Health Education Interventions for Adolescent Pregnancy Prevention: A Scoping Review

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Abstract. UNICEF (2023) reports that 13% of adolescent girls give birth before the age of 18, while the WHO records approximately 21 million adolescent pregnancies per year, with 5.6 million miscarriages and 3.9 million in unsafe conditions due to early sexual activity. In Africa, adolescent girls aged 15-19 years are at high risk of complications such as preeclampsia, prematurity, and low birth weight (LBW), which is the second leading cause of death. This study aims to identify educational intervention models in preventing teenage pregnancy through a scoping review method using Arksey & O'Malley and PRISMA 2020 guidelines. A literature search from 2020 to 2024 in five major databases (Scopus, Science Direct, Springer Link, PubMed, and Google Scholar) yielded 17 articles matching the key inclusion criteria. The analysis found four effective intervention models: (1) Comprehensive Sexuality Education (CSE) integrated with Adolescent Reproductive Health (RHR) services, (2) Problem-Based Learning to improve safe sex skills, (3) Digital apps for access to RHR information, and (4) Hybrid interventions combining economic support and community dialogue. The success of the interventions was determined by skills strengthening, participatory approaches, and adjustments to cultural and social values. This study recommends multisectoral collaboration and youth empowerment through reproductive health clubs to strengthen teenage pregnancy prevention programmes.

1 Introduction

According to UNICEF in 2023, about 13% of adolescent girls give birth before the age of 18 [1]. Meanwhile, data from the *World Health Organization* (WHO) shows that every year, there are 21 million pregnancies in adolescents, with 5.6 million miscarriages and 3.9 million occurring in unsafe conditions due to early sexual activity [2]. In Africa, women aged 15-19 years experience high maternal risks, including preeclampsia/eclampsia, prematurity, and LBW, which is the second leading cause of death. In addition, HIV prevalence among adolescent girls is more than double that of young men [3]. Even in Ethiopia, teenage pregnancy results in high sexual and reproductive health risks for adolescