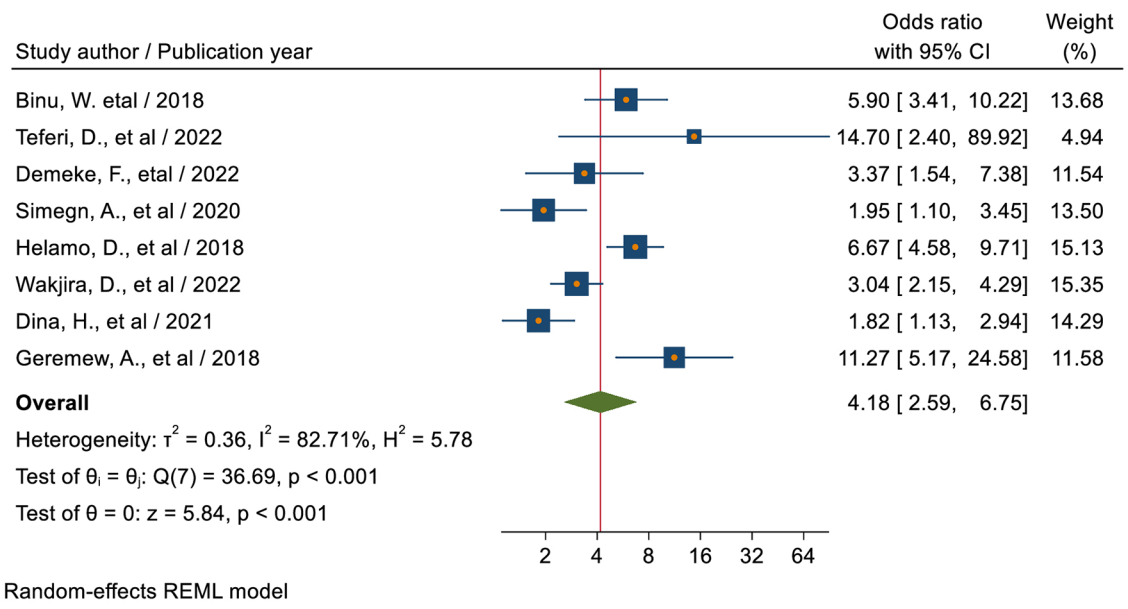

FIGURE 10
Forest plot for the association between the sexual experience of students and sexual reproductive service utilization among high school students in Ethiopia.

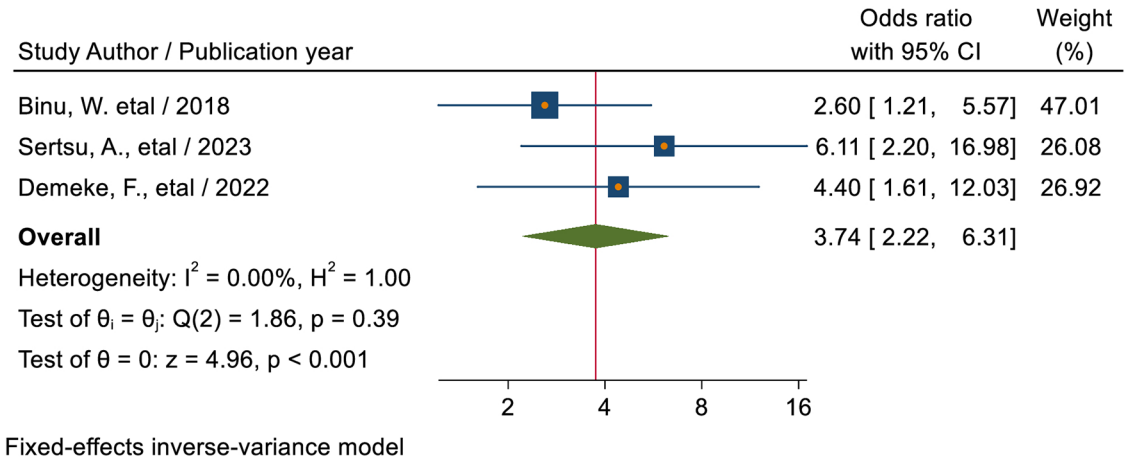

FIGURE 11
Forest plot for the association between the previous history of sexually transmitted infection of students and sexual and reproductive service utilization among high school students in Ethiopia.

either healthcare workers families or teachers or peers, or sexual partners were about 4.04 times (AOR = 4.04; 95% CI: 1.62–10.03) more likely to use reproductive health services than those who had not discussed (Figure 13).

Discussion

The current meta-analysis gives overall evidence on the magnitude of SRHS utilization among high school students in Ethiopia and its associated factors. Accordingly, the pooled magnitude of SRHS utilization among high school students in Ethiopia was found to be 29.79% (95% CI: 25.14, 34.43). This finding was consistent with 30% in Kenya (54). However, it is higher than 6.9% in Malaysia (55), 9.2% in Western Nepal (56), 24.3% in Indonesia (57), and 13.8% in the Philippines (58). However, this finding is lower than previously round as 42.7% in Ethiopia (59), 55.8% in Ghana (60), 38.5% in Kenya (61), and 50.1% in Nigeria (62). This discrepancy may result from variations in study participants' sociodemographic characteristics,

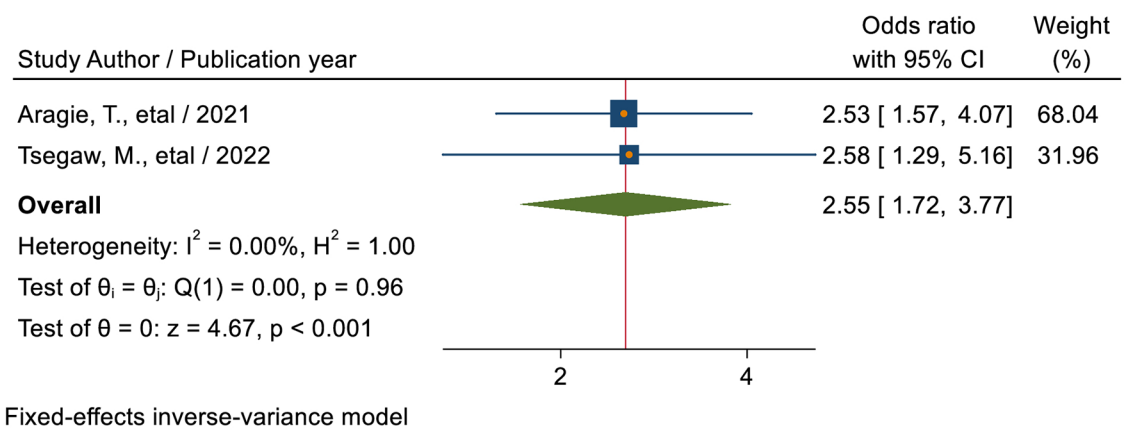

FIGURE 12
Forest plot for the association between the RHS facility in school and sexual and reproductive service utilization among high school students in Ethiopia.

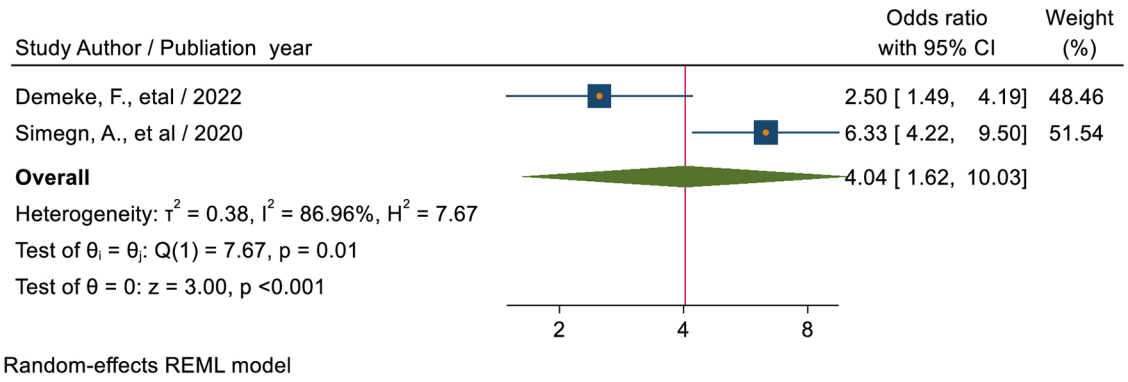

FIGURE 13
Forest plot for the association between students who had ever discussion on sexual and reproductive health issues, and sexual and reproductive service utilization among high school students in Ethiopia.

cultural influences, availability and accessibility of youth-friendly health facilities, policies and strategies of nations, quality of reproductive health services, and sampling techniques as well as the difference in technological advancement of nations in health information dissemination.

Based on subgroup analysis; the Amhara region had about 32.82% and the Southern Nations, Nationalities, and Peoples' region had 32.22% of high school students utilized SRHS. Whereas about 26.30% of high students in the Oromia region had a relatively lower magnitude of SRH service utilization. This could be due to the variations in the care standards, in the professional and caring ways that sexual and reproductive health care services are provided, and as well as the difference in experiences of the providers.

According to the present meta-analysis, students' grade level, age category, knowledge of SRH issues, sexual experience, history of STI, discussion about sexual and reproductive health issues with others, and presence of SRH service facility in the school were statistically significant association with SRHS utilization of secondary school students.

This study revealed that the pooled estimate of students in grades 11 and 12 had a 2.33-times (AOR = 2.33, 95% CI: 1.39, 3.90) more likely to use sexual and reproductive health services than students in grades 9 through 10. This finding is supported by studies conducted in Kenya (54) where educational level differences are significantly associated with SRH Service utilization. This finding is also supported by another systematic review meta-analysis conducted in Ethiopia (59). Possible causes for this include secondary behavioral changes as students move up the grade levels and increased sharing of SRH services information. This could mean that in comparison to students in grades 9 and 10, grade level 11–12 students had greater access to information. This could also be due to students in grades 11 and 12, who are probably more mature, knowledgeable, and inclined to use the services than students in lower grades. One explanation for this could be that individuals with better

educational status were more likely to freely share SRH knowledge with friends, family, and groups, and as they grew older, so did the need for SRH services (63).

In this study, students with an age range of 20–24 years were 2.61 times (AOR = 2.61; 95% CI: 1.79–3.81) more likely to utilize sexual and reproductive health services as compared to students with an age range of 15–19 years. This finding is supported by studies conducted in Kenya (54). This is presumably because, in comparison to youths between the ages of 15 and 19, older youths implement what they have learned about youth reproductive health services and are more inclined to use the SRH programs. They participate in sex as their age increases and exhibit more sexually mature behaviors. To prevent HIV infection and unintended pregnancy, the likelihood of utilizing SRH services increased (20).

Students who had higher level of knowledge regarding SRHS were 3.10 times (AOR = 3.10; 95% CI: 1.67–5.77) more likely to utilize sexual and reproductive health services as compared to students who had lower level of knowledge. It was higher than a study conducted among senior high school students in Indonesia, which found that students who had higher level of SRHS knowledge were 1.74 times more likely to utilize SRHS as compared to students who had lower level of SRHS knowledge (57). It was also supported by a study conducted in Nigeria (64), which states that the majority of youths who used the SRHS services were knowledgeable about SRHS. This is because people who are more knowledgeable about issues related to sexual and reproductive health will grow to be skilled health-seekers. Before being able to quickly and efficiently utilize appropriate treatments, students must have a solid understanding of sexual and reproductive health services. It might also be because responders with a high degree of SRH service knowledge will be aware of the advantages of utilizing SRH services as well as the drawbacks of not using them.

Students who had a previous history of sexual intercourse were 4.18 times (AOR = 4.18; 95% CI: 2.59–6.75) more likely to utilize sexual and reproductive health services as compared to students who had no previous history of sexual intercourse. This finding is lower as compared to the study conducted in Nepal (56). This could be because many sexual and reproductive health services are accessed when young people feel that there are hazards to their reproductive health associated with having sex. This could be because people who have had sex are more likely to seek medical attention and fear negative health consequences like acquiring STIs, getting pregnant unintentionally, and having an abortion. This could also be explained by the fact that young people who had sex were more likely to experience issues related to their reproductive health, which could lead to a greater demand for RH services. This suggests that for young people to engage in safe and healthy behavior, they must have access to a variety of health-related resources, including information and services. Ever engaging in sexual activity was highly correlated with using youth-friendly SRH services, particularly when it came to difficulties from pregnancy. Because women who engage in sexual activity are more likely to become pregnant unintentionally, have STIs, get HIV, and miss school as a result of pregnancy-related issues, they frequently use health facilities for voluntary HIV testing, family planning, and counseling.

Students who had a previous history of sexually transmitted infection were 3.74 times (AOR = 3.74; 95% CI: 2.22–6.31) more likely to utilize sexual and reproductive health services as compared to students who had no previous history of sexually transmitted infection. This could be explained by the possibility that patients with a history of STIs could visit a healthcare facility where they would receive RHS components in addition to STI therapy. This could also be explained by the fact that young people who encountered SRH problems were more concerned about their health when those problems arose. This suggests that for young people to engage in safe and healthy behavior, they must have access to a variety of health-related resources, including information and services.

Students who ever discussed reproductive health issues with either health care workers, families, teachers, peers, or sexual partners were about 4.04 times (AOR = 4.04; 95% CI: 1.62–10.03), compared to those who had not discussed, more likely to use reproductive health care. This finding is supported by a study conducted in Ethiopia (59) and the United States of America (65). This could also be a result of discussions helping young people learn pertinent information about various sexual and reproductive health concerns and services that are accessible. Because of this, knowledgeable young people might be more likely to utilize these services. This could also be because dialogue enables young people to learn pertinent information about various health concerns and resources that are offered. Youth who are well-informed may therefore be more likely to make the wise choice to use the programs (66). This might be explained by the confidence that was built up through a conversation about SRH difficulties with family and friends and the notable differences that resulted from that conversation. Moreover, this may be because candid conversations about SRH issues between families and children raise awareness and help people feel less self-conscious and afraid of being noticed when receiving SRH services. Also, the conversation opens up more opportunities for youth to exchange SRH knowledge and firsthand experiences with health-related issues. This could lead to improved youth awareness of SRH services and the development of favorable attitudes towards youth friendly reproductive health services, which could encourage young to utilize such services.

The odds of utilizing SRHS were 2.55 times (AOR = 2.55; 95% CI: 1.72–3.77) higher among students who had an SRH service facility in their school as compared to students who had no SRH service facility in their school. This is lower than a study conducted in Nepal, 14.85 (56) which stated that students attending secondary schools that included SRH in the school's health services were 15 times more likely to utilize SRH services. This is most likely because the respondents who have access to health facilities in their school are likely to be exposed to health education regarding sexual and reproductive health services during their visits, allowing them to learn about the different types, advantages, and availability of sexual and reproductive health services.

Limitation of study

Despite adhering to PRISMA guidelines throughout the review process, this review had the following limitations. We only include an observational study design for our review. We may miss qualitative and experimental studies. The other possible drawback of the current systematic review could be that it only included full-text publications written in English, which means important works that may have been written in other languages on the subject were missed.

Conclusion

The overall magnitude of sexual and reproductive health service utilization among high school students was low in Ethiopia. Students with age range between 20 and 24 years, grades 11–12, higher level of knowledge regarding sexual and reproductive health services, history of sexual experience, history of sexually transmitted infection, presence of reproductive health service facility in the school and ever discussed about sexual and reproductive health issues had positive a statistically significant association with sexual and reproductive health service utilization as compared to their counterparts. Thus, policymakers and program implementers had better to enhance sexual and reproductive health service utilization among high school students, attention should be given to the identified determinants. It is also important for schools to provide easily accessible sexual and reproductive health services that are affordable, confidential, and convenient for high school students, including follow-up care options.

Author contributions

AD: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. OA: Conceptualization, Data curation, Investigation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. AT: Data curation, Methodology, Validation, Visualization, Writing – original draft, Writing – review & editing. EK: Conceptualization, Methodology, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. TA: Data curation, Formal Analysis, Methodology, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. MT: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Software, Validation, Visualization, Writing – original draft, Writing – review & editing. ET: Conceptualization, Data curation, Formal Analysis, Methodology, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. DE: Conceptualization, Data curation, Investigation, Methodology, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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Supplementary material

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Knowledge of reproductive rights and associated factors among Oda Bultum University students, eastern Ethiopia

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Background: Reproductive rights are an essential element of public health interventions to reduce adolescent and youth mortality and morbidity. A lack of knowledge about sexual and reproductive health is an important barrier that contributes to a variety of health and social issues. This study assessed the knowledge of reproductive rights among Oda Bultum University students, eastern Ethiopia.

Methods: An institution-based cross-sectional study was carried out among 727 students from December 1 to 30, 2020. Participants were selected using a multistage sampling technique. Data were collected using a self-administered, pre-tested, and structured questionnaire. Data were entered into EpiData version 4.1 and analyzed using SPSS version 27. The study employed both bivariable and multivariable logistic regression analysis to determine the variables associated with knowledge regarding reproductive rights. The significance and degree of strength were declared at a p-value < 0.05 using an adjusted odds ratio with a 95% confidence interval.

Results: The overall knowledge of reproductive rights among university students was 47.2% (95% CI: 43.3%, 50.9%). Male gender (AOR = 2.11, 95% CI: 1.50, 2.97), urban residence (AOR = 1.62, 95% CI: 1.16, 2.28), formal maternal education (AOR = 2.26, 95% CI: 1.62, 3.17), participation in a sexual and reproductive health club (AOR = 2.67, 95% CI: 1.74, 4.10), utilization of sexual and reproductive health services (AOR = 6.29, 95% CI: 4.22, 9.36), and discussion about sexual and reproductive health issues (AOR = 1.60, 95% CI: 1.11, 2.30) were the factors that improved the knowledge of reproductive rights.

Conclusions: Almost half of the university students know about reproductive rights. Various factors identified were associated with the knowledge of reproductive rights among university students, including gender, residence, parental education level, engagement in sexual and reproductive health clubs, utilization of sexual and reproductive health services, and discussions about sexual and reproductive issues. Healthcare professionals at all levels should concentrate on offering excellent services related to reproductive health and establishing programs for specific education and counseling on reproductive rights for all well-behaved students.

KEYWORDS

knowledge, reproductive health, reproductive rights, university students, Ethiopia

Introduction

Reproductive rights are the fundamental rights of all individuals and couples, irrespective of age or gender, to reproductive and sexual health, including the ability to determine the number, timing, and spacing of children (1). Human rights declarations protected sexual and reproductive rights (2). Concerns about sexual and reproductive health, which are essential to population and development initiatives, disproportionately affect young people. For young people's well-being, it is crucial to safeguard and advance their reproductive rights and provide them with the knowledge necessary to make well-informed choices (3, 4).

Youths, defined as people between the ages of 15 and 24, account for around 18% of the global population, the great majority of whom reside in developing nations. A time of biological and psychological transition from childhood to maturity, it is marked by increased sexual activity and the ability to reproduce sexually (1, 5). Access to services and information that support these decisions and advance the rights to sexual and reproductive health is part of ensuring reproductive rights. Insufficient knowledge about reproductive rights can result in several harmful health consequences for youths as they grow more mature, including unsafe sexual behavior, unwanted pregnancies, violence, and unprotected sex. These consequences account for 17% of the world's overall disease burden (6). The second highest cause of disease and death in developing countries is unprotected sex (4, 5, 7). Although young people and their parents in Sub-Saharan Africa have little knowledge of reproductive rights, the early onset of sexual relations and the high incidence of sexually transmitted diseases, particularly HIV/AIDS, lead to a lack of protection (8). In Ethiopia, teenage marriages and teenage pregnancies are prevalent. According to the 2016 Ethiopian Demographic Health Survey (EDHS), teenage girls give birth to 16% of all babies in Ethiopia, and 17% of these pregnancies are undesired or unplanned (9).

Even though sexual and reproductive health is vital for everyone, regardless of age, many people, especially youth in developing countries like Ethiopia, lack access to sexual and reproductive health care (10). Due to misunderstanding and insufficient awareness, many sexually active young people feel that they are unable to control or talk about certain elements of their sexual behavior (11). Research indicates that youth usually do not know how much their sexual rights are being violated or where to get social or legal assistance (12). In addition, poor quality rights-based interventions for sexual and reproductive health continue to be a serious problem in low- and middle-income countries (LMICs), such as Ethiopia (13). Research indicates that university students in Ethiopia know as little as 16.4%–57.7% about sexual and reproductive health rights (14–17). Ethiopia has ratified several international agreements concerning sexual and reproductive rights to address these problems, and several organizations have been focusing on sexual and reproductive health services and related rights in Ethiopia (8). However, the continued existence of these problems might be attributed, in part, to higher education institutions' lack of national standards curriculam on sexual and reproductive rights for non-health science majors (8).

The youth's capacity to deal with violations was restricted by several issues, such as feelings of shame, guilt, and humiliation; fears of rejection by friends and family; concerns about confidentiality; and fears of not being believed or of being subjected to discrimination and cultural stigma (7). Another major obstacle that might result in many health risks and social issues is a lack of knowledge about sexual health (18).

There is little information available on reproductive rights and related issues in Ethiopia, especially in the overall setting of the study, despite data on the use of reproductive health care (19–21). In low- and middle-income countries, including Ethiopia, addressing the needs and issues related to youth's sexual and reproductive health is a top priority in population and development programs. Therefore, this study aimed to assess knowledge of reproductive rights and associated factors among students in Oda Bultum University, eastern Ethiopia.

Abbreviations

AOR, adjusted odds ratio; ANC, antenatal care; LIMIC, lower middle-income countries; PNC, postnatal care; PPC, postpsrtum contraceptive; SRH, sexual and reproductive health; SSA, sub-Saharan Africa; WHO, World Health Organization.

Methods and materials

Study design and area

An institution-based cross-sectional study was conducted at Oda Bultum University from December 1 to 30, 2020. Oda Bultum University established in 2016, located in the West Hararghe Zone, 326 kilometers east of Addis Ababa, Ethiopia's capital. The university accepted 2,876 undergraduate students in undergraduate programs during the study period. Of these students, 1,770 were eligible for the study. The institution has one youth club that offers services related to HIV/AIDS and reproductive health and one clinic that delivers basic health care to students, faculty, and the local community.

Population

All undergraduate students at the Oda Bultum University were the source population. Randomly selected undergraduate students at Odabultum University during the study period constituted the study population. The study included regular undergraduates who were 18 years old and above, while critically ill participants who could not respond and were absent from regular class sessions were excluded.

Sample size and sampling procedure

The sample size was determined by Epi Info version 7.1, using a single population proportion formula with the following assumptions: a 95% confidence level, assuming a 31.6% proportion of reproductive health knowledge, a 5% margin of error, a design effect of 2 and a 10% non-response rate. Accordingly, a minimum of 730 students were required to participate in this study.

A multistage stratified sampling procedure was applied to determine study participants. First, Oda Bultum University is stratified by college (College of Agriculture, College of Agroindustry, Natural and Computational Sciences, Business and Economics, Natural Resources and Environmental Sciences, College of Humanity and Social Sciences, and Engineering); then, the sample size proportionally allocated to each college. Second, the assigned samples to each college were proportionally allocated to their respective departments and programs/units found under each college, along with their years of study, using the actual number of learning undergraduate students reviewed from the most recent student lists or registrations available in the Associate Registrar Office of Oda Bultum University during the study period, 2020. We created a sampling frame for each college using student registration numbers and then selected participants using a systematic random selection technique.

Data collection tool and procedure

Data were collected from participants using a structured self-adminstered questionnaire after the classroom was arranged. The questionnaire was adapted from the available published literatures (8, 9, 17, 20–22). The questionnaire contained information on socio-demographic factors (age, gender, ethnicity, religion, marital status, address, family size, paternal and maternal education, paternal and maternal main occupation, and the family's wealth index), school-related factors (type of school attended in lower education, college of the study, and year of the studies), reproductive factors (history of sexual experience, age and time at first sex, number of sexual partners, hearing about sexual and reproductive health information and their primary source of information, participation in a reproductive health club, discussion about sexual and reproductive health issues, advice on sexual and reproductive health issues, and use of sexual and reproductive health services) and knowledge of reproductive rights.

Knowledge of reproductive rights

It was measured using 24 dichotomous (yes/no) items of reproductive rights knowledge. The response of each item was coded ′1′ when the participant responded 'yes' to the correct questions and '0' when the participant responded 'no' to the correct question. Then, the composite index score was computed from 24 dichotomous items, and the total score ranged from 0 to 24. The internal consistency of the items was confirmed, with acceptable consistency (Cronbach $\alpha = 0.83$). The participants who scored the mean and above were considered to have good knowledge of reproductive rights and had poor otherwise (8).

Wealth index

Was evaluated using a standard instrument that included 38 dichotomous (yes/no) questions about three aspects of the family's wealth level (domestic animals, durable assets, other productive assets, and housing circumstances) (9). We found high internal consistency among questions (Cronbach $\alpha = 0.81$) and used principal component analysis using the varimax rotation approach to determine composite wealth index variables and participant wealth status.

Data quality control

The questionnaires were adapted from standard instruments and related published literature to maintain the quality of the data. We pretested the tools on 5% of the total sample at Dire Dawa University in Ethiopia to check the validity of the tools. After the pretest, ambiguous words were simplified based on recommendations from participants. Before actual data collection, data collectors and supervisors were trained for one day on the objective of the study and data collection techniques. Ten health professionals facilitated the overall data collection, and two public health officers supervised data collection with the principal investigator. The study participants filled out the questionnaire in the lecture halls at the same time. The participant's privacy was not compromised by the other participants. Supervisors and principal investigators strictly supervised and validated the collected data.

Data processing and analysis

The data were entered into EpiData version 3.1 and analyzed with SPSS version 27 after being checked for correctness and completeness. Descriptive statistics such as frequencies, measures of central tendency, and measures of dispersion were employed to characterize the individuals. Before any analysis, the internal consistency of the items used to measure each composite index was checked by reliability analysis (using Cronbach α). We found acceptable reliability tests for knowledge of reproductive right items (Cronbach α = 0.83) and wealth index items (Cronbach α = 0.81). The composite wealth index score and wealth status of the students' households were determined using Principal Component Analysis and the varimax rotation method. Predictors with a *P*-value of <0.25 in bivariable analyses be included in the multivariable. The factors independently associated with knowledge about reproductive rights were identified using multivariable logistic regression analyses. The adjusted odds ratio (AOR) (95% CI) was used to report the strengthening of the association, with overall significance noted at a *P*-value <0.05.

Results

Socio-demographic characteristics

A total of 727 students participated in this study, with a response rate of 99.6%. Four hundred forty (60.5%) participants were male. The mean (±SD) age of the participants was 22.71 ± 2.25 years. The majority (77.3%) of participants were in the 21–24-year age group. More than half (56.4%) of the students were from rural areas. A majority (46.4%) of the participants had mothers who had no formal education; half (50.9%) of paternals' occupations were Farmar, about 33.3% of students were from Poor families, followed by 33.4% from Medium and 33.3% from Rich household families. The majority (80.2%) of students attended their preparatory education at governmental schools (Table 1).

TABLE 1 Socio-demographic characteristics of students in Oda Bultum University, eastern Ethiopia, 2021 (*n* = 727).

Characteristics		Frequency	Percent (%)
Sex	Male	440	60.5
	Female	287	39.5
Age (in years)	18–20	30	4.1
	21–24	562	77.3
	≥25	135	18.6
Residence area	Urban	317	43.6
	Rural	410	56.4
Marital status	Single	674	92.7
	Married	40	5.5
	Divorced	13	1.8
Religion	Muslim	247	34.0
	Orthodox	274	37.7
	Protestant	206	28.3
Ethnicity	Oromo	464	63.8
	Amhara	149	20.5
	Tigre	95	13.1
	Others[a]	19	2.6
Family size	≤5	335	46.1
	>5	392	53.9
Maternal education	No formal education	337	46.4
	Had formal education	390	53.6
Paternal education	No formal education	209	28.7
	Had formal education	518	71.3
Maternal main occupation	Housewife	411	56.5
	Government employee	143	19.7
	Merchant	141	19.4
	Others[b]	32	4.4
Paternal main occupation	Farmer	370	50.9
	Government employee	236	32.5
	Merchant	99	13.6
	Others[c]	22	3.0
Preparatory school types	Government	583	80.2
	Private	144	19.8
Faculty	Social sciences	229	28.7
	Natural sciences	498	71.3
Year of the study	2nd year	463	63.7
	3rd year	228	31.4
	≥4th year	36	5.0
Wealth index	Poor	242	33.3
	Medium	243	33.4
	Rich	242	33.3

[a]Somale/Sidama/Gurage/wolayta.
[b]Daily labor.
[c]Daily laborer.

Reproductive characteristics

The majority (78.7%) of participants had sexual experience. Of those who had sexual experience, 55.5% had multiple sexual partners in their lives. Around 71.7% of students were participated on sexual and reproductive clubs, and 32.5% of students were utilized reproductive health services. In addition, 40.7% of students were discussed about reproductive health issues with any body (Table 2).

Knowledge of reproductive rights

The mean (±SD) score for knowledge about reproductive rights is 14.36 ± 3.65. Three hundred forty-three (47.2%) students at the university had a good knowledge of reproductive rights (95% CI: 43.3%, 50.9%).

The majority (61.8%) of participants agreed that families had the right to choose circumcision for their female children. Nearly half (48.1%) agreed that married women should be able to choose how many children they want without the approval of their spouse or partner. Half of the participants (50.2%) agreed that women had the right to decline sexual activity without their boyfriend's consent. Approximately 46.6% of participants believed that boys should be allowed to engage in sexual activity without their partner's consent. More than half of the participants (55.7%) agreed that females have the freedom to make sexual and reproductive health decisions without their parents' permission.

TABLE 2 Reproductive characteristics of students in Oda Bultum University, eastern Ethiopia, 2021 ($n = 727$).

Characteristics		Frequency	Percent (%)
History of sexual intercourse	Yes	155	21.3
	No	572	78.7
Age at first sexual intercourse ($n = 155$)	<15 years	64	41.3
	15–19 years	70	45.2
	20–24 years	21	13.5
Number of sexual partner ($n = 155$)	One	69	44.5
	Two	53	34.2
	Three and above	23	21.3
Heard about SRH issues	Yes	388	53.4
	No	339	46.6
Where did you heard about SRH issues first ($n = 338$)?	Parents	80	23.7
	Peers	49	14.5
	School teacher	73	21.6
	Social media	79	23.4
	Health worker	40	11.8
	Media (TV/Radio)	64	18.9
	Other[a]	28	8.3
Participation on SRH club	Yes	521	71.7
	No	206	28.3
Utilization of SRH services	Yes	236	32.5
	No	491	67.5
Type of SRH services used ($n = 236$)	Condom	62	38.8
	ABC education	62	38.8
	STI and HIV education	31	19.4
	Other[b]	5	3.6
Discussing about SRH issues	Yes	296	40.7
	No	431	59.3
With whom did you discuss about SRH issue ($n = 296$)	My family members	117	39.5
	My friends	87	29.4
	Health worker	62	20.9
	My school teacher	18	6.1
	Other[c]	12	4.1

[a]RH clubs, student and boyfriend.
[b]Contraceptives, abortion care.
[c]Religious leader and grandmother's in law; SRH, sexual and reproductive health.

The majority of them (45.3%) agreed that unmarried couples have the right to use contraception other than condoms (Table 3).

Factors associated with knowledge of reproductive rights

In the bivariable analysis, students' gender, resident area, age, religion, marital status, maternal educational status, family wealth quantile, participation in sexual and reproductive health (SRH) clubs, use of SRH services, discussion about SRH issues, school type, faculty, and year of study were all associated with knowledge of reproductive rights. However, in multivariable analysis, students' gender, living place of residence, maternal education, involvement in an SRH club, and utilization of SRH were the independent characteristics associated with knowledge concerning reproductive rights among university students (Table 4).

Male students were twice as likely as female students to know about reproductive rights (AOR = 2.11, 95% CI: 1.50–2.97). Students from urban areas had 1.6 times higher odds of knowing about reproductive rights compared to those from rural areas (AOR = 1.62, 95% CI: 1.16–2.28). Students whose mothers had a formal education were 2.26 times more likely to be aware of reproductive rights than those whose mothers had no formal education (AOR = 2.26, 95% CI: 1.62–3.17). Similarly, students who participated in the SRH club were 2.67 times more likely to know about reproductive rights than those who did not (AOR = 2.67, 95% CI: 1.74–4.10). Furthermore, students who had previously used SRH services were 6.29 times more likely to be aware of reproductive rights than those who had never used it (AOR = 6.29, 95% CI: 4.22–9.36). Finally, the students who discussed SRH issues with anybody were 1.6 times more likely to know about reproductive rights than those who had not discussed it yet (Table 4).

Discussion

In this study, we assessed the level of knowledge on reproductive rights and associated factors among Oda Bultum University students. Less than half (47.2%) of the students understood their reproductive rights. Male students, living in urban areas, having a mother's formal education, involvement in SRH club, use of SRH services, and discussion of SRH concerns with others were independent predictors of reproductive rights knowledge among University students.

This study indicated that about 47.2% of students were knowledgeable about reproductive rights. This finding was similar with the finding of the studies conducted in Mizan Tepi, southern Ethiopia (46.6%) (23), and Shire, northern Ethiopia (47.1%) (17). However, this finding was higher than the study conducted in Aksum, Northern Ethiopia (16.4) (14). On the other hand, the finding of this study was lower than the studies conducted in Haramaya, Eastern Ethiopia (52.2%) (16), Wolaita Sodo, southern Ethiopia (54.5%) (8), southwest Nigeria (60.3%) (24), and Nepal (83.3%) (22). This disparity could be explained by differences in the research population and participants' educational backgrounds. For example, the study done in Wolaita Sodo included health science students and participants from the health science college were more likely to be aware of reproductive rights than those from other colleges (8). In addition, methodological differences across research may account for this disparity. For instance, a study conducted in Nigeria used fewer items to assess the level of knowledge regarding reproductive rights and used a mixed-methods methodology (24). Furthermore, this variation could be attributed to the difference in study settings and populations among studies.

This study revealed that male students were more likely to know about reproductive rights than female students. This finding was supported by the study conducted in Aksum, northern Ethiopia (14). This difference may attributed to the presence of social and cultural barriers that inhibit females from engaging in discussions about sexual and reproductive health (25). In addition, the patriarchal systems, gender inequality, and the violation of women's rights, as well as the reluctance of

TABLE 3 Responses to items of knowledge of reproductive rights among Oda bultum university students, eastern Ethiopia, 2021 ($n = 727$).

Items	Yes (%)	No (%)
Do families have right to decide about their female child to be circumcised?	449 (61.8)	278 (38.2)
Do girls have the right to dismiss her arranged marriage without their family's consent?	360 (49.5)	367 (50.5)
Do youths have the right to mate selection without their family's consent?	427 (58.7)	300 (41.3)
Can a married woman say no to have children if she doesn't want?	350 (48.1)	377 (51.9)
Do women have the right to say no to have sex without their husband's/partners desire/need?	365 (50.2)	362 (49.8)
Do youths have the right that their use of reproductive health services is to be kept confidential?	418 (57.7)	309 (42.5)
A man shouldn't have sex whenever he wants irrespective of his girlfriend's wish?	388 (53.4)	339 (46.6)
Do youths have the right to ask each other for HIV testing before sexual engagements?	433 (59.6)	294 (40.4)
Do youths have the right to have information on reproductive health facilities	483 (66.4)	244 (33.6)
Do youths have rights to access information of reproductive rights at higher institutions?	464 (63.8)	263 (36.2)
Do you think that youths have right to be free from all forms of discrimination due to their reproductive and sexual orientation?	381 (52.4)	346 (47.6)
Do boys have no special right to be protected from sexual exploitation and abuse	357 (49.1)	370 (50.9)
Do all girls have the right to access to autonomous reproductive choices including choices relating to safe abortion?	328 (45.1)	399 (54.9)
Do girls have the right to resist genital mutilation against their families will?	402 (55.3)	325 (44.7)
Do youths have full right to access reproductive health service without parents consent	455 (62.6)	272 (37.4)
Do youths have the right to decide on sexual and reproductive health issues of themselves without their parents' consent?	405 (55.7)	322 (44.3)
Do all women have right to autonomous reproductive choices to use contraceptive	364 (50.1)	363 (49.9)
Do girls have right to autonomous reproductive choice without partner's consent	328 (45.1)	399 (54.9)
Do students have a right to freedom of assembly and political participation to influence governments to place *a priority* on sexual and reproductive health?	422 (58.0)	305 (42.0)
Do students have the right to access new reproductive technologies	411 (56.5)	316 (43.5)
Do you think that all students must be free to enjoy and control their sexual and reproductive life?	381 (52.4)	346 (47.6)
Do youths have the right to form an association or clubs that aims to promote their sexual and reproductive health?	380 (52.3)	347 (47.7)
Do unmarried woman have the right to maternity leave with adequate social security benefits?	377 (51.9)	350 (48.1)
Do unmarried couples have the right to use contraceptives other than condoms?	329(45.3)	398(54.7)

TABLE 4 Factors associated with knowledge of reproductive rights among Oda Bultum University students, eastern Ethiopia, 2021 ($n = 727$).

Variables		Knowledge of reproductive rights		COR (95%CI)	AOR (95%CI)
		Good (%)	Poor (%)		
Gender	Female	108 (37.6)	179 (62.4)	1	1
	Male	235 (53.4)	205 (46.6)	**1.90 (1.40, 2.57)*****	**2.11 (1.50, 2.97)*****
Age (in years)	18–20	11 (36.7)	19 (63.3)	1	1
	21–24	259 (46.1)	303 (53.9)	1.48 (0.69,3.16)	1.58 (0.65, 3.83)
	≥25	73 (54.1)	62 (45.9)	2.03 (0.90,4.60)	2.16 (0.84, 5.59)
Residence area	Urban	167 (52.7)	150 (47.3)	**1.48 (1.10, 1.99)****	**1.62 (1.16, 2.28)****
	Rural	176 (42.9)	234 (57.1)	1	1
Religion	Muslim	110 (44.5)	137 (55.5)	1	1
	Orthodox	130 (47.4)	144 (52.6)	1.24 (0.80, 1.59)	1.48 (0.99, 2.22)
	Protestant	103 (50.0)	103 (50.0)	1.24 (0.86, 1.80)	1.37 (0.89, 2.11)
Preparatory School type	Private	77 (53.5)	67 (46.5)	1.37 (0.95, 1.97)	1.04 (0.67, 1.61)
	Government	266 (45.6)	317 (54.4)	1	1
Year of the study	2nd year	207 (44.7)	256 (55.3)	1	1
	3rd year	115 (50.4)	113 (49.6)	1.37 (0.87, 3.44)	1.15 (0.80, 1.66)
	≥4th year	21 (58.3)	15 (41.7)	1.62 (0.92,1.74)	1.49 (0.67, 3.28)
Maternal education	No formal education	129 (38.3)	208 (61.7)	1	1
	Had formal education	214 (54.9)	176 (45.6)	**1.96 (1.46, 2.64)*****	**2.26 (1.62, 3.17)*****
Family wealth index	Poor	114 (47.1)	128 (52.9)	1	1
	Medium	108 (44.6)	134 (55.4)	0.91 (0.63,1.29)	0.90 (0.60, 1.35)
	Rich	121 (49.8)	122 (50.2)	1.11 (0.78, 1.59)	1.24 (0.82, 1.86)
Participated on SRH club	Yes	244 (46.8)	277 (53.2)	**1.51 (1.10, 2.09)***	**2.67 (1.74, 4.10)*****
	No	99 (48.1)	107 (51.9)	1	1
Used SRH services	Yes	171 (72.5)	65 (27.5)	**4.88 (3.47, 6.86)*****	**6.29 (4.22, 9.36)*****
	No	172 (35.0)	319 (65.0)	1	1
Discussed about SRH issues	Yes	167 (56.4)	129 (43.6)	**1.87(1.39, 2.53)*****	**1.60(1.11, 2.30)***
	No	176(40.8)	255(59.2)	1	1

*p-value < 0.05; **p-value < 0.01; ***p-value < 0.001; AOR, adjusted odds ratio; COR, crude odds ratio; SRH, sexual and reproductive health.
The meaning of the bold value is indicated for variable having p-value <0.05; while the non-bold value indicated for variable having p-value ≥0.05.

females who participate in sexual and reproductive health education, may also contribute to this disparity (26).

Students from urban residents were more likely to be aware of reproductive rights than those from rural residents. This finding was consistent with studies carried out in Aksum, northern Ethiopia (14), Wolaita Sodo, southern Ethiopia (8) and Gondar, Northwest Ethiopia (15). This could be because students from urban areas have more access to reproductive health information. In addition, urban family units had higher levels of education and had more discussions with their children about sexual and reproductive health than rural ones (14). Developing strategies that help to increase the window access to information on sexual and reproductive health for rural residences is required to improve the knowledge of reproductive rights.

Maternal education is significantly associated with knowledge about reproductive rights. Students whose mothers had a formal education were more likely to be aware of reproductive rights than students whose mothers had not. This finding, supported by studies carried out in Haramaya, eastern Ethiopia (16), Adet, northwest Ethiopia (27) and Riyadh, Saud Arabia (18), implies that students from educated families discussed reproductive rights with their families. Educated families might not restrict their children from discussing sexual and reproductive rights, which may enhance the children's knowledge. Given that, encouraging family members to discuss reproductive health in the household is imperative to improve the knowledge level of reproductive rights in the community.

The students who participated in the sexual and reproductive health club were more likely to know about reproductive rights compared to those who did not participate. This finding has been strengthened by the studies conducted in Shire, northern Ethiopia (17) and Wolaita Sodo, southern Ethiopia (8). Participating in a sexual and reproductive health club allows individuals to discuss their ideas and feelings, concerns, difficulties, and problems with an expert, which helps them have a better understanding of their experiences and find an existing choice. Given that, providing routine and effective sexual and reproductive health counseling for youth age groups at any contact with health facilities is essential to improve the level of knowledge of reproductive rights.

In addition, the study found that the use of reproductive health care services is substantially associated with knowledge about reproductive rights. Students who used reproductive health services were six times more likely to understand reproductive rights than their counterparts. A cross-sectional study conducted in southern Ethiopia provided support for this finding. These could be attributed to a higher likelihood of receiving advice from healthcare providers during service utilization and a greater emphasis on understanding what they use (8). This means that the availability of reproductive health services and intervention-based sexual and reproductive health education at the university is essential for increasing students' knowledge of reproductive rights.

Furthermore, students who discussed sexual and reproductive health issues with others were more likely to understand reproductive rights than their peers. This could be due to enhanced knowledge gained through discussion and experience sharing. These findings have been supported by studies conducted in Aksum, northern Ethiopia (14), Wolayta Sodo, southern Ethiopia (8), and Adet, northwest Ethiopia (27). A providing strategy-based health education about sexual and reproductive health for all adolescent groups is important to enhance the level of reproductive rights.

The study's strength was that it used a large sample size and multistage stratified sampling method and that we included individuals from across the region of the country. This study has some limitations even though it adheres closely to scientific procedures. For example, because the study had been limited to one public university in Ethiopia, it could not represent all governmental and private universities in the country. In addition, because sexual and reproductive issues are sensitive, the findings of the study might influenced by the social desirability bias. Furthermore, it is difficult to determine the temporal correlations between variables because the study was cross-sectional.

Conclusions

According to this study, 47.2% of Oda Bultum University students were know of their reproductive rights. Male gender, urban residence, higher maternal education level, participation in SRH clubs, use of SRH services, and discussion of SRH concerns with others were independent predictors of reproductive rights awareness among university students. Public health facilities at all levels should work with existing higher education institutions to encourage students to participate in reproductive health concerns. In addition, healthcare service providers at all levels should prioritize delivering high-quality reproductive health services, as well as establishing special education and counseling programs on reproductive rights for all disciplinary students. Overall, the Ethiopian Ministry of Education and the Ministry of Health should coordinate to design strategy-based curricula that incorporate reproductive health and rights in high schools and institutions of higher learning, which is essential to enhance the knowledge level of reproductive rights.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by the ethical clearance was obtained from the Ethical Review Committee of Arsi University, Ethiopia (Ref. No: A/CHS/ RC/11/2021). All study procedures followed the Helsinki Declaration of human

research. Written informed consent was obtained from all participants after explaining the purpose and benefits of the study.

Author contributions

AMH: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. AAU: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Writing – original draft, Writing – review & editing. GA: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Validation, Writing – original draft, Writing – review & editing. TD: Conceptualization, Data curation, Methodology, Project administration, Resources, Software, Validation, Writing – original draft, Writing – review & editing. HAA: Formal Analysis, Investigation, Methodology, Resources, Software, Supervision, Writing – original draft, Writing – review & editing. MY: Conceptualization, Methodology, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. AE: Conceptualization, Data curation, Formal Analysis, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. AAS: Data curation, Project administration, Resources, Software, Supervision, Validation, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Risky sexual practices and associated factors among taxi drivers in the Finoteselam town, northwest Ethiopia, 2023: a community-based cross-sectional study

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Background: Risky sexual practices among taxi drivers pose a significant threat to public health, contributing to the spread of sexually transmitted infections (STIs) and HIV/AIDS. The nature of their profession often exposes taxi drivers to factors that increase their vulnerability to engaging in risky sexual practices. Although research on sexual health in general is readily available, studies specifically focused on this population are limited. Understanding the contributing factors behind risky sexual practices among taxi drivers is crucial to developing targeted interventions that address their unique needs and vulnerabilities.

Objectives: To assess the prevalence and associated factors of risky sexual practices among taxi drivers in Finoteselam town, northwest Ethiopia, 2023.

Methods: A cross-sectional study was conducted among 359 taxi drivers in the Finoteselam town. Data were collected using pre-tested questionnaires and analyzed using SPSS. Bivariate and multivariable analyses were performed to identify factors associated with risky sexual practices. In the bivariate analysis, a p-value ≤ 0.25 at 95% CI was used to consider the variables in the multivariate analysis. Finally, statistical significance was declared with a p-value of less than 0.05 with a 95% CI.

Results: The prevalence of risky sexual practices among taxi drivers was 32.9 (95% CI: 28.01, 38.7). Living alone (AOR = 3.47, 95% CI: 1.86, 6.48), taxi ownership (AOR = 2.08, 95% CI: 1.01, 4.25), neglecting the discussion of the SRH issue (AOR = 2.05, 95% CI: 1.08, 4.00), substance use (AOR = 1.56, 95% CI: 1.04, 2.09), attending night clubs (AOR = 6.04, 95% CI: 1.97, 18.55) and watching pornographic materials (AOR = 4.44, 95% CI: 2.14, 9.19) were significantly associated with risky sexual practices.

Conclusions and recommendation: This study revealed a high prevalence of risky sexual practices among taxi drivers in Finoteselam town. Therefore, a comprehensive approach involving different stakeholders is required for reducing risky sexual practices. Information dissemination, awareness creation (about risks of attending nightclubs, substance use, and watching pornography), and encouraging knowledge sharing about sexual health are some of the interventions required to reduce risky sexual practices among taxi drivers.

KEYWORDS

risky sexual practice, sexual behaviour, adverse sexual practice, taxi drivers, Ethiopia

Introduction

Risky sexual practices are any form of sexual activity that contributes to the spread of STIs and HIV/AIDS (1) and is commonly experienced in the taxi industry (2). Sexual practices such as premarital sex, multiple sexual partners, unprotected sex, and sex with prostitutes are commonly experienced risky practices by taxi drivers (3, 4). Risky sexual practices result in infections believed to be one of the main causes of preventable mortality in developing nations, including Ethiopia (5). Due to their work habits, taxi drivers did not get access to information and support about their sexual health, and therefore, participation in risky sexual practice was significantly higher, and the odds of risky sexual practice in nations without access to high-quality reproductive health care are higher (6–8).

Due to risky sexual conduct, 14,000 new HIV infections occur worldwide every day; more than 95% of these infections occur in sub-Saharan Africa (9–11). The proportion of sex before marriage (premarital sex) (12) and non-communication about reproductive health issues is significantly higher in developing nations, including Ethiopia (13). Neglecting sexual and reproductive health concerns results in serious reproductive and sexual health problems (11, 13–16).

In many developing countries, taxi drivers were recognised as vulnerable community members for risky sexual practices (17–20); furthermore, the odds of risky sexual practice among taxi drivers was significantly higher (21). As a result of risky sexual practices, the magnitude of STDs and HIV/AIDS among taxi drivers and their respective assistants increased (22). The habit of condom use among taxi drivers was significantly low (23). Studies conducted in Bangladesh showed that risky sexual practices such as unprotected sex, inconsistent condom use, premarital sex, multiple sexual partners among taxi drivers were significantly higher (24–26). According to the study, strong family connection was identified as a protective factor against risky sexual practices (27).

Substance use and alcohol consumption had far-reaching implications for risky sexual practices, which have been demonstrated through studies (25, 26, 28–30). The habit of discussing sexual and reproductive health issues with your family improved the taxi driver sexual practices and reproductive life (31–33), but pressure from peers increased the likelihood of engaging in risky sexual practices (31). As a result of this, the promotion of good communication habits about SRH issues promotes the sexual and reproductive health of people (33). The absence of parental control over individual sexual and reproductive practices promotes the practices of risky sexual acts (34), but a study conducted in Ghana found that family communication did not affect the individuals sexual practices (35). Absence of parental control over individual sexual and reproductive issues improves risky sexual practices (33).

The odds of risky sexual practices among those who had the habit of watching audio-visual pornographic audiovisual material were significantly higher (36). Studies conducted in the USA have shown that exposure to sexually explicit websites was significantly linked to risky sexual practices (37) and pornographic materials change their perceptions of themselves and their sexual practices (38). Another study showed that the habit of watching pornographic materials (39) and the frequent engagement in watching of pornographic materials (40) promote risky sexual practices among the individuals. Taxi drivers who had the habit of attending nightclubs and bars engaged in risky sexual practices under the influence of illegal substances and excessive alcohol consumption (41).

Although there is a strong effort to improve reproductive and sexual health, the incidence of STI and HIV/AIDS is a result of risky sexual practices (2, 26, 40). Although the scientific evidence is a baseline to develop interventional strategies and activities to reduce sexual health problems, there is limited evidence of risky sexual practice in the study area. Long working hours, irregular schedules, and contact with a wide range of passengers make taxi drivers more vulnerable to risky sexual practices, so the conduct of this scientific evidence is important for reducing risky sexual practices induced sexual and reproductive health problems among taxi drivers. The current study is significantly important for providing baseline information for health policy makers and reproductive health experts to prioritise the study population. The findings of the research provide a baseline for the development of awareness creation interventions for taxi drivers. Therefore, the current study aimed to assess the prevalence and associated factors of risky sexual practices among taxi drivers in Finoteselam town, northwest Ethiopia, in 2023.

Abbreviations

HIV/AIDS, human immune virus/acquired immune deficiency syndrome; Sd, standard deviation; STI, sexually transmitted infection; SRH, sexual and reproductive health; USA, United States of America; RSP, risky sexual practice.

Methods and materials

Study design, study period, and study setting

A community-based cross-sectional study was conducted in the Finoteselam town, northwest Ethiopia, from September 1 to October 30, 2023. The study area is located in the West Gojjam district of the Amhara region, and the finote selam town serves as the west Gojjam zonal administrative site. The finote Selam town is located 387 km from the Addis Ababa and 176 km from administrative town of the region called Bahir Dar town. The city administration has four urban and two rural Kebeles. According to the 2007 national census conducted by the Central Statistical Agency of Ethiopia (CSA), this town has a total population of 25,913 people, 13,035 of whom are men and 12,878 of whom are women. According to the report of the town transport administrative department, there are more than 1,000 automobile taxis with their respective drivers available in the town. Despite the presence of a large number of taxis, only 798 taxi drivers were serving the community by joining formal taxi associations.

Population

All taxi drivers in the town were a source populations, while those randomly selected taxi drivers from similar settings were study populations.

Eligibility criteria

All taxi drivers who agreed to participate were included in the study, while those who suffered of sever medical illness and were not member of taxi drivers association during the study period were excluded from the study.

Sample size determination

The required sample size was determined with the single population proportion formula using the *p*-value of risky sexual practices (30.6%) among transport workers (21). The sample size was determined using a 5% margin of error and a 5% level of significance (two-sided). The sample size was calculated as follows:

$$n = \frac{(Z\alpha/2)^2 p(1-p)}{d^2}$$

$$n = \frac{(1.96)^2 \times 0.306\,(1-0.306)}{(0.05)^2} = 326.19$$

The final sample size was 375.12~376 with a 15% non-response rate.

Sampling procedure

There are two taxi associations with a total membership of 798 taxi drivers in the town. Each taxi side number or code was obtained from the taxi association logbook after merging of the two taxi associations. By taking the taxi side number or assigned code number as the sampling frame, a simple random sampling method was used to draw 376 taxi drivers (see Figure 1).

Variables

The dependent variable of the study was risky sexual practices, whereas the independent variables were sociodemographic characteristics (age, marital status, educational level, living status, monthly income, residency, religion, experience driving and taxi ownership), lifestyle habits [substance use (alcohol, chat, and cigarettes), pornographic view, attending night clubs, having intimate friends who started sexual contact] and sexual behaviour (ever started sex, number of sexual partners, habit of condom use).

Operational and term definitions

Risky sexual practices

Taxi drivers who have one or more of the following sexual practices: premarital sex, multiple sexual partners, unprotected sexual practices, or inconsistent use during sexual acts (21, 42–44).

Substance use

Alcohol consumption, khat chawing, smoking, use of shisha and related substances that alter the individuals conscious judgment of the individual (45).

Premarital sex

A practice of performing sexual activity before marriage (46).

Inconsistent condom use

Interrupted, incorrect, and occasional use of a condom during episodes of sexual activity with at least one nonmarried and extra-sexual partner.

Multiple sexual partners

Taxi who had ever had an additional sexual partner at least once in their lifetime until the study period.

Unprotected sexual practice

Act of performing sexual contact with nonmarried or extra sexual partners without the use of a condom.

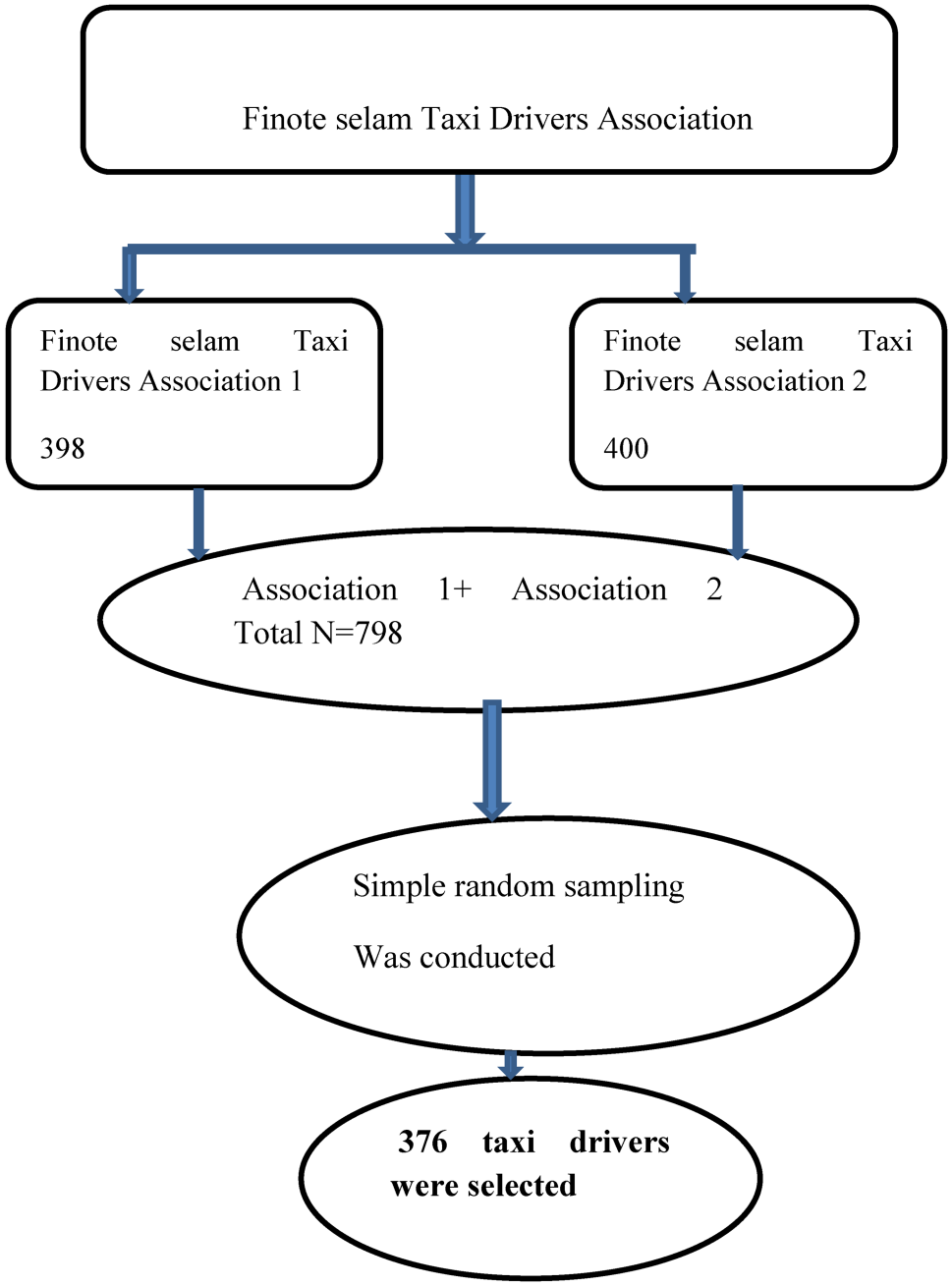

FIGURE 1
Schematic representation of the sampling procedure to select taxi drivers in the Finoteselam town, northwest Ethiopia, 2023.

Data collection tools and technique

Six data collectors collected data by using a pretested structured questionnaire and a checklist prepared in the local language. Two health officers supervised the data collection. The questionnaire was adapted from related previous studies in which their validity was tested (21, 43, 45). Data collectors approached the study participants on the time waiting for their respective round at taxi terminals (fermata). The data collectors approached the taxi drivers using randomly selected respective taxi side number or the town code number of the taxi at the taxi terminals (fermata) of the town. Questionnaires prepared in the local language were provided to each taxi drivers to complete them.

Data quality assurance

Two weeks before the actual study, a pretest was conducted among 5% (19 taxi drivers) of the total of taxi drivers in Burie town. After the pretest, the necessary amendments were made to

the questionnaires. Confusing and unclear questions were checked and edited accordingly prior to actual data collection. Regular check-ups for completeness and consistency of the data were performed daily. The English version of the questionnaire was translated to Amharic (a local language) and then retranslated back to English by two language experts. Three days of training was provided to data collectors and supervisors. After the data was collected, the data were entered into the epi info version. Furthermore, during data analysis, the data were cleaned and any missing values were carefully handled.

Data processing and analysis

Data were cleaned to ensure completeness, consistency, the absence of missing values, and appropriate variable coding. After the data was collected and entered in to Epi Info version 7, the collected data were exported to SPSS version 26 for analysis. The sociodemographic characteristics of the taxi drivers were analysed using a descriptive analysis of SPSS. A binary logistic regression was performed to identify factors associated with risky sexual practices. A p-value < 0.05 at 95% CI was used in the bivariate (bivariable) analysis to consider variables in the multivariate (multivariable) analysis and a p-value < 0.05 at 95% CI was used to declare final significance of the association. A model fit test was conducted using the Hosmer and Lemeshow test, and data presentation techniques such as percentages, frequency distribution tables and figures were used to present the findings.

Results

Sociodemographic characteristics

A total of 359 taxi drivers participated and a response rate of 95.48%. Most of the taxi drivers were male (356 (99.2%) males and 3 (0.8%) females). The mean age of the taxi drivers was 27.73 years (SD = ±5.7). The mean age of the taxi drivers was 27.73 years (SD = ±5.7) and 259 (72.1%) were taxi owners. Most of taxi drivers were living with their families (199, 55.4%) (see Table 1).

TABLE 1 Sociodemographic characteristics of taxi drivers in the Finoteselam town, northwest Ethiopia, 2023.

Variables	Categories	Frequency	Percentage (%)
Age	18–24 years	80	22.3%
	25–34 years	209	58.2%
	≥35 years	70	19.5%
Residence	Urban	312	86.9%
	Rural	47	13.1%
Religion	Orthodox	289	80.5%
	Muslims	56	15.6%
	Others[a]	14	3.9%
Marital status	Never married	176	49.1%
	Married	152	42.3%
	Others[b]	31	8.6%
Educational status	Completed 1^{ry} school	27	7.5%
	Completed 2^{ry} school	191	53.2%
	College and above	141	39.3%
Living arrangement	Live alone	160	44.6%
	Live with family	199	55.4%
Taxi ownership	Owner of taxi	259	72.1%
	Non owner of taxi	100	27.9%
Work experience	Less than 5 years	170	47.4%
	Greater or equal to 5 years	189	52.6%
Monthly income	<5,000 ETB	67	18.7%
	≥5,000 ETB	292	81.3%

[a]Protestant and without religion.
[b]Divorced and widowed.

Lifestyle habits and behavioural characteristics of taxi drivers

Most taxi drivers (190, 52.9%) used different types of substances, and the most commonly used substance was alcohol [102, 53.7%]. Even the majority of taxi drivers [273 (76%)] perceived the risk of STDs, 126 (35.1%) of them neglected the discussion of the issue of SRH. Among taxi drivers, 89 (24.8%) and 43 (12%) of them had the habit of watching pornography and attending nightclubs, respectively (see Table 2).

TABLE 2 Lifestyle habits and behavioural characteristics of taxi drivers in finoteselam town, northwest Ethiopia, 2023.

Variables	Categories of variables	Frequency	Percentage (%)
Substance use	Yes	190	52.9%
	No	169	47.1%
Type of substance use[b]	Alcohol	102	53.7%
	Khat	37	19.5%
	Cigarette	29	15.3%
	Others[a]	14	7.4%
	More than 2 types of substance	8	4.2%
Intimate friend who started sex	Yes	162	45.1%
	No	197	54.9%
SRH issue discussion	No	126	35.1%
	Yes	233	64.9%
Watching pornography	Yes	89	24.8%
	No	270	75.2%
Attending nightclub	Yes	43	12%
	No	316	88%
Perceived risk of STDs	No	86	24%
	Yes	273	76%
History of STI/ STDs	Yes	26	9.5%
	No	248	90.5%

SRH-, sexual and reproductive health.
[a]Shisha, cannabis and related illicit drugs.
[b]More than one choice possible, parents and their sexual partners.

Sexual practices of taxi drivers in finote selam town

The prevalence of risky sexual practices among taxi drivers was 32.9 (95% CI: 28.01, 38.7). Among taxi drivers, 105 (38.3%) of them had premarital sex, and 107 (39.1%) had unprotected sexual practices (see Table 3 and Figure 2).

Factors associated with risky sexual practices

In the bivariate analysis, characteristics such as age, residence, education status, current living arrangement, status of taxi ownership status, having intimate friends who started sexual contact, previous history of STI, perceived risk of STI and HIV/AIDS, discussion of sexual and reproductive health (SRH) issues with family, habit of substance use, attending night clubs and watching sex-eliciting audio-visual materials were variables associated with risky sexual practices of taxi drivers at $p \leq 0.25$ at 95% confidence levels.

In the multivariate analysis, current living arrangement, taxi ownership, substance use, discussion of the SRH issue, attending nightclubs and watching pornography were significantly associated with risky sexual practices at p values < 0.05 with a 95% confidence level. Accordingly, the likelihood of risky sexual practices among taxi drivers who lived alone was three times greater than among those living with family (AOR = 3.47, 95% CI 1.86, 6.48). Taxi drivers who drove their own taxi had twice the risk of experiencing risky sexual practices (AOR = 2.08, 95% CI: 1.01, 4.25). The odds of risky sexual practices among taxi drivers who neglected to discuss the SRH issue were twofold greater than those who discussed the SRH issues (AOR = 2.05, 95% CI 1.08, 4.00). The odds of risky sexual practices among substance users taxi drivers were 1.5 times greater than among nonusers (AOR = 1.56, 95% CI: 1.04, 2.09). Taxi drivers attending nightclubs were six times (AOR = 6.04, 95% CI 1.97, 18.55) and watching pornography were four times (AOR = 4.44, 95% CI: 2.14, 9.19) more likely to engage in risky sexual practices respectively (see Table 4).

TABLE 3 Sexual practices and characteristics of taxi drivers in the finoteselam town, northwest Ethiopia, 2023.

Variables	Categories	Frequency	Percentage (%)
Ever had sexual contact	Yes	274	76.3%
	No	85	23.7%
Multiple sexual partners	Yes	92	33.6%
	No	182	66.4%
Number of sexual partners	2 partners	44	47.8%
	3 partners	41	44.6%
	>3 partners	7	7.6%
Premarital sex	Yes	105	38.3%
	No	169	61.7%
Use of condom during sex	No	107	39.1%
	Yes	167	60.9%
condom use status	Inconsistently	48	28.7%
	Consistently	119	71.3%
Sexual practice	Risky	118	32.9%
	Non risky	241	67.1%

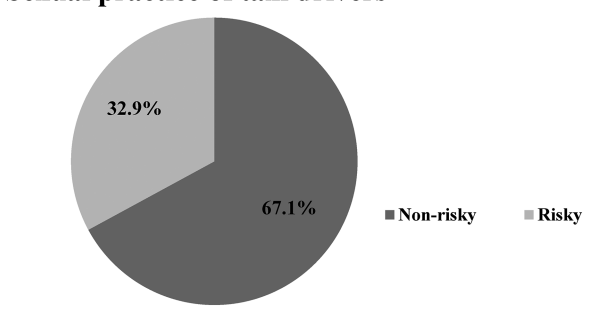

FIGURE 2
Sexual practice of taxi drivers in the Finoteselam town, northwest Ethiopia, 2023.

Discussion

This study determined the higher prevalence of risky sexual practices among taxi drivers in northwest Ethiopia. The finding is consistent with studies in Ethiopia (27, 30), Thailand (25) and Bangladesh (47). The findings demonstrated that taxi drivers were extremely vulnerable to risky sexual practices (18). The study showed a high proportion of premarital sex among taxi drivers. This figure is comparable with findings from studies conducted in Ethiopia (30), Nepal (22), Bangladesh (47), and Thailand (25). The habit of multiple sexual partners in the study area was higher. This finding is consistent with studies in Nepal (22), South Africa (23), and low- and middle-income countries (25). The study found that a higher proportion of taxi drivers who did not intend to use during their contact with extra partners. The finding is comparable to studies conducted in Nepal (22), South Africa (23) and Ethiopia (27, 30).

This study revealed that living alone was associated with a three-fold probability of engaging in risky sexual practices than living with families (parents and spouse). This finding is consistent with studies in Bangladesh (47) and Thailand (25). This could be due to the fact that living alone provides taxi drivers with more opportunities to entertain themselves in nightclubs and unbridled freedom to have several sexual partners (27). Compared to taxi drivers who operate taxi under the supervision of another person who owns the vehicle, those who operate their own taxis are significantly more likely to engage in risky sexual practices, as demonstrated in the study. This could be due to the opportunity to experiment and participate in activities that are catalysts for risky sexual practices being greater for taxi drivers who own their own vehicles.

This study also showed that there was a greater than twofold greater opportunity for risky sexual practices among taxi drivers

TABLE 4 Logistic regression of factors associated with risky sexual practices among taxi drivers in the Finoteselam town, northwest Ethiopia, 2023.

Variables		Frequency (%)		COR (95% CI)	AOR (95% CI)	*p*-value
		Risky	Non-risky			
Age	18–24 years	10 (12.5%)	70 (87.5%)	0.96 (0.37, 2.54)	1.94 (0.609,6.21)	0.26
	25–34 years	99 (47.4%)	110 (52.6%)	6.1 (2.88, 12.92)	6.4 (0.81, 9.51)	0.07
	≥35 years	9 (12.9%)	61 (87.1%)	1	1	
Residence	Urban	107 (34.3%)	205 (65.7%)	1.7 (0.84,2.49)	1.5 (0.576,4.22)	
	Rural	11 (23.4%)	36 (76.6%)	1	1	0.3
Educational status	1^{ry} school	12 (44.4%)	15 (55.6%)	2.02 (0.87, 4.69)	3.11 (0.88, 11.0)	0.07
	2ry school	66 (34.6%)	125 (65.4%)	1.33 (0.83, 2.14)	1.58 (0.80, 3.12)	0.1
	College	40 (28.4%)	101 (71.6%)	1	1	
Living status	Alone	84 (52.5%)	76 (47.5%)	5.36 (3.31,8.688)	3.47 (1.86, 6.48)	**0.000****
	With family[a]	34 (17.1%)	165 (82.9%)	1	1	
Ownership	Owner of taxi	91 (35.1%)	168 (64.9%)	1.46 (0.88, 2.44)	2.08 (1.01, 4.25)	
	Non owner	27 (27%)	73 (73%)	1	1	**0.045***
peers who started sex	Yes	46 (28.4%)	116 (71.6%)	0.68 (0.44,1.07)	0.64 (0.33,1.245)	
	No	72 (36.5%)	125 (63.5%)	1	1	0.19
Ever had STDs	Yes	15 (57.7%)	11 (42.3%)	1.9 (0.84, 4.35)	0.85 (0.28, 2.59)	
	No	103 (41.5%)	145 (58.5%)	1	1	0.7
Perceived risk STDs	No	33 (38.4%)	53 (61.6%)	1.37 (0.83, 2.28)	0.92 (0.44, 1.92)	
	Yes	85 (31.1%)	188 (68.9%)	1	1	0.8
SRH discussion	No	60 (47.6%)	66 (52.4%)	2.74 (1.73, 4.33)	2.08 (1.08, 4.00)	
	Yes	58 (24.9%)	175 (75.1%)	1	1	**0.028***
substance use	Yes	73 (38.4%)	117 (61.6%)	1.71 (1.09, 2.69)	1.56 (1.04, 2.09)	**0.047***
	No	45 (26.6%)	124 (73.4%)	1	1	
Attending night clubs	Yes	34 (79.1%)	9 (20.9%)	10.4 (4.8, 22.67)	6.04 (1.97, 18.55)	
	No	84 (26.6%)	232 (73.4%)	1	1	**0.002***
Watching pornography	Yes	58 (65.2%)	31 (34.8%)	6.55(3.8, 11.03)	4.44(2.14, 9.19)	
	No	60(22.2%)	210(77.8%)	1	1	**0.000****

[a]parents and their sexual partners, SRH- sexual and reproductive health.
*$P < 0.05$.
**$P < 0.001$.

who did not discuss SRH with their families. This finding is comparable to studies conducted in the USA (48) and Ethiopia (49). However, a study in Ghana demonstrated that family communication does not affect an individual's sexual activity (35). This could be due to lack of perceptions and awareness of the detrimental health consequence of risky sexual practices and a misunderstanding of the importance of condom use.

The current study revealed that substance use, smoking, and illicit drug use were shown to be strong risk factors for risky sexual practices. Therefore, taxi drivers who had a habit of using substances were more likely to engage in risky sexual practices than those who did not. This finding is comparable to studies conducted in Bangladesh (47), Thailand (25), Poland (28), South Africa (29), and Ethiopia (30). This may be due to the fact that substance use can adversely affect adolescents' mental decision-making ability and conscious judgement (50). This could also be due to the fact that substance use creates a favourable opportunity (multiple sexual partners, attending night clubs, and watching pornography) to improve risky sexual practices of the individuals (51). Furthermore, the study demonstrated a significant correlation between nightclub attendance and risky sexual practices among taxi drivers in the study area. Taxi drivers who had experience attending nightclubs were six times more likely to engage in risky sexual practices than their counter participants. The figure is comparable to the study in USA (41). This may be due to the fact that taxi drivers attending nightclubs are more likely to have sexual relationships with commercial sexual workers, and substance use in the club may result in unlucky condom use and unwanted sexual relationships (25, 28, 29).

Similarly, the study showed that the odds of risky sexual practices among taxi drivers who had a habit of watching pornographic materials were four times higher than those who did not watch. This figure is comparable to studies in the US (38), New Works (39), and Ethiopia (40). This could be due to watching pornography drive taxi drivers for premarital sex, increased sexual desire, and motivation, which leads them to risky sexual practices (38).

Limitations of the study

Recruitment of taxi drivers from those who were formally joined legal taxi association may miss those taxi drivers who did not join the taxi association formally as a result the study findings may not be representative of the entire population of taxi drivers and underestimation of the proportion of risky sexual practices. The use of a small number of female taxi drivers or taxi drivers in the study may compromise the general representativeness of the study findings for the various female taxi drivers.

Relying solely on self-reported data may compromise the actual study finding because taxi drivers might underreport their risky sexual practices. Reporting sexual activity is a sensitive issue and is considered taboo in the study community, so our results might not accurately reflect the exact sexual practices of general populations. The study findings may not be directly applicable to diverse populations of taxi drivers because sexual practices vary significantly between cultures and over time. Furthermore, the study findings do not provide information about taxi drivers' knowledge and awareness level about risky sexual factors and determinants factors.

Conclusions and recommendations

This study highlights a concerning prevalence of risky sexual practices among taxi drivers in Finoteselam town, Northwest Ethiopia. Factors such as living alone, taxi ownership, neglect of sexual and reproductive health (SRH) discussions, substance use, exposure to pornography, and attending nightclubs were significantly associated variables with risky sexual practices.

Addressing this issue requires a multipronged approach. The Ministry of Health should implement national policies promoting sexual health and STD prevention, focusing on taxi drivers. Local health departments should provide accessible services such as STI/STD screening, counseling, and condom distribution, especially in areas frequented by taxi drivers. They should also encourage open SRH discussions and raise awareness about the harmful consequences of risky sexual practices. Transportation authorities should incorporate sexual health education into driver training and licensing requirements, while promoting safer sexual practices within the industry.

Taxi driver associations should advocate for their members' sexual health needs and act as intermediaries between drivers and health authorities. Media and communication channels should provide information and connect drivers with sexual health messages. Finally, researchers should conduct more studies, including longitudinal and qualitative research, to understand the social and environmental factors that contribute to risky sexual practices, focusing on larger sample sizes and including more female taxi drivers.

By working together, stakeholders can effectively address the issue of risky sexual practices among taxi drivers and promote safer sexual practices within this community.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by institutional review board Debre Markos University college of medicine and health science. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

ML: Formal Analysis, Investigation, Methodology, Resources, Supervision, Validation, Writing – original draft, Writing – review & editing. YF: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Software, Visualization, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that they have no potential conflicts of interest with respect to this research, authorship, funding, or publication.

Publisher's note

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Prevalence and associated factors of non-consensual sexual acts among adolescents in the Democratic Republic of Congo

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Introduction: During adolescence, due to lack of experience, individuals may engage in or tolerate certain non-consensual acts under coercion. There are significant associations between forced sexual intercourse and a range of negative effects on reproductive health, as well as psychological and emotional health. Studies on non-consensual sexual acts among adolescents are rare in the Democratic Republic of Congo (DRC). This study is one of the first to focus on urban adolescents, aiming to assess the prevalence of non-consensual sexual acts and to identify associated factors.

Methods: Data for this study were obtained from the baseline survey of the project "Reducing the Vulnerability of Adolescents and Young Girls to Violence and HIV/AIDS Infection," conducted in 2018 in the provinces of Kinshasa and Kasaï Oriental among adolescents aged 10-24 years. A total of 2,123 adolescents were surveyed (46.8% in Kinshasa and 53.2% in Kasaï Oriental). A structured survey questionnaire was developed in French to collect data. This questionnaire was pre-tested and corrected before use. Non-consensual sexual acts were assessed using three variables: (i) Have you ever experienced non-consensual touching, (ii) Have you ever experienced an attempted forced sexual intercourse, and (iii) Have you ever been physically forced, injured, or threatened to have sexual intercourse. Bivariate and multivariate analyses were conducted on these three variables separately.

Results: Among all adolescents surveyed, 11.5% reported having experienced non-consensual touching, 15.3% reported having experienced an attempted forced sexual intercourse, and 5.8% reported having been physically forced, injured, or threatened to have sexual intercourse. Among the 575 sexually active adolescents, these proportions were 43.4%, 57.4% and 22.0%, respectively. Prevalences were higher among girls and in the province of Kinshasa. Factors associated with non-consensual sexual acts included gender, cohabitation with biological parents (father and mother), age at first sexual intercourse, communication about sexuality or intimate subjects with a family member, and adolescents' perceptions of the role and place of partners in intimate relationships. A quarter (25.5%) of adolescents who were victims of forced sexual intercourse and were aware of an appropriate institution or person sought help from a professional for the violence they experienced.

Discussion: The results revealed a high prevalence of non-consensual sexual acts, the significance attributed by adolescents to traditional beliefs regarding the dominant role of men in intimate relationships, and the existence of barriers preventing victims of sexual violence from seeking appropriate care. These findings advocate for providing healthcare services tailored to the needs of adolescents and adapted to sociocultural contexts.

KEYWORDS

sexuality, non-consensual sexual, forced sexual, adolescents, Democratic Republic of Congo

Introduction

Non-consensual sexual acts refer to sexual acts experienced under coercion, classified under the category of sexual violence. According to Bagwell-Gray et al. (1), sexual violence can be categorized into four groups: (1) acts of sexual coercion, (2) sexual assaults, (3) abusive sexual behaviors, and (4) forced sexual activities. During adolescence, due to lack of experience, individuals may engage in or tolerate certain non-consensual acts under coercion.

Previous research mostly studied sexual coercion using victimization perspective. The focus is on prevalence, associated factors, and impacts on the individual, family, and society. Verissimo et al. (2) found a prevalence of sexual victimization of 36.4% among adolescents aged 12–19 in a public school in Recife, Brazil. A meta-analysis of 16 reviews reported a prevalence of sexual violence ranging from 0.1% to 64.6% in adolescent and youth romantic relationships (3). Another meta-analysis highlighted that one in seven adolescent girls, aged 13–18, experienced at least one form of sexual violence perpetrated by an intimate partner (4). The authors found an overall prevalence of sexual violence of 9%. Girls reported lower perpetration rates than boys (3% vs. 10%) and higher victimization rates (14% vs. 8%). Some studies have demonstrated the complexity of assessing the extent of sexual violence as many young people struggle to recognize themselves as victims (5).

In sub-Saharan Africa, studies on non-consensual sexual relations in adolescence have reported different prevalence rates. In Rwanda, a survey conducted among sexually active students in upper secondary education revealed that 15.5% reported having experienced forced sexual intercourse (6). In a university community in Benin City, Nigeria, Gharoro et al. (7) found a prevalence of 18.4% of non-consensual sexual intercourse. A study among sexually experienced youth aged 10–24 in Nyeri, Kenya, recorded rates of coerced sexual relations of 21% for women and 11% for men (8).

A considerable proportion of adolescents are at risk of experiencing non-consensual sexual acts within the context of their first romantic relationships (9, 10). In Rakai, Uganda, 14% of sexually active young women aged 15–19 reported experiencing their first sexual intercourse under coercion (11). Using nationally representative surveys conducted in Malawi among girls aged 12–19 in 2004, Moore et al. (12) found that 38% of girls reported being "not at all willing" during their first sexual experience, while 30% of girls in Ghana, 23% in Uganda, and 15% in Burkina Faso were in similar situations. In Ghana, 25% of women aged 12–24 reported that their first sexual intercourse was forced (13). Coercion experienced at sexual initiation is a major determinant of subsequent sexual behaviors.

In Côte d'Ivoire and Burkina Faso, national surveys have been conducted on violence against children and youth, focusing on the prevalence and types of sexual violence experienced. In Côte d'Ivoire, survey results showed that 19.2% of women aged 18–24 and 11.4% of men experienced sexual violence before the age of 18 (14). Prevalences in Burkina Faso are lower than in Côte d'Ivoire. It was found that 3.1% of children aged 12–17 experienced sexual violence in the past 12 months (5.7% for girls compared to 0.8% for boys) (15). Across the results of both surveys, it appears that girls are more exposed than boys to experiencing various forms of non-consensual sexual acts.

Research has reported significant associations between forced sexual intercourse and a range of negative effects on reproductive health, as well as psychological and emotional health (12, 14, 15). Risks to reproductive health related to sexual coercion include sexually transmitted infections, unwanted pregnancies, and the onset of risky behaviors (other non-consensual sexual experiences, multiple partnerships, and unprotected sexual intercourse).

Some studies have examined factors associated with non-consensual sexual relations among adolescents. Thus, it is found that married or previously married women and those not living with a parent or spouse were at significantly higher risk of sexual coercion (8). In a study in Rwanda, sexual victimization was associated with being female and having (had) a concurrent sexual relationship (6).

In the Democratic Republic of Congo (DRC), sexual violence is cited among the 14 reproductive health problems of adolescents within the framework of the 2008 National Adolescent Health Policy (PNSA). This policy considers sexual violence as one of the causes of mental disorders and aims to combat it by implementing the provisions of articles 167 and 168 of Law 06/018 of July 20, 2006, on sexual violence and providing care for adolescent victims. According to a recent study on sexual and reproductive health services in the DRC (16), a very few health centers (22%) offer services for combating sexual and gender-based violence. Additionally, the PNSA does not incorporate prevention against sexual violence into its objectives.

Studies on non-consensual sexual acts among adolescents are scarce in the DRC. In a report jointly produced by UNFPA and PRB in 2012, a prevalence of sexual violence of 36% for those aged 15%–19% and 31% for those aged 20–24 was noted (12). Thus, there is very little evidence of non-consensual sexual acts experienced by adolescents, both in the general population and across different residential settings. This study is one of the first to focus on non-consensual sexual acts among sexually active adolescents of both sexes residing in urban areas of the DRC. It aims to assess the prevalence of non-consensual sexual acts and to identify factors associated with this phenomenon.

Materials and methods

Site and type of study

The Democratic Republic of Congo (DRC) covers an area of 2,345,000 square kilometers and consists of 26 provinces, with a population estimated by the United Nations at 96 million inhabitants in 2018. Adolescents (aged 10–24 years) represented nearly one-third of the population (17).

In 2018, a cross-sectional survey was conducted among adolescents in the provinces of Kinshasa and Kasaï Oriental as part of the project "Reducing the vulnerability of adolescents and young girls to violence and HIV/AIDS infection," implemented by CORDAID with financial support from the Global Fund. The survey aimed to establish the baseline situation of the project, which seeks to improve adolescents' and young women's access to appropriate health services, enhance their knowledge of sexual and reproductive health as well as human rights, and reduce gender-based violence (GBV) in school and professional environments. The project covered 3 urban health zones in each province. These were Kalamu 1, Makala, and Kitambo in the city of Kinshasa (Kinshasa Province) and Diulu, Kansele, and Nzaba in the city of Mbuji-Mayi (Kasaï Oriental Province). The DRC's healthcare system is structured on 3 levels: the central or national level, the intermediate or provincial level, and the peripheral or operational level. The last level is the Health Zone (ZS), which comprises a General Reference Hospital and health areas (AS). Each health area has a health center (CS).

Data collection tools

A structured survey questionnaire was developed in French to collect data from adolescents. It covered nine thematic modules: (i) characteristics of adolescents, (ii) community environment, (iii) activities and sexual relationships, (iv) HIV/AIDS and other STIs, (v) forced sexual intercourse, (vi) reproduction, (vii) access to health services, (viii) gender-based violence in school, and (ix) access to information on sexual health and gender-based violence. The module addressing forced sexual intercourse was reserved for adolescents who had experienced their first sexual intercourse. In this module, adolescents were initially asked about their perceptions of the roles and powers of partners of each sex in intimate relationships. Subsequently, questions related to experiences of unwanted touching, attempted forced sexual intercourse, sexual intercourse following threat, violence, or injury were addressed. Victims of forced sex were asked about their use of care services and post-exposure prophylaxis for HIV.

The survey questionnaire was translated into Lingala and Tshiluba, which are the main languages spoken, respectively, in the provinces of Kinshasa and Kasaï Oriental. The French and local language versions were used for field agent training, but only the French version was used for data collection after a pre-test in each province.

Participants and sampling strategy

The survey covered the 6 urban health zones (3 per province) selected for project implementation. Data were collected from adolescents residing in households within the health areas comprising these health zones. The project targeted individuals aged 10–24 years, who are considered adolescents according to the PNSA document (2008). In the adolescent health policy, adolescence is defined as a period from 10 to 24 years, encompassing early adolescence (10–14 years), adolescence (15–19 years), and late adolescence (20–24 years).

The sample size was determined using the formula below, developed by FANTA (Food and Nutrition Technical Assistance III Project), which is suitable for baseline surveys of projects targeting households. The sheet "Comparative for Proportions" of the Excel file "Population-Based Survey Sampling Calculator" was used to calculate household size (18). The project, whose data were used for this study, aims to reduce the prevalence of risky sexual behaviour in the adolescent population. The formula allowed for the calculation of the minimum number of households to be visited to survey adolescents, considering the average number of adolescents expected per household. The procedure proposed by FANTA makes it easier to determine the size of the sample to be surveyed at the end of the project as part of the final evaluation, with regard to the level of the indicator to be achieved by the project.

$$n = \left(D* \left[\frac{Z_{1-\alpha}\sqrt{2\bar{P}(1-\bar{P})} + Z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)}}{\delta} \right]^2 \right) *\mathrm{adj}_1 *\mathrm{adj}_2$$

$$\bar{P} = \frac{P_1 + P_2}{2}$$

Where

- n: Minimum sample size.
- D: Effect of the survey sampling design.
- P_1: Level of the indicator (proportion) at the baseline survey.
- P_2: Expected level of the indicator at the end of the project.
- $Z_{1-\alpha}$: Confidence level desired to conclude that an observed change in size (P2—P1) did not occur by chance.

- $Z_{1-\beta}$: Confidence level desired to reliably detect a change in size (P2—P1) if such a change did occur.
- δ : Minimum size of change to be achieved by the end of the project.
- adj_1 : Adjustment factor for the sample size to account for the level of measurement of the indicator (household or individual). If the indicator is measured at the individual level, the adjustment considers the proportion of the target population and the household size.
- adj_2 : Adjustment factor for the sample size to account for non-responses.

The final sample size of households calculated, based on available data and basic parameters, was 747 households, rounded to 750. It was expected to survey a minimum of 1,500 adolescents in these households. Finally, 2,123 adolescents were surveyed, with 46.8% in the province of Kinshasa and 53.2% in Kasaï Oriental. An excess of the expected target quantities was recorded through a conversion of the planned days for household enumeration into survey time. Initially, the survey plan aimed to allocate 2 days per province for household enumeration to establish a sampling frame. However, once in the field, data on streets and the number of plots per street were used to draw the household sample, bypassing a household enumeration phase.

The sampling of households and adolescents was done randomly. In each province, the number of households to be sampled per health zone was proportional to the demographic weight across the three zones. In each health zone, 3–4 health areas were selected. Within each selected health area, 3–4 streets were randomly chosen, and within the selected street, at least 10 plots, and one household per plot were randomly selected for survey. In the selected household, the head of the household or their representative, as well as all adolescents in the household, were surveyed.

Data collection, entry, processing, and analysis

The survey process was supervised by a steering committee and a technical committee, chaired by the National Program of AIDS Control.

A team of supervisors, controllers, and investigators (men and women) was recruited and trained in each province for data collection using two paper questionnaires, one addressed to household heads to identify eligible individuals and the second targeting adolescents present in households. Data collection took place in August 2018.

Data entry was conducted in Kinshasa in September 2018 by a team of recruited and trained agents. The data entry template was designed using EPIDATA. The data were exported to SPSS and cleaned using the same software to address inconsistencies not detected during data entry and filters not adhered to in the field. It was also during this phase that responses to open-ended questions (especially for the "Other" categories) were coded. The coding was done after grouping the responses treating the same idea, followed by the determination of a word or group of words best summarizing the idea. This word or group of words was coded and added to the variable's modalities.

Cross-tabulation was used to describe the sociodemographic characteristics of adolescents, assess the prevalence of non-consensual sexual experiences, and describe the use of appropriate services for the care of victims of sexual violence. Non-consensual sexual acts were evaluated using three binary (Yes/No) variables: (i) Ever experienced unwanted touching, (ii) Ever experienced attempted forced sexual intercourse, and (iii) Ever been physically forced, injured, or threatened to have sexual intercourse. Binomial logistic regression was used to model associations between non-consensual sexual acts and sociodemographic characteristics (gender, age group, marital status, education level, cohabitation with biological parents, participation in religious services, internet access, membership in a social group), communication about sexuality or intimate subjects (communication with a family member, communication with a non-family member), and adolescents' perceptions (five statements about trust in their community and power relations in intimate relationships). Due to the small number of sexually active adolescents (575, including 373 in Kinshasa, 64.9%, and 202 in Kasai Oriental, 35.1%), it was not possible to conduct regression models by sex and province.

Ethical considerations

The survey addressed topics related to adolescents' intimate lives, safety, and social norms. Additionally, it targeted adolescents, who are still immature in certain aspects of life. Given these considerations, measures were taken to avoid risks, protect individuals' rights, and ensure the safety of all study participants. It was through the planning of these measures that the National Ethics Committee for Health (CNES) of the Ministry of Public Health of the Democratic Republic of the Congo gave a favorable opinion to the conduct of the survey (CNES Opinion No. 78/CNES/BN/PMMF/2018 dated 02/08/2018).

Results

Sociodemographic characteristics, communication about sexuality or intimate subjects, and adolescents' perceptions

The survey covered adolescents aged 10–24 years, with an average age of 16.3 years. The median age of sexual debut for these adolescents is 15 years (14.7 years for boys and 15.1 years for girls).

More than half (56.2%) of the respondents who had initiated sexual activity were aged 20–24 years, and this was consistent across gender and province (See Table 1). The majority were single (87.5%). Overall, less than a tenth (8.6%) of the

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TABLE 1 Variables related to sociodemographic characteristics, communication about sexuality or intimate subjects, and perceptions of sexually active adolescents in the provinces of Kinshasa and Kasai oriental (Democratic Republic of the Congo), 2018.

Variables related to sociodemographic characteristics, communication about sexuality or intimate subjects, and adolescents' perceptions	Overall		Sex				Province			
			Male		Female		Kinshasa		Kasai Oriental	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Total	575		231	40.2	344	59.8	373	64.9	202	35.1
Sociodemographic characteristics										
Age group										
10–19 years old	252	43.8	95	41.1	157	45.6	158	42.4	94	46.5
20–24 years old	323	56.2	136	58.9	187	54.4	215	57.6	108	53.5
Marital status										
Single	502	87.5	220	95.2	282	82.2	354	95.2	148	73.3
Married/Widowed/Divorced/Separated	72	12.5	11	4.8	61	17.8	18	4.8	54	26.7
Level of education										
No education	49	8.6	19	8.3	30	8.8	23	6.2	26	12.9
Primary	39	6.8	10	4.4	29	8.5	22	6.0	17	8.5
Secondary	372	65.3	153	66.5	219	64.4	240	65.0	132	65.7
Higher education	110	19.3	48	20.9	62	18.2	84	22.8	26	12.9
Cohabitation with biological parents (father and mother)										
Both parents	291	50.6	122	52.8	169	49.1	175	46.9	116	57.4
Father or Mother	107	18.6	42	18.2	65	18.9	86	23.1	21	10.4
None	177	30.8	67	29.0	110	32.0	112	30.0	65	32.2
Participation in religious services (worship/mass/prayer)										
More than once a week	385	67.0	133	57.6	252	73.3	242	64.9	143	70.8
Other	190	33.0	98	42.4	92	26.7	131	35.1	59	29.2
Access to the internet										
Often/Rarely	365	63.5	178	77.1	187	54.4	248	66.5	117	57.9
Never used the internet/Unfamiliar with the internet	210	36.5	53	22.9	157	45.6	125	33.5	85	42.1
Membership in a social group (association, club)										
Yes	179	31.2	90	39.0	89	26.0	118	31.6	61	30.4
No	395	68.8	141	61.0	254	74.1	255	68.4	140	69.7
Communication about sexuality or intimate subjects										
Communication about sexuality or intimate subjects with a family member										
Yes	298	52.8	111	48.9	187	55.5	178	48.8	120	60.3
No	266	47.2	116	51.1	150	44.5	187	51.2	79	39.7
Communication about sexuality or intimate subjects with someone outside the family										
Yes	427	77.4	189	85.1	238	72.1	277	78.0	150	76.1
No	125	22.6	33	14.9	92	27.9	78	22.0	47	23.9
Adolescents' perceptions										
I believe we can trust people in my community										
Agree	359	62.4	162	70.1	197	57.3	196	52.6	163	80.7
Disagree	216	37.6	69	29.9	147	42.7	177	47.5	39	19.3
I feel safe in my community										
Agree	420	73.2	185	80.1	235	68.5	258	69.4	162	80.2
Disagree	154	26.8	46	19.9	108	31.5	114	30.7	40	19.8
It's the man who decides when to have sexual relations										
Agree	404	72.4	172	77.5	232	69.1	230	63.9	174	87.9
Disagree	154	27.6	50	22.5	104	31.0	130	36.1	24	12.1
A man needs to have multiple sexual partners, even if he has a regular sexual partner										
Agree	310	58.7	125	59.2	185	58.4	181	53.4	129	68.3
Disagree	218	41.3	86	40.8	132	41.6	158	46.6	60	31.8
A woman should tolerate violence from her sexual partner or spouse to avoid losing him										
Agree	164	32.1	78	38.4	86	27.9	73	22.2	91	50.0
Disagree	347	67.9	125	61.6	222	72.1	256	77.8	91	50.0

respondents had no formal education. However, this proportional distribution was not observed in Kasai Oriental, where 12.9% of the respondents had no education. Thus, most sexually active respondents had attended school, with 84.6% having at least a secondary education level. Three out of ten respondents (30.8%) did not live with either biological parent. The majority (67.0%) participated in religious services (worship/mass/prayer) more than once a week. However, compared to other groups of adolescents, the proportion of boys participating in religious services more than once a week was the lowest (57.6%). Overall, 63.5% of respondents had access (often or rarely) to the internet; male adolescents were proportionally more likely to access the Internet, accounting for 77.1%. Slightly more than three out of ten respondents (31.2%) belonged to a social group (association, group, or club); boys were the most numerous proportionally (39%) to belong to such groups, while girls were the least numerous (26%). Slightly more than half (52.8%) of the respondents communicated about sexuality or intimate subjects with a family member, and the majority (77.4%) did so with a non-family member. Overall, 62.4% and 73.2% of respondents agreed, respectively, with the statements "I think we can trust people in my community" and "I feel safe in my community". The majority (72.4%) of respondents agreed with the statement "It is the man who decides when to have sexual relations", 58.7% with the statement "A man needs to have multiple sexual partners, even if he has a regular sexual partner", and 32.1% with the statement "A woman should tolerate violence from her sexual partner or spouse to avoid losing him".

Prevalence of non-consensual sexual acts

Table 2 presents the prevalence of experiences of non-consensual sexual acts among adolescents, for all surveyed adolescents and for those who are sexually active.

Considering all adolescents who participated in the survey, 11.5% reported having experienced unwanted touching, 15.3% reported having experienced attempted forced sexual intercourse, and 5.8% reported having been physically forced, injured, or threatened to have sexual intercourse. These prevalences were higher among girls compared to boys and higher in Kinshasa province than in Kasai Oriental.

Among sexually active adolescents, the levels of prevalence of non-consensual sexual acts were almost quadrupled. In this group, 43.4% reported having experienced unwanted touching, 57.4% reported having experienced attempted forced sexual intercourse, and 22.0% reported having been physically forced, injured, or threatened to have sexual intercourse. As in the overall group of adolescents, prevalences were higher among girls and in Kinshasa province. The only exception was observed for the proportion of adolescents who had been physically forced, injured, or threatened to have sexual intercourse, which was higher in Kasai Oriental (28.3%) than in Kinshasa province (18.5%).

Characteristics of adolescents involved in non-consensual sexual acts

Table 3 presents the intersection of indicators of non-consensual sexual acts with variables related to sociodemographic characteristics, communication about sexuality or intimate subjects, and adolescents' perceptions. Only associations significant at the 10% threshold are interpreted.

Considering unwanted touching, adolescents cohabitating with only one parent (father or mother) are proportionally more numerous (52.8%) to have experienced it. They are followed by adolescents who do not reside with any parent (46%) and those who live in the same household as both parents (38.3%). Adolescents who have communicated about sexuality or intimate subjects with someone outside the family are more likely to experience unwanted touching (45.1%) compared to those who have not communicated (36.4%). Regarding adolescents' perceptions about the role and place of partners in intimate relationships, those who agree with certain statements are more likely to experience unwanted touching than those who do not

TABLE 2 Prevalence of non-consensual sexual acts among adolescents in the provinces of Kinshasa and Kasai oriental (Democratic Republic of the Congo), 2018.

	Among all adolescents			Among adolescents already sexually active		
	Has experienced non-consensual touching	Has experienced an attempted forced sexual intercourse	Has experienced physical force, injury, or threats for sexual intercourse	Has experienced non-consensual sexual touching	Has experienced an attempted forced sexual intercourse	Has experienced physical force, injury, or threats for sexual intercourse
Sex						
Male	10.6	13.9	3.6	39.9	51.5	13.7
Female	12.2	16.3	7.3	45.8	61.5	27.5
Province						
Kinshasa	15.5	21.8	6.8	42.2	59.1	18.5
Kasai Oriental	8.1	9.7	5.0	45.7	54.5	28.3
Overall	11.5	15.3	5.8	43.4	57.4	22.0

TABLE 3 Experience of non-consensual sexual acts according to variables related to socio-demographic characteristics, communication about sexuality or intimate subjects, and perceptions of adolescents in the provinces of Kinshasa and Kasai oriental (Democratic Republic of the Congo), 2018.

Variables related to sociodemographic characteristics, communication about sexuality or intimate subjects, and adolescents' perceptions	Has experienced non-consensual touching			Has experienced an attempted forced sexual intercourse			Has experienced physical force, injury, or threats for sexual intercourse		
	Yes		Prob. Chi2	Yes		Prob. Chi2	Yes		Prob. Chi2
	n	%		*n*	%		*n*	%	
Total	245			324			123		
Province									
Kinshasa	154	42.2	0.418	215	59.1	0.294	67	18.5	0.008
Kasai Oriental	91	45.7		109	54.5		56	28.3	
Sociodemographic characteristics									
Sex									
Male	91	39.9	0.164	118	51.5	0.019	31	13.7	0.000
Fémale	154	45.8		206	61.5		92	27.5	
Age group									
10–19 years old	105	43.0	0.865	133	54.1	0.153	57	23.5	0.455
20–24 years old	140	43.8		191	60.1		66	20.8	
Marital status									
Single	212	43.2	0.671	282	57.3	0.946	104	21.3	0.300
Married, Widowed, Divorced, Separated	33	45.8		41	57.8		19	26.8	
Level of education									
No education	16	32.7	0.344	30	62.5	0.363	10	20.8	0.374
Primary	14	37.8		23	62.2		10	27.8	
Secondary	165	45.3		199	54.5		84	23.3	
Higher education	47	43.1		68	62.4		18	16.4	
Cohabitation with biological parents (father and mother)									
Both parents	108	38.3	0.026	155	54.6	0.338	56	19.8	0.389
Father or Mother	56	52.8		62	58.5		27	26.0	
None	81	46.0		107	61.5		40	23.1	
Participation in religious services (worship/mass/prayer)									
More than once a week	166	43.9	0.745	212	56.1	0.351	87	23.3	0.272
Other	79	42.5		112	60.2		36	19.3	
Access to the internet									
Often/Rarely	159	44.4	0.539	208	57.9	0.755	75	21.0	0.469
Never used the internet, Unfamiliar with the internet	86	41.8		116	56.6		48	23.7	
Membership in a social group (association, club)									
Yes	80	45.5	0.532	105	60.0	0.429	43	24.6	0.323
No	165	42.6		219	56.4		80	20.8	
Communication about sexuality or intimate subjects									
Communication about sexuality or intimate subjects with a family member									
Yes	123	42.1	0.548	178	60.8	0.091	63	21.7	0.994
No	117	44.7		140	53.6		56	21.6	
Communication about sexuality or intimate subjects with someone outside the family									
Yes	190	45.1	0.086	249	59.1	0.061	97	23.3	0.298
No	44	36.4		60	49.6		23	18.9	
Adolescents' perceptions									
I believe we can trust people in my community									
Agree	146	41.2	0.172	202	57.1	0.810	76	21.7	0.854
Disagree	99	47.1		122	58.1		47	22.4	
I feel safe in my community									
Agree	179	43.6	0.978	236	57.3	0.943	91	22.2	0.856
Disagree	66	43.4		87	57.6		32	21.5	

(*Continued*)

TABLE 3 Continued

Variables related to sociodemographic characteristics, communication about sexuality or intimate subjects, and adolescents' perceptions	Has experienced non-consensual touching			Has experienced an attempted forced sexual intercourse			Has experienced physical force, injury, or threats for sexual intercourse		
	Yes		Prob. Chi2	Yes		Prob. Chi2	Yes		Prob. Chi2
	n	%		*n*	%		*n*	%	
It's the man who decides when to have sexual relations									
Agree	170	42.3	0.311	233	58.1	0.448	87	21.8	0.719
Disagree	72	47.1		84	54.6		35	23.2	
A man needs to have multiple sexual partners, even if he has a regular sexual partner									
Agree	152	49.5	0.005	188	61.0	0.052	82	26.9	0.004
Disagree	81	37.2		114	52.5		35	16.2	
A woman should tolerate violence from her sexual partner or spouse to avoid losing him									
Agree	91	56.2	0.001	101	61.6	0.242	47	29.6	0.011
Disagree	138	39.9		193	56.1		67	19.4	

agree: "A man needs to have multiple sexual partners, even if he has a regular sexual partner" (49.5% vs. 37.2%) and "A woman should tolerate violence from her sexual partner or spouse in order not to lose him" (56.2% vs. 39.9%).

Regarding attempted forced sexual intercourse, girls are more likely (61.5%) to have experienced such an attempt than boys (51.5%). Adolescents who have communicated about sexuality or intimate subjects with someone outside the family are more likely to experience attempted forced sexual intercourse (60.8%) compared to those who have not communicated (53.6%). The same applies to communication about subjects with someone outside the family (59.1% vs. 49.6%). Adolescents who agree with a certain statement are more likely to experience attempted forced sexual intercourse than those who do not agree (61% vs. 52.5%): "A man needs to have multiple sexual partners, even if he has a regular sexual partner".

The results show that adolescents from Kasai Oriental are more likely (28.3%) to have been physically forced, injured, or threatened to have sexual intercourse than those from Kinshasa (18.5%). Girls are more likely (27.5%) to have been physically forced, injured, or threatened to have sexual intercourse than boys (13.7%). Regarding adolescents' perceptions, those who agree with certain statements are more likely to have been physically forced, injured, or threatened to have sexual intercourse than those who do not agree. These statements include "A man needs to have multiple sexual partners, even if he has a regular sexual partner" (26.9% vs. 16.2%) and "A woman should tolerate violence from her sexual partner or spouse in order not to lose him" (29.6% vs. 19.4%).

Factors associated with non-consensual sexual acts among adolescents

Table 4 presents the results of binomial logistic regression models predicting the probability of experiencing non-consensual sexual acts among sexually active adolescents. The independent variables are related to sociodemographic characteristics, communication about sexuality or intimate subjects, and adolescents' perceptions. Only factors associated with the 10% threshold are interpreted. Factors associated with unwanted touching include gender, cohabitation with biological parents (father and mother), age at first sexual intercourse, and the statements "A man needs to have multiple sexual partners, even if he has a regular sexual partner" and "A woman should tolerate violence from her sexual partner or spouse in order not to lose him." For attempted forced sexual intercourse, associated factors include gender, age at first sexual intercourse, and communication about sexuality or intimate subjects with a family member. Regarding forced sexual intercourse, associated factors include province, gender, cohabitation with biological parents (father and mother), and the statements "It is the man who decides when to have sexual relations," "A man needs to have multiple sexual partners, even if he has a regular sexual partner," and "A woman should tolerate violence from her sexual partner or spouse in order not to lose him."

Utilization of appropriate services for the care of victims of sexual violence

Among adolescents who have been physically forced, injured, or threatened to have sexual intercourse, 36.9% reported knowing an institution or person who can assist a victim of forced sexual intercourse (Table 5). Girls are proportionally more numerous (40.7%) in knowing the institution or person than boys (25.8%). The same applies to adolescents from Kinshasa (43.3%) compared to those from Kasai Oriental (29.1%). Of the 12 adolescents aware of a source of assistance for victims of forced sex, a quarter (25.5%) of adolescents who have been victims of forced sexual intercourse and are aware of an appropriate institution or person have sought help from a professional for the violence experienced. Among those who sought help, the majority (90.9%) received it from a professional.

When asked about the reasons for not seeking help from personnel in an appropriate service (Figure 1), the concerned

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TABLE 4 Logistic regression coefficients predicting the probability of experiencing non-consensual sexual acts among adolescents in the provinces of Kinshasa and Kasai oriental (Democratic Republic of the Congo), 2018.

Variables related to sociodemographic characteristics, communication about sexuality or intimate subjects, and adolescents' perceptions		Has experienced non-consensual touching		Has experienced an attempted forced sexual intercourse		Has experienced physical force, injury, or threats for sexual intercourse	
		Coefficient	Standard errors	Coefficient	Standard errors	Coefficient	Standard errors
Province	Kinshasa	0.000		0.000		0,000	
	Kasai Oriental	0.383	(0.247)	−0.109	(0.241)	0.683**	(0.291)
Sociodemographic characteristics							
Sex	Male	0.000		0.000		0.000	
	Female	0.605***	(0.225)	0.594***	(0.217)	1.115***	(0.282)
Age group	10–19 years old	0.000		0,000		0.000	
	20–24 years old	0.00863	(0.231)	0.243	(0.227)	−0.110	(0.269)
Marital status	Single	0.000		0.000		0.000	
	Married/Widowed/ Divorced/Separated	−0.385	(0.347)	−0.251	(0.344)	−0.200	(0.382)
Level of education	No education	0.000		0,000		0.000	
	Primary	0.151	(0.548)	−0.377	(0.526)	0.0188	(0.593)
	Secondary	0.561	(0.399)	−0.300	(0.384)	−0.00312	(0.446)
	Higher education	0.555	(0.450)	0.0296	(0.436)	−0.304	(0.529)
Cohabitation with biological parents (father and mother)	Both parents	0.000		0.000		0.000	
	Father or Mother	0.887***	(0.277)	0.345	(0.272)	0.539*	(0.324)
	None	0.654***	(0.248)	0.198	(0.242)	0.383	(0.292)
Participation in religious services (worship/mass/prayer)	More than once a week	0.000		0.000		0.000	
	Other	0.195	(0.215)	0.325	(0.211)	−0.109	(0.258)
Access to the internet	Often/Rarely	0.000		0.000		0.000	
	Never used the internet/Unfamiliar with the internet	−0.191	(0.41)	0.0859	(0.237)	0.00589	(0.280)
Membership in a social group (association, club)	Yes	0.000		0.000		0.000	
	No	−0.0462	(0.219)	−0.174	(0.217)	−0.345	(0.252)
Communication about sexuality or intimate subjects							
Age at the first intercourse		−0.116**	(0.0483)	−0.129***	(0.0476)	−0.0458	(0.0580)
Communication about sexuality or intimate subjects with a family member	Yes	0.000		0.000		0.000	
	No	−0.0740	(0.204)	−0.375*	(0.199)	0.0821	(0.243)
Communication about sexuality or intimate subjects with someone outside the family	Yes	0.000		0.000		0.000	
	No	−0.292	(0.258)	−0.240	(0.251)	−0.446	(0.308)
Adolescents' perceptions							
I believe we can trust people in my community	Agree	0.000		0.000		0.000	
	Disagree	0.379	(0.239)	−0.0569	(0.234)	0.0652	(0.286)
I feel safe in my community	Agree	0.000		0.000		0.000	
	Disagree	−0.0635	(0.254)	−0.155	(0.248)	0.0437	(0.304)
It's the man who decides when to have sexual relations	Agree	0.000		0.000		0.000	
	Disagree	0.367	(0.235)	−0.186	(0.230)	0.465*	(0.283)
A man needs to have multiple sexual partners, even if he has a regular sexual partner	Agree	0.000		0,000		0.000	
	Disagree	−0.428**	(0.214)	−0.224	(0.209)	−0.596**	(0.261)
A woman should tolerate violence from her sexual partner or spouse to avoid losing him	Agree	0.000		0.000		0.000	
	Disagree	−0.890***	(0.242)	−0.255	(0.238)	−0.577**	(0.283)
Constant		1.076	(0.892)	2.701***	(0.893)	−0.790	(1.068)
Observations		467		468		465	

*$p < 0.1$.
**$p < 0.05$.
***$p < 0.01$.

adolescents cited several reasons, with the main ones being no need for such a service (24.3%), shame for oneself, and one's family (21.6%), and fear of retaliation from the perpetrator of the violence (18.9%). One-tenth (10.8%) stated not knowing that experiencing sexual violence is a problem.

Discussion

The median age of sexual debut among adolescents aged 10–24 participating in the baseline survey of the "Reducing the vulnerability of adolescents and young girls to violence and HIV/AIDS infection" project is 15 years. This result reflects an earlier sexual initiation among a significant portion of these adolescents, with potentially negative implications for their future behavior (19, 20). However, the description of the characteristics of adolescents who have initiated sexual activity reveals that the majority are educated (at least to a secondary level), attend religious services, have access to the Internet, and are confident in their community. At least half have communicated about sexuality or intimate subjects. These are adolescents who are more likely to be informed about sexuality and its consequences and who, for the most part, reject violence against women in intimate relationships, even though many believe in the dominant role of men in an intimate relationship.

Overall, among adolescents aged 10–24 in the survey population, the prevalence of non-consensual sexual acts ranges from 5.8% to 15.3%, depending on the type of act. Forced sexual intercourse is the least prevalent, while attempted forced sexual intercourse remains the most prevalent. These prevalences are similar to those observed in a study conducted by the Ministry of Women, Family, and Children in Côte d'Ivoire (14), which explored the same types of non-consensual sexual acts in the general population aged 18–24. Among adolescents aged 10–24 in the provinces of Kinshasa and Kasai Oriental who have initiated sexual activity, the prevalence of non-consensual sexual acts is higher, ranging from 22.0% to 57.4%, corresponding, respectively, to the experience of forced sexual intercourse and attempted forced sexual intercourse. Considering the proportion of adolescents who reported having experienced forced sexual intercourse, this is higher than the proportions obtained in previous studies conducted in Africa. This corroborates with findings from Rwanda among upper secondary school students, which is 15.5% (6), from Benin City, Nigeria, among university students, which is 18.4% (7), and from Nyeri, Kenya, among young women (21%) and men (11%) (8).

The factors associated with non-consensual sexual acts are related to sociodemographic characteristics, communication about sexuality or intimate subjects, and adolescents' perceptions of the role and place of partners in intimate relationships. Regarding sociodemographic characteristics, these include gender, cohabitation with biological parents (father and mother), and age

TABLE 5 Knowledge of an assistance source for victim of forced sexual intercourse in the provinces of Kinshasa and Kasai oriental (Democratic Republic of the Congo), 2018.

	Knowledge of an institution/person who can provide assistance to a person victim of forced sexual intercourse			
	Yes		No	
	n	%	*n*	%
Sex				
Male	8	25,8	23	74.2
Female	37	40.7	54	59.3
Province				
Kinshasa	29	43.3	38	56.7
Kasai Oriental	16	29.1	39	70.9
Total	**45**	**36.9**	**77**	**63.1**

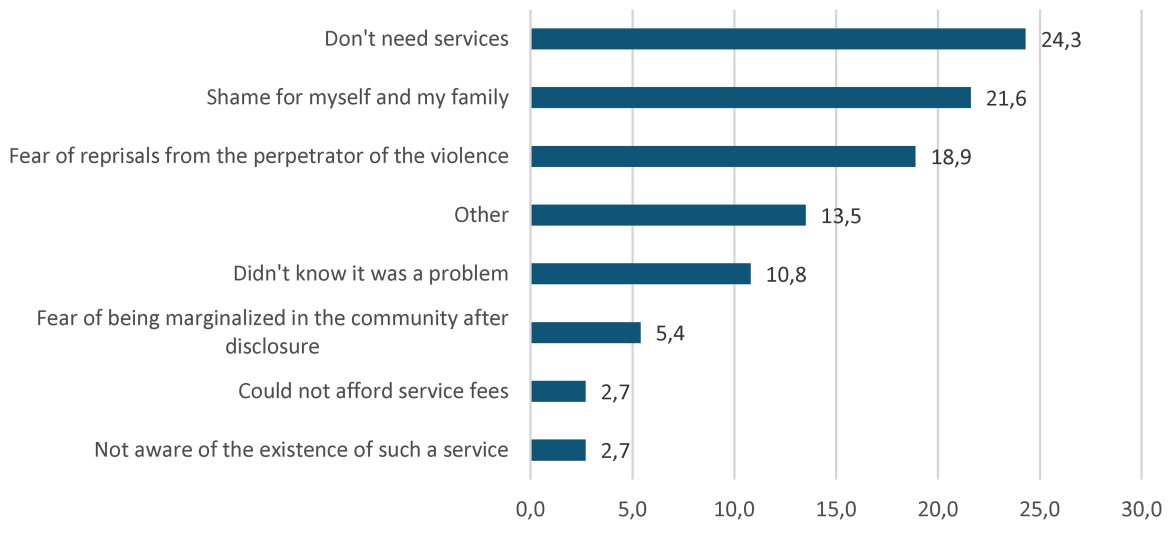

FIGURE 1
Reasons for not seeking assistance from personnel in a service.

at first sexual intercourse. Communication about sexuality or intimate subjects with a family member and all variables related to adolescents' perceptions of the role and place of partners in intimate relationships are associated with non-consensual sexual acts.

The tendency to attach great importance to traditional values leads to the acceptance of sexual coercion by adolescent victims (6). The results of this study indicate a low interest among victims in seeking professional help for the violence they have experienced. Only 25.5% of adolescents who were aware of an institution or individual who could assist actually sought it. As observed in studies conducted in Côte d'Ivoire and Burkina Faso, there is a trend towards not reporting perpetrators and/or not seeking appropriate care services (14, 15).

The results of the study confirm the existence of non-consensual sexual acts among adolescents in the DRC. Because of the immediate and future consequences of sexual violence, it is necessary to combat this phenomenon from adolescence onwards. Unfortunately, the DRC is not yet sufficiently committed to this approach. Admittedly, the phenomenon is well targeted in the National Adolescent Health Policy (PNSA) and in Law 06/018 of July 20, 2006, but it is poorly taken into account in the operational sphere of the health system. And yet, it is this first level that must do most of the work in preventing the phenomenon and caring for victims of sexual violence. There is also a void in the educational and social sectors. The few projects working in the field of sexual violence tend to target armed conflict zones, and ignore adolescents.

One of the strategies for dealing with non-consensual sexual acts among adolescents is to identify and work with the whole of the adolescent's living environment, both in and out of school. This includes the household, the school, the health center, the socio-educational center, the police, the justice system and the community. This means involving all the players in the adolescents' living environment, while offering services adapted to these contexts and to the adolescents' needs. The first step is to train the adults working in these environments, to raise awareness of the scale of the phenomenon and the means of preventing and combating it. We need to deconstruct the social and cultural logics behind non-consensual sexual acts, and build sexual and reproductive health education that respects each partner. Next, we need to raise awareness and train adolescents, and set up self-managed structures to give them a sense of responsibility in preventing and combating non-consensual sexual acts. Once all players, including adolescents, have been informed and trained, a regular system of prevention, denunciation and combating is put in place, followed by referral and care for victims. This is the strategy put in place by the pilot project to reduce the vulnerability of adolescent girls and young women in the DRC, and it is likely to be a long-term one because of its roots among adolescents and in the community.

Conclusion

The prevalence of non-consensual sexual acts among the general adolescent population (aged 10–24) or among those who have initiated sexual activity is higher in the cities of Kinshasa and Mbuji-Mayi in the DRC. This situation is observed among educated adolescents, who are likely to be better informed about sexuality and its consequences but may also be more attached to traditional beliefs about the dominant role of men in intimate relationships. Additionally, various barriers prevent victims of sexual violence from seeking appropriate care. The study results advocate for mobilizing community and family spheres in the fight against sexual violence and providing health services tailored to the needs of adolescents and adapted to socio-cultural contexts.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The survey received a favorable opinion from the National Health Ethics Committee of the Ministry of Public Health (CNES Opinion No. 78/CNES/BN/PMMF/2018 of 02/08/2018). In the implementation of the survey, the informed and voluntary consent of adolescents and young people was obtained prior to their participation. For respondents under the age of 18, additional consent was obtained from the parent or guardian.

Author contributions

MY: Writing – original draft, Writing – review & editing. FE: Writing – review & editing. BM: Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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The factors associated with teenage pregnancy among young women aged between 15 and 19 years in Rwanda: a retrospective cross-sectional study on the Rwanda Demographic Health Survey 2019–2020

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Background: Teenage pregnancy is a significant public health issue and is strongly associated with risky sexual behaviors such as early sexual initiation, unprotected sex, and multiple sexual partners. According to the 2014 World Health Organization report, 11% of all births worldwide were to teenagers aged 15–19 years, with more than 95% of these pregnancies occurring in low- and middle-income countries, particularly in sub-Saharan Africa, which bears much of this burden. In Rwanda, the prevalence of teenage pregnancy has risen from 4.1% in 2005 to 7.3% in 2014, indicating a growing concern. However, there is limited and inconsistent evidence on the factors contributing to teenage pregnancy. Hence, our study aimed to investigate the factors associated with teenage pregnancy. This research seeks to provide valuable insights for targeted interventions, which are urgently needed in light of the increasing rates.

Methods: We employed a cross-sectional study design, utilizing data from the 2019/2020 Rwanda Demographic Health Survey of 3,258 eligible participants aged 15–19 years. To identify factors associated with teenage pregnancy, we performed a bivariate logistic regression analysis. The significant variables from the bivariate analysis were then exported into multivariate logistic regression models, with the results presented as odds ratios (ORs) along with 95% confidence intervals (CIs) and a significance threshold set at 5%.

Results: Our findings indicated that teenagers aged 18–19 years were more likely to experience pregnancy compared to those younger than 17 (OR = 4.2; 95% CI: 2.16–8.37). Adolescents who had engaged in sexual activity 95 times or more had a significantly higher likelihood of becoming pregnant than those with less frequent sexual activity (OR = 13.53; 95% CI: 5.21–35.12). Furthermore, adolescents with parents with a secondary education were 80% less likely to become pregnant compared to those with parents with a primary or no education (OR = 0.2; 95% CI: 0.07–0.63).

Conclusion: Our study revealed that teenage pregnancy is shaped by several individual factors including age and sexual behavior, along with parental education levels. These findings underscore the critical need for targeted sexual education and enhanced family support systems to mitigate teenage pregnancies. Further, longitudinal studies are essential for establishing causality and guiding effective policy development.

KEYWORDS

teenage, pregnancy, adolescent, Rwanda, Demographic Health Survey

1 Background

The transition between childhood and adulthood requires particular care and attention from a young person's caregivers as this stage is accompanied by physiological, psychological, physical, and emotional changes. During this period, some young people are experiencing and engaged in active sexuality and marriage (1, 2). The term "teenage pregnancy" is defined as pregnancy among girls aged 10–19 years old and is associated with neonatal and maternal complications, financial instability, welfare dependency, low level of attended education, abortion, HIV infection, substance abuse, child marriage, and other sexual and reproductive health (SRH) problems. However, this is a public health concern in low- and middle-income countries (LMICs) (3, 4).

The estimated prevalence of pregnancy among adolescent women is 25% worldwide. However, the prevalence of adolescent pregnancy in Africa is recorded at 18.8% with 19.3% in sub-Saharan Africa and 21.5% in Eastern Africa. The prevalence of teenage pregnancy in eastern Africa ranges between 18% and 29% (5). Although the number of teenage pregnancies has fallen considerably in most high-income countries, it remains high in LMICs (6, 7). In 2017, the birth rate among teenagers aged 15–19 years in the United States of America fell significantly to a low teenage fertility rate of 18.8 births per 1,000, a reduction of 7% compared to 2016 (7, 8). In total, 21 million young girls aged 15–19 years old reportedly become pregnant each year and 95% of teenage pregnancies recorded are in LMICs compared to industrialized countries, representing a profound public health concern. For example, childbirth and pregnancy contribute to teenage death with 99% of teenage maternal deaths occurring in LMICs (9, 10).

In LMICs, especially in sub-Saharan African countries, teenage pregnancies have risen sharply (11, 12). In 2013, teenage mothers accounted for more than 50% of all births in this region; the projected number is 101 births for every 1,000 teenagers aged 15–19 years (11, 13). The proportion of young teenage mothers under the age of 18 years has doubled in many African countries, including Mozambique, Niger, Malawi, Uganda, and Cameroon (14, 15).

However, policymakers have developed policies and guidelines to decrease the rate of unintended teenage pregnancy in some LMICs. For instance, Nigeria introduced a curriculum for sex education (10). However, the poor attitude of the teachers and inadequate support from parents and religious leaders has led to a failure to implement this curriculum (7, 8).

Specifically, many policymakers, government officials, religious leaders, and parents fear that talking about sex with young people will only encourage promiscuous behavior. In fact, none of the sex education mandates have made any significant contribution to a decline in teenage pregnancy (16, 17).

In Rwanda, the results of the 2014–2015 Demographic and Health Survey showed an increase in the prevalence of teenage pregnancy. The teenage pregnancy rate rose from 4.1% in 2005 to 7.3% in 2014 (18). In May 2018, the Rwanda Investigation Bureau (RIB) reported 222 cases of rape of adolescent girls under the age of 18 in Rwanda that resulted in pregnancies. The Ministry of Gender and Family Promotion (MIGEPROF) reported that in 2016, 17,000 adolescent girls aged 15–19 years became pregnant (19). Other studies indicate that from 2013 to 2016, 818 teenagers became pregnant in all districts of Rwanda (20). In 2014, the Gender Monitoring Officer of Rwanda (GMO) reported that the issue of teenage pregnancy had reached alarming levels: in 2014 alone, 522 pupils under the age of 18 gave birth and dropped out of school (21, 22). The number of unwanted pregnancies among young girls was alarmingly high in certain districts such as Karongi (Western Province), Gatsibo and Kayonza (Eastern Province), and Gasabo (City of Kigali) (22). Rwandan populations include a large number of adolescents as they represent 50% of the Rwandan population. Teenage pregnancy in Rwanda is not only a health problem, but also a socio-economic and development concern.

Teenage pregnancy is linked to the high risk of sexual and reproductive health problems such as under-age marriage, unwanted pregnancies, a high number of elective abortions performed by non-professionals, an increase in maternal deaths at this age, sexually transmitted infections, HIV and AIDS, and other life-threatening adolescent problems, as well as dropping out of school (23). There is an increased risk of premature delivery, anemia, pre-eclampsia, and low birth weight (14). Many adolescent girls also have limited access to medical services, leading them to resort to unsafe procedures. Approximately 3.9 million adolescents undergo unsafe abortions and approximately 70,000 die as a result (22). Furthermore, they are more likely to develop depression (24). Teenage pregnancy is associated with a higher risk of dropping out of school, which affects their learning, long-term financial security, and future (8, 15). Some research has highlighted a long list of possible risk factors associated with teenage pregnancy, such as low levels of education, lack of negotiation skills, lack of parental supervision, lack of access to contraceptive methods, premature marriage,

religion and culture, and the family's economic situation (16, 17). Some strategies that aim to solve these problems involve encouraging sexual abstinence and improving access to contraceptives. Different strategies that combine different methods of support for adolescents need to take female characteristics into account, as well as different cultures, religious beliefs, and population attitudes (18).

Despite the aforementioned increase in teenage pregnancy, there is limited evidence on the factors that contribute to teenage pregnancy. Our study aimed to address this gap by investigating the factors associated with teen pregnancy. By identifying key predictors, the study sought to provide valuable insights for targeted interventions, which are urgently needed in light of the increasing rates. To the best of our knowledge, there is no study on the determinants of teen pregnancy using a recent Rwanda Demographic and Health Survey (RDHS) (19). The results of this study will provide all stakeholders with data for appropriate interventions to reduce teenage pregnancy and the number of early marriages among teenagers. This study will also provide appropriate evidence at the national level to achieve the United Nations Sustainable Development Goal 3 (SDG-3) (7).

2 Method and materials

2.1 Study design

We conducted a retrospective cross-sectional study using the 2019–2020 RDHS data to analyze factors associated with teenage pregnancy among adolescents aged 15–19 years. This approach allowed us to examine historical patterns and relationships relevant to teenage reproductive health.

2.2 Study settings

Rwanda, located in East Africa, is bordered by Uganda to the north, Tanzania to the east, Burundi to the south, and the Democratic Republic of the Congo to the west. With a population of approximately 13.1 million in 2020, Rwanda spans an area of 26,338 km^2. The country is divided into four provinces and the city of Kigali, encompassing 30 districts, 416 sectors, 2,148 cells, and 14,837 villages. Kinyarwanda, a local language, is the predominant language used alongside English (instructive language) and French. The health system is structured into three tiers: primary healthcare facilities, district hospitals, and specialized referral hospitals. The government has made significant strides in improving access to healthcare services, including SRH services. Healthcare professionals, including doctors, nurses, and midwives, are crucial in providing comprehensive SRH services. They are trained to offer clinical care, counseling, and education, helping to empower adolescents and women to make informed decisions about their health. Further, community health workers (CHWs) also play a critical role in enhancing access to services, particularly in rural areas. They are trained to provide basic healthcare, health education, and referrals, thereby bridging the gap between the health system and underserved populations. CHWs actively promote health initiatives, facilitate access to contraceptives, and provide information about SRH, helping to reduce stigma and increase awareness among adolescents. Despite these efforts, challenges remain in accessing SRH information and services, particularly among adolescents, who face barriers such as stigma, lack of knowledge, and cultural taboos. Although the government has made efforts to improve SRH education and services for young people, many still lack adequate resources and support.

2.3 Study population

This research targeted adolescents aged 15–19 years. This selected population encompasses young individuals who participated in the RDHS interviews, representing a crucial demographic for examining teenage pregnancy. The inclusion criteria stipulate that participants must be residents of Rwanda within the specified age range, must have provided informed consent to participate in the survey, and must have complete data on relevant variables related to sexual and reproductive health. Conversely, individuals outside this age bracket, those who did not complete the survey, or who lacked pertinent information regarding teenage pregnancy were excluded from the study. In addition, participants with missing variables essential for analysis were also excluded. This stringent selection process ensures a focused analysis of the sexual and reproductive health challenges faced by Rwandan adolescents, facilitating a comprehensive understanding of the socio-cultural and individual factors that influence teenage pregnancy in the country.

2.4 Sample size and sampling techniques

The 2019–2020 RDHS gathered data from 14,634 women aged 15–49 years and 6,513 men aged 15–59 years. A significant portion of the participants was under the age of 30 years, with 53% of women and 55% of men falling within this age group. However, for the purposes of this analysis, only women aged 15–19 years were included, resulting in a study population of 3,258 participants. We were left with this sample after we performed data cleaning and removed participants with missing variables especially those who did not have a teen pregnancy status. The sample for the 2019–2020 RDHS was drawn from a stratified sampling framework established in two stages based on the 2012 census. Stratification involved dividing each district into urban and rural categories, thereby creating a total of 60 distinct sampling strata (25).

2.5 Data collection

Data collection was carried out by 17 field teams with 10 supervisors from the National Institute of Statistics of Rwanda (NISR) and the National Reference Laboratory (NRL) who

supervised and coordinated all field activities. The fieldwork for the 2019–2020 RDHS was carried out under close supervision starting on 9 November 2019, in the clusters in the 17 districts in the North, West, and East provinces. After completion of the fieldwork in these 17 districts, the teams were dispatched to the final 13 districts. However, due to the COVID-19 pandemic, the fieldwork was suspended from April to June 2020. Data collection resumed on 4 June and was completed on 20 July 2020.

A total of 500 clusters were selected, 112 in urban areas and 388 in rural areas. In total, 26 households were selected from each sample point, for a total sample size of 13,000 households. Because of the approximately equal sample sizes in each district, the sample was not self-weighted at the national level, and weighting factors have been added to the data file so that the results are proportional at the national level. However, all the women and men aged 15–49 years who were either permanent residents of the selected households or visitors who stayed in the household the night before the survey were eligible to be interviewed. Thus, we extracted data for adolescents aged 15–19 years old after obtaining information on teenage pregnancy in all provinces in Rwanda. To access the dataset, the investigator used the DHS program website to request access to the data set and this was approved within 24 h (25).

2.6 Materials

A questionnaire and different tools were used in the training. Lectures were held on the technical aspects of biomarker collection, and the other tools used included a video and hands-on demonstrations of the biomarker collection process, instructions on how to fill out the questionnaire and transmittal sheets, and instructions on data quality procedures. In addition, break-out sessions were held daily during which trainees had the opportunity for hands-on practice with both adults and children. A total of three anthropometry standardization exercises were carried out in a community health center. Following the standardization exercises, the results of the exercises were presented. General observations regarding accuracy (difference between the reference value and the participant's value) and precision (difference between the first and second readings) were discussed.

2.7 Data analysis

Data analysis was conducted using Stata version 13.0, facilitating both descriptive and analytical assessments. Descriptive statistics included means and standard deviations (SDs) for continuous variables and then frequency and percentages for categorical variables, providing a comprehensive overview of the study participants. For the analytical component, bivariate and multiple logistic regression analyses were employed to identify factors associated with teenage pregnancy. The bivariate analysis helped establish preliminary associations, while multiple logistic regression adjusted for potential confounders, using odds ratios (ORs) to quantify the strength of these associations. Confidence intervals (CIs) at 95% and a statistical significance level set at 5% were utilized to ensure robust findings. This structured approach enabled a thorough examination of the relationships between individual, familial, and contextual factors influencing teenage pregnancy, ultimately contributing to the formulation of targeted interventions and policy recommendations.

3 Results

The study sample consisted of 3,258 teenage participants, with ages ranging from 15 to 19 years. The majority of the participants were aged 15–17 years (66.21%). Most of the participants (82.25%) resided in rural areas, while 17.76% lived in urban settings. Geographically, the largest group of participants comes from the Eastern region (30.35%), followed by the Western (21.31%) and Southern (20.92%) regions. Regarding formal education, a little over half of the participants (50.63%) had completed primary education, while 48% had reached secondary school. A significant number of the teenagers (63.82%) were still attending school. Regarding employment, the majority (61.76%) was unemployed. In terms of family background, a large portion of the teenagers (57.95%) had fathers who were still alive. However, media access was limited, with 61.65% of the participants lacking access to radio, and 91.80% having no access to television. Most participants (97.45%) had never been in a union, highlighting their young age and the fact that they were still transitioning into adulthood. Wealth distribution showed a relatively even spread across socio-economic classes, with nearly a quarter (24.99%) falling into the richest category whereas 15.25% of the girls were from the poorest families (Table 1).

Our results identified several factors associated with teenage pregnancy: age was a significant factor, with teenagers aged 18–19 years having a much higher likelihood of pregnancy (12.3%) compared to those aged 15–17 years (1.6%), with a highly significant $p < 0.001$.

There was no significant difference between urban and rural areas ($p = 0.381$). However, regional differences were evident, with the East province showing the highest pregnancy rate at 15.4%, though these results were not statistically significant across regions. Education was strongly associated with teenage pregnancy: those with no education had the highest pregnancy rate (25.1%), while those with primary and secondary education had significantly lower rates (7.3% and 2.6%, respectively), with $p < .001$. Employment status was also significant; employed teenagers had a much higher pregnancy rate (8.4%) compared to those who were not employed (3.2%), with $p < 0.001$. Marital status was a critical factor, as teenagers who had ever been in a union were much more likely to be pregnant (19.9%) compared to those who had never been married (3.1%), with a very high significance level ($p < 0.001$). Overall, age, education, employment, and marital status emerged as key factors for teenage pregnancy in Rwanda (Table 2).

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TABLE 1 Socio-demographic characteristics of the study participants ($N = 3,258$).

Variable	Frequency	%
Socio-demographic variables		
Age of teenager (years)		
15–17	2,157	66.21
17–19	1,101	33.79
Place of residence		
Urban	579	17.76
Rural	2,680	82.25
Place of residence		
City of Kigali	397	12.18
South	681	20.92
West	694	21.31
North	497	15.25
East	989	30.35
Formal education		
No education	32	0.99
Primary	1,650	50.63
Secondary	1,564	48.00
School attendance		
In school	2,079	63.82
Not in school	87	2.66
Father alive (under 18)		
Yes	1,888	57.95
No	261	8.00
Teen still at school		
Yes	2,079	63.82
No	87	2.66
Employment status of the participants		
Employed	1,246	38.25
Not employed	2,012	61.76
Siblings		
No sibling	3	0.09
Less than 5	97	2.98
5–9	63	1.95
Above 9	6	0.18
Combined wealth index		
Poorest	497	15.25
Poorer	619	19.01
Middle	650	19.95
Richer	678	20.81
Richest	814	24.99
Access to radio		
No	2,008	61.65
Yes	1,250	38.36
Access to TV		
No	2,991	91.80
Yes	267	8.21
Magazine		
No	2,935	90.07
Yes	324	9.93
Marital status		
Never in union	3,175	97.45
Married	1	0.02
Living with partner	73	2.23
Divorced	2	0.07
No longer living together	8	0.23

TV, television.

TABLE 2 Bivariate analyses of the association between the socio-demographic characteristics and teenage pregnancy in Rwanda.

Variable	Number	Yes			
		%	OR	CI	*p*-value
Age of teenager (years)					
15–17	2,158	1.6	1		
18–19	1,1	12.3	9.98	7.11–14.01	<0.001*
Place of residence					
Urban	579	5	1		
Rural	2,68	5.2	0.86	0.62–1.20	0.381
Province					
City of Kigali	397	0.1	1		
South	681	1	1.07	0.67–1.71	0.777
West	694	3.9	0.77	0.47–1.27	0.308
North	497	8.6	0.87	0.52–1.47	0.622
East	989	15.4	1.16	0.75–1.8	0.502
Education					
No education	32	25.1	1		
Primary	1,65	7.3	0.22	0.11–0.46	<0.001*
Secondary	1,564	2.6	0.08	0.04–0.17	<0.001*
Father alive (for those under 18 years)					
No	87	1	1		
Yes	2,079	1.6	1.53	0.33–7.22	0.586
Don't know	1	0			
Teenage employment status					
Not employed	2,012	3.2	1		
Employed	1,246	8.4	2.53	1.94–3.31	<0.001*
Marital status					
Never married	3,482	3.1	1		
Ever in union	49	19.9	117.93	64.2–216.63	<0.001*

CI, confidence interval.
*Significant of *p*-value.

We found that the teenagers who initiated sexual activity at 18–19 years old were significantly more likely to fall pregnant (42%, $p = 0.023$) compared to those who did so aged 15–17 years. Having multiple sexual partners did not show a significant association, except for those with more than five partners, who had a 100% pregnancy rate. A higher frequency of sexual intercourse was strongly associated with teenage pregnancy, with those having intercourse more frequently (95 times or more)

showing a very high likelihood of pregnancy (84.7%, $p < 0.001$). Contraceptive use significantly reduced the risk of pregnancy, with users having a much lower pregnancy rate (69.1%, $p < 0.001$) compared to non-users. Regarding familial backgrounds, education played a key role in reducing teenage pregnancies. Teenagers with a secondary education had the lowest pregnancy rate (2.7%, $p < 0.001$), followed by those with a primary education (7%, $p = 0.011$), while those with no education had a higher pregnancy rate (6.4%). The employment status of the household head was also significant, with unemployed household heads associated with a higher teenage pregnancy rate (8.3%, $p < 0.001$). Household size and wealth quintiles were also influential, with larger households (five to nine members) and lower wealth quintiles (poorest) linked to lower pregnancy rates ($p = 0.000$ and $p < 0.001$, respectively). Concerning access to media and technology, teenagers who read newspapers or magazines at least once a week were significantly less likely to become pregnant (2.7%, $p = 0.011$). Those with less media exposure had higher pregnancy rates, though radio and TV exposure did not show statistically significant differences. For sexual reproductive health characteristics, our findings showed that condom use was strongly protective, with teenagers who used condoms having a significantly lower pregnancy rate (19.4%, $p < 0.001$). Knowledge of family planning methods was also protective, with those knowing about family planning sources for non-users showing a significantly reduced pregnancy rate (0.6%, $p = 0.003$). Domestic violence, whether physical or sexual, did not show a significant association with pregnancy rates. In addition, distance to health facilities was not a significant factor ($p = 0.448$). Overall, age at first sexual intercourse, frequency of intercourse, contraceptive use, education, and employment status of household heads emerged as significant factors associated with teenage pregnancies in Rwanda. Access to media and reproductive health knowledge also played protective roles (Table 3).

The multiple logistic regression analysis identified several significant factors associated with teenage pregnancy. Teenagers who had their first sexual encounter between the ages of 15 and 19 years were at a higher risk of pregnancy (OR = 4.25; 95% CI: 2.16–8.37, $p < 0.001$) compared to those who initiated sexual activity before age 15. Higher frequency of sexual intercourse was also strongly linked to increased odds of pregnancy; for example, those who reported having had sexual intercourse two to four times had an increased likelihood (OR = 2.52; 95% CI: 1.26–5.05, $p = 0.009$), while those having had sexual intercourse 5–40 times and 41–94 times showed ORs of 4.12 (95% CI: 1.74–9.76, $p = 0.001$) and 8.89 (95% CI: 1.91–41.45, $p = 0.006$), respectively. Contraceptive use showed a protective effect, reducing the likelihood of pregnancy (OR = 1.36, 95% CI: 0.66–2.79, $p < 0.001$). Secondary education significantly reduced pregnancy risk, with an OR of 0.21 (95% CI: 0.07–0.63, $p = 0.005$), compared to no education. Employment status was associated with increased odds of teenage pregnancy (OR = 191.66, 95% CI: 1.28–2.87, $p = 0.002$), as was marital status, where married teens had a higher likelihood (OR = 817.37; 95% CI: 4.33–15.44, $p < 0.001$) than their non-married counterparts. Household size also mattered, with larger households (10 or more members) showing a higher risk of pregnancy (OR = 263.52, 95% CI: 1.23–5.63, $p = 0.013$). Access to print media, specifically newspapers or magazines, was associated with lower odds of pregnancy; limited access (less than once a week) had an OR of 0.61 (95% CI: 0.39–0.98, $p = 0.039$), and regular access (at least once a week) had an OR of 0.43 (95% CI: 0.22–0.86, $p = 0.016$). Wealth index and access to radio or TV do not show significant associations, suggesting that socio-economic status and media exposure may have had limited direct influence on teenage pregnancy in this sample (Table 4).

4 Discussion

The analysis in our study showed that adolescents with parents with secondary education were less exposed to the risk of pregnancy than those with primary education or no education. The results showed a certain similarity in socio-economic factors with other studies carried out in African countries (15). Although some reasonable explanations have pointed to the fact that teenage girls from educated families delay marriage and that lectures on sexual and reproductive health are offered to teenage girls when they talk to their parents, the other explanation for this association is that educated teenage girls are less likely to become pregnant than those with no education. However, another explanation for this association is that teenage girls who become pregnant before they complete secondary education are not in a position to continue it because of the extra care they have to provide for their baby and the responsibilities that come with being a mother. Furthermore, researchers are encouraged to carry out more research into this public health problem (14, 15, 24).

The results showed that adolescent girls whose families were employed were more likely to become pregnant than those whose families were not employed (17). This result had some similarities with studies carried out in some African countries, where socio-economic disadvantage was statistically associated with teenage pregnancy at both the household and community levels. Although being employed or not defined by the level of poverty/income at the household and community levels, in West Africa, poverty at the community level was associated with teenage pregnancy as each time the poverty level increased, the probability of teenage pregnancy increased significantly by 1%. Reasonable factors likely to be associated with teenage pregnancy could be rural or urban environments.

Furthermore, child marriage in poor settings is justified as a means of reducing the economic burden within the household by marrying off female children, thereby reducing household size, and increasing resources through the dowry obtained from the groom at the time of marriage (14, 17).

Our study showed that there was a statistically significant association between a never-married family and teenage pregnancy, with never-married families being more likely to be associated with teenage pregnancy. These results could be attributed to religion. Indeed, in certain contexts, families who do not believe in religion have certain limitations, such as a lack of fear of sin and independence in matters of sexual and reproductive health, which are at the root of these families' carelessness. Although no research has published these results, researchers are encouraged to carry out such research.

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TABLE 3 Bivariate logistic regression analyses for behavioral, familial, access to media, and sexual reproductive health factors associated with teen pregnancy.

Variable	Number	Yes			
		%	OR	CI	*p*-value
A. Behavioral factors					
Age at first sexual intercourse (years)					
15–17	3,008	0	1		
18–19	169	42	171.33	89.27–328.8	0.023[a]
Multiple sexual partners					
1	543	31.2	1		
2	116	32.1	1.13	0.66–1.93	0.646
3–5	66	36.7	1.25	0.65–2.45	0.498
Above 5	5	100	1		
Frequency of sexual intercourse					
No sexual intercourse	4,064	1.3	1		
1 time	110	31.8	29.21	15.49–55.10	<0.01[b]
2–4 times	117	38.1	44.77	25.72–77.96	<0.001[c]
5–40 times	55	52.1	73.13	35.88–149.06	<0.001[c]
41–94 times	17	83.9	230.08	56.62–935.04	<0.001[c]
95 times and above	73	84.7	437.30	184.85–1,034.57	<0.001[c]
Use of contraceptive methods					
No	4,27	2.9	1		
Yes	164	69.1	70.846	43.63–115.04	<0.001[c]
B. Familial background factors					
Education level					
No education	392	6.4	1		
Primary	2,321	7	0.30	0.12–0.76	0.011[a]
Secondary	1,696	2.7	0.10	0.04–0.26	<0.001[c]
Gender of HH head					
Male	2,933	5.1	1		
Female	1,503	5.8	1.129	0.80–1.60	0.494
Employment status of HH head					
Employed	1,706	3.5	1		
Not employed	2,729	8.3	2.762	1.98–3.85	<0.001[c]
Number of siblings from biological parent					
No sibling	52	7.3	1		
Less than 5	2,898	4.8	0.58	0.20–1.72	0.325
5–9	1,404	6.1	0.77	0.26–2.36	0.658
Above 9	82	9.5	1.20	0.26–5.55	0.808
HH size					
Less than 5	1,215	10.3	1		
5–9	3,058	3.2	0.267	0.18–0.38	<0.001[c]
Above 9	163	9.2	0.971	0.49–1.91	0.932
HH wealth quintile					
Wealthiest	694	7.8	1		
Fourth	845	5.9	0.82	0.52–1.32	0.423
Middle	911	6.9	0.82	0.52–1.29	0.39
Second	927	3.9	0.49	0.29–0.83	0.008[b]
Poorest	1,058	3.1	0.33	0.18–0.63	0.001[b]
C. Access to media and technology					
Frequency of reading newspaper or magazine					
Not at all	2,779	6.4	1		
Less than once a week	1,133	3.8	0.59	0.38–0.92	0.019[a]
At least once a week	524	2.7	0.42	0.22–0.82	0.011[a]
Frequency of listening to radio					
Not at all	775	6.6	1		
Less than once a week	710	5	0.69	0.40–1.20	0.189
At least once a week	2,95	5.1	0.69	0.47–1.04	0.073
Frequency of watching TV					
Not at all	2,255	5.7	1		
Less than once a week	1,221	4.9	0.846	0.57–1.25	0.4
At least once a week	959	4.9	0.714	0.45–1.14	0.156
D. Sexual reproductive health characteristics					
Domestic violence (teen)					
Physical violence only	101	8.3	1		
Sexual violence only	42	2.2	0.31	0.03–2.94	0.308
Both	32	7.3	0.90	0.16–5.07	0.909
Condom use					
No	255	63.3	1		
Yes	116	19.4	0.12	0.07–0.24	<0.001[c]
Distance to a health facility					
Big problem	833	5.6	1		
Not a big problem	3,603	5.3	0.86	0.58–1.27	0.448
Knows the source of family planning for non-users					
No	3,288	3.5	1		
Yes	983	0.6	0.16	0.05–0.53	0.003[b]

HH, household; TV, television.
[a]Statistical significance at $p < 0.05$.
[b]Statistical significance at $p < 0.01$.
[c]Strongly statistically significant at $p < 0.001$.

The results of our study show that teenagers in the 15–19 years age group were 4.2 times more likely to become pregnant than those under 15 years. These results are similar to those of studies carried out in developed countries such as America and Australia. Possible attributable factors are genetic and socio-environmental factors. Not surprisingly, delaying sexual debut is one of the aims of many pregnancy prevention efforts, as is (sometimes) improving knowledge, access, and use of contraception (18).

The results of our study showed that adolescents who had sexual intercourse 95 times or more were more likely to become pregnant than those who had sexual intercourse less than 95 times. This may be associated with certain reasonable ideas such as sexual dependence. However, the analysis showed that an increased frequency of sexual intercourse resulted in a statistically significant correlation between the variable and the outcome. Future research on this topic is recommended for policymakers to prevent and monitor teenage pregnancy (17, 18).

5 Study strengths and limitations

This study has several limitations that must be acknowledged. First, the retrospective cross-sectional design prevents establishing

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TABLE 4 Multiple logistic regression analysis of the factors associated with teenage pregnancy.

Variable	95%CI			
	OR	Lower bound	Upper bound	*p*-value
Age at first sexual intercourse (years)				
<15	1			
15–19	4.25	2.157	8.370	<0.001[a]
Number of sex partners				
1	1			
2	0.99	0.48	2.00	0.964
3–5	0.74	0.27	1.98	0.546
Frequency of sexual intercourse				
Never	1			
1 time	1.58	0.73	3.44	0.244
2–4 times	2.52	1.26	5.05	0.009[b]
5–40 times	4.12	1.74	9.75	0.001[b]
41–94 times	8.89	190.58	4.15	0.006[b]
95 times and above	1.35	5.21	3.51	<0.001[b]
Use of contraceptive				
No	1			
Yes	1.36	6.65	2.79	<.001[a]
Education				
No education	1			
Primary	0.45	0.16	1.31	0.145
Secondary	0.21	0.07	0.63	0.005[b]
Employment status				
No	1			
Yes	191.66	1.28	2.87	0.002
Marital status				
Never married	1			
Ever married	817.37	4.33	1.54	<0.001[a]
HH size				
0–4				
5–9	0.62	0.38	1.01	0.053
10 or more	263.52	1.23	5.63	0.013[c]
Wealth index				
Poorest	1			
Poorer	112.89	0.60	211.95	0.705
Middle	126.64	0.66	2.42	0.474
Richer	115.58	0.60	2.21	0.661
Richest	0.86	0.41	1.80	0.694
Access to newspapers or magazine				
Not at all	1			
Less than once a week	0.61	0.39	0.98	0.039
At least once a week	0.43	0.22	0.86	0.016[c]
Access to radio				
Not at all	1			
Less than once a week	0.77	0.44	1.34	0.355
At least once a week	0.83	0.54	1.28	0.407
Access to TV				
Not at all	1			
Less than once a week	1.06	0.69	1.62	0.777
At least once a week	0.82	0.49	1.35	0.435

HH, household; TV, television.
[a]Strongly statistically significant at $p < 0.001$.
[b]Statistical significance at $p < 0.01$.
[c]Statistical significance at $p < 0.05$.

causal relationships between the identified risk factors and teenage pregnancy. Second, this study relied on a retrospective design with secondary data, which restricts the ability to establish causality and limits the analysis to the variables available in the dataset, potentially missing important contextual factors. For instance, the study did not account for socio-cultural beliefs or perspectives that may play a significant role in influencing teenage pregnancy, which limits a more holistic understanding of the phenomenon. In addition, the exclusion of younger adolescents, specifically those under 15 years old, may have led to either an underestimation or overestimation of the prevalence of teenage pregnancy. This exclusion also restricts the generalizability of the findings to the broader adolescent population aged 10–19 years. Despite these limitations, this study has several notable strengths. First, it utilized a large, nationally representative sample from the RDHS 2019–2020, enabling the results to be generalized to the broader population of young women aged 15–19 years. The use of standardized instruments further strengthens the validity and reliability of the findings. In addition, this study is the first of its kind since 2019 to examine the risk factors associated with teenage pregnancy at the national level in Rwanda, making it a valuable contribution to the existing body of knowledge on adolescent reproductive health in the country. These strengths, combined with the comprehensive nature of the dataset, underscore the importance and relevance of the findings despite the study's inherent limitations.

6 Public health implications

The findings of this scholarship have significant public health implications for addressing teenage pregnancy in Rwanda. By identifying key risk factors among young women aged 15–19 years, the study highlights critical areas for intervention, such as improving access to reproductive health education, family planning services, and addressing socio-economic vulnerabilities.

The results underscore the need for targeted public health strategies that can reduce teenage pregnancy rates, particularly in rural and low-income areas. In addition, the study's national scope provides a strong evidence base for policymakers to develop comprehensive programs aimed at empowering adolescents with the knowledge and resources needed to prevent unintended pregnancies, ultimately contributing to better maternal and child health outcomes across the country.

7 Future directions

Future research should take a more comprehensive approach to understanding the factors influencing teenage pregnancy by incorporating both qualitative and quantitative methods. A mixed-methods design would allow for a deeper exploration of the socio-cultural, economic, and psychological factors that contribute to teenage pregnancy, providing both statistical rigor and rich, context-specific insights. In addition, longitudinal research is crucial to establish causal relationships and assess the long-term impact of interventions over time, particularly in tracking changes in adolescent behavior, socio-economic conditions, and pregnancy outcomes. Further, incorporating participatory research approaches, such as the Community-Based Participatory Research (CBPR) or Community Development (CD) models, would further enhance the relevance and effectiveness of future interventions on early pregnancies. These approaches engage communities directly in the research process, ensuring that solutions are culturally sensitive, context-specific, and supported by the local population. By involving adolescents, families, and community leaders in the design and implementation of interventions, the CBPR and CD approaches can help foster sustainable behavioral changes and improve the overall health of the community. Furthermore, future studies should consider integrating geospatial analysis to identify geographic areas where teenage pregnancy rates are higher and target interventions accordingly. This could help optimize resource allocation and provide localized public health solutions. Finally, expanding research to include adolescents under the age of 15 years would ensure that interventions target the entire spectrum of at-risk youth, leading to more comprehensive and inclusive strategies for preventing teenage pregnancy.

8 Conclusion

The analysis of this study reveals that teenage pregnancy was influenced by a range of individual and family-related factors, particularly among young women aged 15–19 years. Key individual factors, such as age at first sexual encounter, frequency of sexual activity, and contraceptive use, were found to be significantly associated with the likelihood of pregnancy. Furthermore, parental factors such as an increase in parental formal education played a protective role in early pregnancy. These findings emphasize the importance of targeted interventions that address both individual behaviors and family dynamics. Based on our analysis, we recommend that policymakers revise and strengthen existing policies and educational curricula, particularly by focusing on vulnerable categories of youth. There is a need for Behavior Change Communication (BCC) initiatives directed at parents, religious leaders, and educators to foster early sexual health education and encourage preventive behaviors among teenagers. A holistic approach, incorporating both individual and family factors, will be essential for reducing teenage pregnancies and promoting the health and wellbeing of adolescents.

Data availability statement

Publicly available datasets were analyzed in this study. These data can be found here: https://www.dhsprogram.com/data/dataset_admin/login_main.cfm.

Ethic statement

This study was conducted under the ethical approval previously granted by the Rwanda National Ethics Committee (RNEC) for the RDHS 2019/2020. Authorization to access the publicly available RDHS dataset was obtained through the Demographic and Health Surveys (DHS) program. In the original ethical clearance, informed consent was obtained from participants aged 18 years and older, while adolescents aged 15–17 years provided assent to participate. Participant confidentiality was rigorously maintained, and all data were collected anonymously to ensure privacy and protect the identity of respondents.

Author contributions

FN: Funding acquisition, Project administration, Writing – original draft, Writing – review & editing, Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Resources, Software, Supervision, Validation, Visualization. EK: Formal Analysis, Methodology, Writing – original draft, Writing – review & editing, Conceptualization, Data curation, Funding acquisition, Investigation, Project administration, Resources, Software, Supervision, Validation, Visualization. SM: Conceptualization, Supervision, Validation, Writing – review & editing. DM: Formal Analysis, Writing – review & editing. AM: Visualization, Writing – review & editing. LN: Supervision, Validation, Visualization, Writing – review & editing.

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Supplementary material

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Psychosocial consequences and early life factors impact on the occurrence of childhood sexual assault among secondary school students in Southern Ethiopia: unmatched case-control study

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Background: Child sexual assault is a violation of fundamental human rights that leads to various negative consequences, including psychological and physical problems. While it is the least reported and addressed form of violence against schoolgirls in Ethiopia, it is a public health issue that affects millions of people globally each year. Thus, this study aims to provide information on the early life factors impact on the occurrence of childhood sexual assault among secondary school students.

Methods: An institution unmatched case-control study was conducted in Arba Minch Zuria district among high school female students attending regular education from March 20, 2023 to May 20, 2023. The data were collected using structured, pretested self-administered questionnaire in all school in Arba Minch Zuria Woreda. Reports of schoolgirls being sexually assaulted were first obtained from the district police office. According to these reports, there were seventy-five (75) cases where the girls were attending or had attended the mentioned high school. In addition, female control students were randomly selected from non-case students. Odds ratio with 95% CI was used as a measure of association, and variables with a p-value of ≤0.05 were considered to be statistically significant.

Results: Multivariate logistic regression analysis was used to identify significant factors. Accordingly factors such as had consumed alcohol (AOR = 4.0, 95CI: 1.68–9.70), living with non-biological parents (AOR = 7.49, 95CI: 2.72–13.65) and living alone (AOR = 4.6, 95CI: 1.49–14.41), being street food vendors (AOR = 4.5, 95CI: 1.48–13.70) and visiting library at improper time (AOR = 5.0, 95CI: 1.87–13.47) were significantly associated with childhood sexual assault.

Conclusion: Had consumed alcohol, living with non-biological parents and alone, being street food vendors and improper library time were identified as significant determinants of child sexual assault (CSA) among students included in this study. Thus, high schools and families with children should collaborate to develop a plan to reduce sexual abuse that violates children rights. Families should oversee their children to help prevent substance use during their school years. Additionally, parents should remain close to their children, as distancing can lead to exposure to risky relationships.

KEYWORDS

abuse, assault, childhood, rape, in Ethiopia

Introduction

Child sexual abuse (CSA) is the term used to describe when a child (under the age of eighteen) is involved in sexual activity for which he or she is not developmentally ready to give informed consent, does not fully understand, is unable to give consent for, or that violates legal requirements or social taboos (1). It is illegal to exploit children for an adult's sexual gratification, and Child sexual abuse is among the most undisclosed problem and least addressed forms of child abuse worldwide (2). Sexual abuse is a widespread violation of human rights that is now considered a public health priority. It affects individuals of all genders, sexual orientations, and ages in every community, but in both industrialized and developing nations, the majority of victims are children (3).

The two primary categories of child sexual abuse that are typically distinguished are contact and non-contact child sexual abuse. Intercourse that involves penetration (like oral and vaginal sex) is considered abuse of contacts. Non-contact activities include coercing or threatening children to watch or produce porn, encouraging kids to act or behave inappropriately in sexual situations, and grooming kids to commit sexual abuse (4).

One out of twenty adolescent girls worldwide reported experiencing coercion during their first Sexual experience. Sometimes there is more overt aggressiveness involved when sexual assault (rape) happens on or around school premises. Thus, globally, the prevalence of CSA among adolescent girls was estimated to be 19.7% (5). Asia and sub-Saharan Africa had greater rates of childhood sexual abuse (23.9% and 34.4%, respectively) than did Europe and America (9.2% and 10.1%) (6, 7). In Sub-Saharan Africa (SSA), sexual abuse of victims often occurs at the hands of family members, neighbors, and acquaintances. A local survey revealed that 34.4% of female respondents reported experiencing sexual abuse during childhood (6). Research among female students in southern Nigeria found that 26% had faced similar experiences (8) and South Africa has one of the highest rates of sexual assault globally, particularly affecting teenage girls aged 12–17, with a vulnerability rate of 39% (9).

In the context of Ethiopian high schools, studies have been done on the magnitude of CSA in Butajira, which was 32.8% (10), in Gandhi Memorial Hospital in Addis Ababa, which was 42.7% (11), in Bahir Dar, which was 37.3% (12), and in Dire Dawa, which was 48.9% (3). According to a WHO report, in many underdeveloped nations, including Ethiopia, CSA is the least recorded form of violence, with barely one out of ten instances being reported (13).

Psychological reactions such as dread, anger, fury, guilt, and/or disbelief are frequently experienced by victims of child sexual abuse (14). Consequently, individuals often experience the symptoms such as post-traumatic syndrome disorder (PTSD), such as the burden of STDs, HIV/AIDS, unintended pregnancy, unsafe abortion, crying, and bleeding (15). Worldwide, there are thought to be 74 million unintended pregnancies annually, which leads to 25 million unsafe abortions and 47,000 maternal deaths (16). But at some time in their lives, 2.9 million American women (2.4%) become pregnant as a result of rape (17).

Children with disabilities or in residential care were particularly vulnerable to these kinds of abuses. When it comes to disabilities, children with mental or intellectual impairments are more vulnerable than those with other kinds (4), poor governance, culture, weak rule of law, unemployment, social and gender norms, gender inequality, low income, restricted educational opportunities, and the absence of one or both parents are all highly associated with sexual abuse (6, 8). Research indicates that children mental health issues significantly influence long-term economic consequences more than childhood physical health issues (18).

Ethiopia signed the United Nations Convention on the Rights of the Child (UNCRC) in 1991. Since then, the government has launched numerous programs to ensure the advancement and defense of children's rights and welfare. Rape or other abuse of a girls and boys between the ages of 13 and 18 by a member of the opposite sex is considered an aggravating circumstance and is punishable by up to 20 years in jail, as per the 2004 Ethiopian modified law [Article 623(2)(a)/2004] (19).

Despite the fact that the occurrence of child sexual abuse is influenced by various factors such as measurement issues, cultural context, complex interactions, sample size and diversity, and temporal factors there have been few studies on the prevalence and severity of child sexual abuse among high school students in Ethiopia. Additionally, little research has explored the

Abbreviations

AOR, adjusted odds ratio; CI, confidence interval; CSA, child sexual abuse; SPSS, statically package for social science; SSA, Sub-Saharan Africa.

early factors that contribute to these events. Therefore, studying child sexual abuse is crucial to developing evidence-based interventions, and thus, this study was conducted to assess the early life factors that are associated with the occurrence of child sexual abuse (CSA) among female high school students in Arba Minch Zuria Woreda, Southern Ethiopia, in 2023.

Methods and materials

Study design and setting

An institution-case-control study was conducted in Arba Minch Zuria district among high school female students attending regular education from March 20, 2023 to May 20, 2023. The woreda is situated around Arba Minch Town, the capital of the South Nationalities, Nations, and Peoples (Debub) Regional State. Hawassa, the Sidama region's commercial and administrative hub, is 275 km away, and Addis Ababa, the capital of Ethiopia, is 505 km South-West. In 2023, there were roughly 129,666 people living there. Located in the Gamo zone, it is one of 19 woredas with seven high schools. Located in the Gamo zone, it is one of 19 woredas with seven high schools offering both regular and irregular classes. Of the total number of students enrolled in all high schools, 1,639 were female.

Study participants

The study participants were female high school students randomly chosen from the source population who met the inclusion and exclusion criteria. The source population for this study consisted of all female high school students enrolled in their education during the academic year 2022/2023.

Case definition and sample size determination

An institutional (school) based unmatched case control study design was conducted. Reports of schoolgirls having been sexually assaulted were first obtained from the Arba Minch Zuria woreda which provide both day and night education program, Southern Ethiopia. Reports of schoolgirls being sexually assaulted were first obtained from the Arba Minch Zuria district police office. According to this report, there were seventy-five (75) cases who were attending or had attended the mentioned high school. A total of 150 female control students were also randomly selected from non-case students. Then, all cases were interviewed one after the other through home visits for those who had stopped attending school, or one-on-one interactions with school administrators at break time for those currently attending school.

Eligibility criteria

Students who were critically sick or who attended classes on the weekends were excluded from the study due to the challenges in collecting the required data. Individuals who met the eligibility criteria but refused to give consent to participate in the research were also not included.

Data collection procedures and data quality

Before the two weeks of actual data collection, 5% of the female students at Chencha Woreda High School completed pretests of the questionnaires. In response, adjustments were made to the instrument, clarity, and ambiguity of the language tool. Five female teachers were chosen to act as data collectors and supervisors due to their previous experience in data collection and proficiency in local languages. They received two days of continuous training on the study's objectives, data collection tools, and techniques. Data was collected by self-administered questionnaires at break time in morning and afternoon without affecting teaching leaching learning processes. To maintain privacy, a separate space was prepared in advance for students, with data collectors and facilitators assigned to each room. The questionnaire should be filled out and placed on the designated table, but participants were instructed not to write their names or any other identifying information on it. As soon as the data was obtained, the supervisors and investigator checked it for accuracy, clarity, and consistency.

Statistical analysis

Data was collected by self-administered questionnaires and the coded, modified and input into the Epidata version 4.6 software, the data was ready for analysis. Descriptive statistics, which comprised relevant features including frequencies, proportions, and summary statistics, were used to characterize the study population. The association between the dependent and independent variables was evaluated using binary logistic regression. Multi-collinearity and the model's goodness of fit were checked using the VIF (<10) and Hosmer-Lemeshow tests (>0.05), respectively. Accordingly, any variable having $p \leq 0.25$ was considered a candidate variable for multivariable analysis and entered into a multivariable logistic regression model using the backward elimination stepwise likelihood ratio method. All tests were two-sided, and $p < 0.05$ was considered statistically significant. The results were reported as the odds ratio (OR) and 95% confidence interval (CI). A p-value of less than 0.05 was chosen as the level for statistical significance.

Variables measurement

The outcome variable of this study is the determinants of childhood sexual assault, which includes six items (components)

TABLE 1 Questions and responses about child sexual abuse.

Components of childhood sexual abuse and questions	Response	Operational definition
Have you experienced to any form of childhood sexual abuse?	Participants responded with "Yes" or "No" to the questions, and if they answered "Yes," they were asked to specify the type of sexual abuse they had experienced. 1. Involuntary kissing Forced to look at sexual 1. activities 2. Encourged to behave sexually 3. Unwellcome touch 4. Verbal harassment 5. Rape	The participants were reported to have experienced any form of the listed abuse, coding their responses as "Yes" for those who did and "No" for those who did not (20).
Who was the person that inflicted the abuse on you?	They provided response in the form of ' 1. Family member 2. Schoomates 3. Teachers 4. Boyfriends 5. Neighbours 6. Strangers/unrecognized person'	The items were recorded starting from 1 to 6 making easy for analysis.
Health consequences after the event	Responses included 1'physical injury', 2"peer-rejection", 3' low-self-esteem', 4' stop learning', 5'unwanted pregnancy, 6' abortion', 7'STIs', and 8'vaginal bleeding'	The items were recorded starting from 1 to 8 making easy for analysis.
The physical forms of sexual abuse:	Responses included 1 "genital contact', 2"fondling", and 3 "rape".	The item was recorded as 0 "NO" if participant never exposed and 1 "Yes" if had history of exposure (3, 21).
Non-physical forms of sexual abuse	Responses included 1 "plain talk about sex", 2 "watch sexual acts" and 3' other indecent exposure'	The item was recorded as 0 "NO" if participant never exposed and 1 "Yes" if had history of exposure.

that were extracted and adapted from previously published research (Table 1).

Key independent variables

Having boyfriend

This variable is nominal and has been associated with child sexual abuse in various studies (3, 8, 14). In this study, participants who had boyfriends were coded as 1 "Yes" while those who did not were coded as 0 "No".

Parental conflict

High levels of conflict create a stressful environment that can lead to poor parental mental health and impaired judgment, making it easier for abuse to occur (22, 23). According to this study, participants who reported experiencing any form of parental conflict were coded as 1 "Yes," while those who did not experience such conflict were coded as 0 "No."

Open discussion with family

Clearly, this variable is nominal and has shown a significant association with the occurrence of child sexual assault (6, 15, 24, 25). It was coded as 1 "Yes" for respondents who felt comfortable discussing reproductive health issues within the family, and 0 "No" for those who were concerned about such discussions.

History of sexual intercourse

Respondents with a history of sexual practices were coded as 1 "Yes," while those without such a history were coded as 0 "No."

Substance abuse

Is the use of alcohol, chat, and/or cigarette in quantities or ways that are harmful to the user or others. Participants who were found to be using substances were assigned a code of 1 for "Yes," while those who were not using substances received a code of 0 for "No." (26).

Results

Characteristics of the study population

A total of 225 participants (75 cases and 150 controls) were included in the study, for a response rate of 100%. The mean age of the participants was 17.26 years (SD ± 1.54) with a minimum and maximum age of 14 and 22, respectively. Participants who were over 18 were asked only about their exposure to CSA that occurred before they turned 18. The majority of the students, 77.3% and 78.7% among cases and controls, respectively, came from rural areas. One-tenth of the participants, 22 (9.8%), were married; 9.3% of the cases and 10% of the controls. The majority of participants, 66.7% vs. 78.7%, among cases and controls, respectively, had both biological parents. The majority, 57.3% vs. 72%, of participants among cases and controls, respectively, were Gamo in ethnicity, while 48% of mothers among cases and 51.3% among controls were Protestant in terms of their religion.

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TABLE 2 Socio-demographic characteristics of study population, 2023 ($N = 225$).

Variables	Categories	Case ($n = 75$)	Control ($n = 150$)
Age	≤15	10 (13.3%)	29 (19.3%)
	16–17	36 (48%)	58 (38.7%)
	18–19	23 (30.7%)	57 (38%)
	>=20	6 (8%)	6 (4%)
Marital status	Unmarried	68 (90.7%)	135 (90%)
	Married	7 (9.3%)	15 (10%)
Residence	Urban	16 (21.3%)	34 (22.7%)
	Rural	59 (78.7%)	116 (81.7)
Religion	Orthodox	23 (30.7%)	34 (22.7%)
	Muslim	11 (14.7%)	32 (21.3%)
	Protestant	36 (48%)	77 (51.3%)
	Other	5 (6.5%)	7 (4.7%)
Ethnic	Gamo	43 (57.3%)	108 (72.0%)
	Wolaita	12 (16.0%)	14 (9.3%)
	Amhara	12 (16.0%)	23 (15.3%)
	Other*	8 (10.7%)	5 (3.3%)
Father's occupation	Employed	15 (20%)	24 (16%)
	Daily worker	14 (18.7%)	41 (27.3%)
	Merchant	21 (28%)	24 (16%)
	Farmer	25 (33.3%)	61 (40.7%)
Father's education	Unable to read and write	12 (19.4%)	16 (12.8%)
	Primary	34 (54.8%)	61 (48.8%)
	Secondary	16 (25.8%)	48 (38.4%)
Mother's education	Unable to read and write	16 (22.2%)	21 (14.9%)
	Primary	43 (59.7%)	82 (58.2%)
	Secondary	13 (18.1%)	38 (27%)
Family size	Less than 5	29 (38.7%)	65 (43.3%)
	5 & More than 5	46 (61.3%)	85 (56.7%)
Family monthly income	< 1,317 ETB	14 (18.7%)	18 (12%)
	≥ 1,317 ETB	61 (81.3%)	18 (12%)

*Others ethnic Gurage and omo.

Among the participants in the cases and the controls, 33.3% and 40.7%, respectively, their father had been working on daily labor. While about 61.3% and 56.7% of the cases and controls were living in families of more than five, 81.3% of the families of the participants among the cases and 88% of the participants among the controls were earning less than 1,317 ETB (Table 2).

Behavioral characteristics of participants and their family

Only 26.7% of both cases (16%) and controls (32%) slept with their mothers. The majority of the participants, 77.3% vs. 63.3%, had a boyfriend among the cases and control, respectively. Only 45.3% of the participants had an open discussion on sexual and reproductive health issues. About 27.6% of participants' families (38.7% vs. 22.7%) among the cases and controls used substances like alcohol and chewing or smoking. The majority of participants started sexual practices between the ages of 14 and 16. The largest percentage, 40% vs. 26.7%, of participants among cases and controls were working with street food vendors, while 52% of participants among cases and 29.3% among controls claimed improper library arrangements (Table 3).

TABLE 3 Behavioral characteristics of participants and family of study population, 2023 ($N = 225$).

Variables	Categories	Case ($N = 75$)	Control ($N = 150$)
Co-sleeping	Mother	12 (16%)	48 (32%)
	Sister	34 (45.3%)	73 (48.7%)
	Brother/s	2 (2.7%)	8 (5.3%)
	Alone	27 (36%)	21 (14%)
Parental conflict	Yes	29 (38.7%)	34 (22.7%)
	No	46 (61.3%)	116 (77.3%)
Family substance user	Yes	25 (33.3%)	37 (24.7%)
	No	50 (66.7%)	113 (75.3%)
Have boyfriend	Yes	58 (77.3%)	95 (63.3%)
	No	17 (22.7%)	55 (36.7%)
Open discussion with family	Yes	9 (12%)	93 (62%)
	No	66 (88%)	57 (38%)
Drinking alcohol	Yes	45 (60%)	29 (19.3%)
	No	30 (40%)	121 (80.7%)
Chewing chat	Yes	16 (21.3%)	14 (9.3%0
	No	59 (78.7%)	136 (90.7%)
Age of sexual intercourse	14–16	24 (49%)	38 (55.9%)
	17–19	25 (51%)	30 (44.1%)
Economical supported by	Parental	69 (92%)	144 (96%)
	Non -parental	6 (8%)	6 (4%)
Had been living with	Biological parents	14 (18.7%)	101 (67.3%)
	Non- biological parents	37 (49.3%)	32 (21.3%)
	Alone	24 (32%)	17 (11.3%)
Being street food vendors	Yes	30 (40%)	40 (26.7%)
	No	45 (60%)	110 (73.3%)
Improper library time	Yes	39 (52%)	44 (29.3%)
	No	36 (48%)	106 (69.7%)

Characteristics of the sexual assault

Most of the students (cases) were assaulted by non-relatives such as neighbors (26.7%), boyfriends (25.3%), and schoolmates (21.3%). About 17.3% of the participants did not know the perpetrator (strangers). Just 7 (9%) of the offenders were detained, placed under arrest, and brought to court. Regarding the place of assault, the majority of 24 (32%) of the students were assaulted at their own home, and 18 (24%) raped on the street or in the field (undefined area). The Among 75 rape survivors, only 4 (5.3%) were assaulted by family members.

Psychosocial and health consequences of sexual assault (rape)

Among the 75 cases adolescents who reported rape, more than half 40 (53.3%) had visited the clinic and received post exposure prophylaxis for pregnancy and infectious disease. Twenty (26.7%) of the respondents reported having suffered a physical harm during the incident. Twelve respondents (26%) reported that they ended their relationships with both their boyfriend and girlfriend following the rape, and nearly one-fifth (20%) felt they had lost confidence in themselves compared to before the incident (low self-esteem). Additionally, around ten students (13.3%) intended

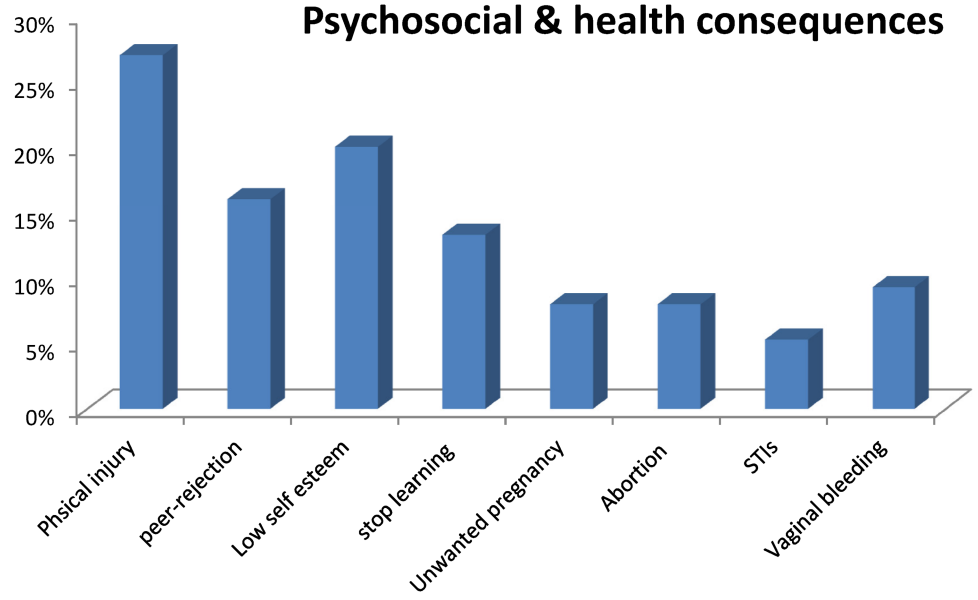

FIGURE 1
Shows psychosocial and health consequences of sexual assault (rape) among secondary school girls in Arba Minch Zuria woreda, southern Ethiopia, 2023 (*N* = 225).

to stop their studies for one to two years due to feelings of humiliation, guilt, and fear. And nearly one-fourth of participants reported become substance users after the assault (Figure 1).

Factors associated with sexual assault

In the bi-variable logistic regression, ten variables: presence of both parents, parental conflict, having a boyfriend, having a history of sexual intercourse, open discussion with parents, history of alcohol drinking, living with non-biological parents, being street food vendors, and improper library arrangements were statistically significantly associated with childhood sexual assault at a *p*-value of 0.25. All these variables were included in the multivariable logistic regression model, but other variables that had a *p*-value greater than 0.25 in this model were not included in the multivariable regression model.

In the multivariate logistic regression model, four independent variables, namely, having ever drunk alcohol, with whom they had been living, being street food vendors, and improper library time arrangements, were found to be statistically significantly associated with life-time childhood assault at a 95% confidence level and a *p*-value of less than 0.05.

The study showed that students who had been using alcohol before incident were about four times more likely to experience childhood assault compared to students who did not use alcohol (AOR = 4.0, 95CI: 1.68–9.70). students who had been living with non-biological parents and alone were about seven and five times more likely to be exposed to sexual assault as compared to those who had been living with their biological parents (AOR = 7.49, 95CI: 2.72–13.65) and (AOR = 4.6, 95CI: 1.49–14.41), respectively. Similarly, participants who had been working as street food vendors (selling) were five times more likely to have experienced sexual assault compared to those who did not participate in this work (AOR = 4.5, 95CI: 1.48–13.70). Likewise, the odds of childhood sexual assault among students exposed to improper library time in school compared to their counterparts were fivefold (AOR = 5.0, 95CI: 1.87–13.47) (Table 4).

Discussion

This study indicated that 80% of students have experienced at least some form of psychosocial consequences. Among the cases, only half of them had visited the clinic and received post-exposure prophylaxis for pregnancy and infection. Physical harm is the most common consequence of child sexual assault in this study, which covers about 27%. Acts such as slapping, cutting, and genital tearing are examples of physical injury. The survivors or victims may have to deal with behavioral aggression, a sense of unforgettably high sin, and the accommodation of bacterial infection through cutting and, in rare cases, fistula and inconsistence. This justification was supported by different studies and reports conducted worldwide (22, 27–29). Others participants have reported complain of emotional disorders like, peer-rejection, low self-esteem and substance user after then.

Students who had been using alcohol were about four times more likely to experience childhood rape (assault) compared to students who did not use alcohol. On another hand, respondents who had

TABLE 4 Factor associated with CSA in multivariable logistic regression analysis for secondary school female students, Arba Minch Zuria Woreda, Ethiopia 2023 ($N = 225$).

Variables	Categories	Cases	Control	COR (95% CI)	AOR (95% CI)	*P*-value
		N (75)	*N* (150)			
Presence of Both parents	Yes	50	118	1	1	–
	No	25	32	1.84 (.99–3.42)	2.48 (.91–6.77)	0.075
Parental conflict	Yes	29	34	2.15 (1.18–3.92)		
	No	46	116	1	1	
Boy friend	Yes	58	95	1.97 (1.04–3.73)	1.40 (.48–4.06)	0.512
	No	17	55	1	1	–
Had history of sexual intercourse	Yes	49	68	2.27 (1.28–4.04)	1.95 (.75–5.10)	0.175
	No	26	82	1	1	–
Open discussion with family	Yes	9	93	1	1	–
	No	66	57	12 (5.53–25.85)	2.04 (.75–5.53)	0.175
Had ever drunk alcohol	Yes	45	29	6.3 (3.38–11.57)	4.0 (1.68–9.70)	0.002*
	No	30	121	1	1	–
Whom with had been living	Biological parent	14	101	1	1	–
	Non- biological parents	37	32	8.3 (4.01–17.35)	7.49 (2.72–13.65)	0.000*
	Alone	24	17	10.2 (4.41–23.5)	4.6 (1.49–14.41)	0.008*
Had ever chewed chat	Yes	16	14	2.63 (1.20–5.75)	.65 (.17–2.39)	0.521
	No	59	136	1	1	–
Being street food vendors	Yes	30	40	1.8 (1.02–3.29)	4.5 (1.48–13.70)	0.008*
	No	45	110	1	1	–
Improper library time arrangement	Yes	39	44	2.6 (1.47–6.42)	5.0 (1.87–13.47)	0.001*
	No	36	106	1	1	–

*$P < 0.05$ or significant.

history of alcohol consumption were at higher risk of experiencing sexual assault than their counterparts. This finding is similar with studies conducted in united states (30), Columbia (31) and Dire Dawa, Ethiopia (3). This could be explained by the fact that drinking reduces one's capacity to make thoughtful decisions about relationships pertaining to their sexual and reproductive health. Furthermore, alcohol can occasionally make one depressed and lead them to form indiscriminate relationships with even complete strangers (someone they had never met before).

In this study, child sexual assault was less common (18.7%) among respondents living with their biological parents. Thus, pupils who had been living with non-biological parents and alone were roughly seven and five times more likely to be subjected to sexual assault as compared to those who had been living with their biological parents. This might be due to the parents are more concerned for their daughter than their friends and being alone, this may help reduce the likelihood that they will experience sexual abuse. This finding was consistent with study from third National Incidence Study of Child Abuse in Washington which stated that Children who live with a non-biological parents and that has a live-in partner were at the highest risk: they are 20 times more likely to be victims of child sexual abuse than children living with both biological parents (32).

Participants working as street food sellers were five times more likely to have experienced sexual assault compared to those who did not participate in this work. Because they live and work on the streets all night, street children are vulnerable to acts of violence in the community. Many African cultural settings have a difficult cultural foundation that accepts violence against children. In certain communities, traditional beliefs may condone physical punishment or other forms of violence as acceptable disciplinary measures. Cultural practices, such as initiation rites or certain rituals, may inadvertently inflict harm on children, often justified by longstanding customs. Certain regulations by the government ignore the suffering that these children endure (23, 33, 34).

The data indicates a concerning correlation between improper library time arrangements and the prevalence of child sexual assault. Specifically, 52% of respondents who reported negative reactions to library time arrangements had experienced such assaults. This suggests that students who face inadequate or poorly structured library time are significantly more vulnerable to sexual violence. This may be warranted since students who return to the library improperly may depart at an inappropriate time, perhaps at night, when they are more likely to be sexually assaulted by someone on the street. This is clear from the fact that 24% of survivors reported being raped in a field or on the street.

Implication of the study

Generally, this study suggests that policymakers should modify the laws regarding illegal acts committed against children, even though there isn't a 100% safe place to prevent juvenile sexual assault. In addition, parents should carefully monitor their school-age children if they read this study. This work serves as a foundation (cornerstone) for further research on the subject of childhood rape by other scholars.

Strength and limitation of the study

The nature of this study design allows for the assessment of temporal causality between exposure and the problem (disease). However, given the sensitive nature of the study, which addresses personal issues related to sexuality, there may be underreporting of sexual abuse experiences. Therefore, the findings should be interpreted in light of these limitations.

Conclusion

The study found that several significant factors contribute to child sexual assault (CSA) among students, including alcohol consumption, living with non-biological parents, living alone, working as street food vendors, and negative experiences related to library time. In this study, physical injury, peer-rejection, low self-esteem and unintended pregnancies were the most often seen psychosocial and health consequences of sexual assault on victims. Thus, high schools and families with children, especially those with children who live away from home, should collaborate to develop a plan to reduce sexual abuse that violates human rights while highlighting the above reasons. Finally, the study recommends that future researchers include boys in their investigations of child sexual abuse, as evidence shows that abuse of boys is increasingly reported across various societies.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary Material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by ARBA MINCH UNIVERSITY, IRB/HW 1332/2022. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

DD: Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Writing – original draft. HW: Investigation, Methodology, Project administration, Resources, Writing – review & editing. SM: Conceptualization, Supervision, Validation, Visualization, Writing – review & editing. BD: Conceptualization, Formal Analysis, Supervision, Visualization, Writing – review & editing. GK: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Writing – review & editing. GF: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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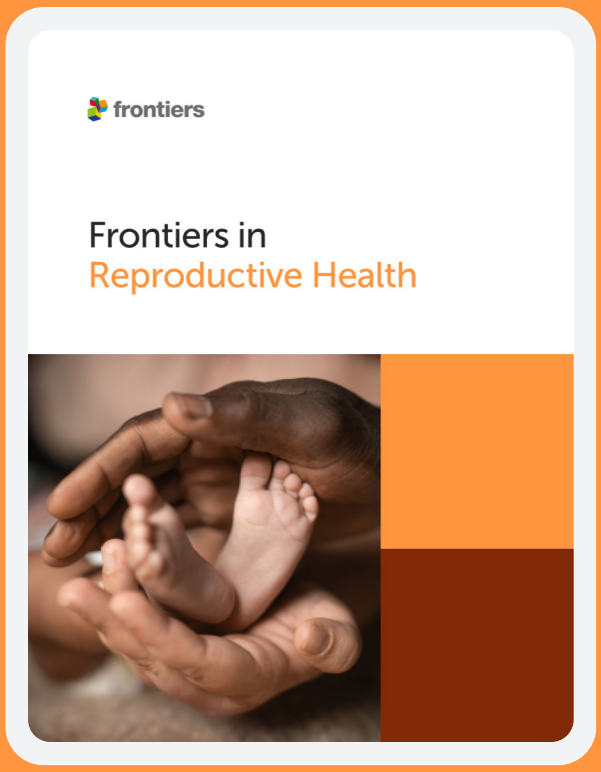

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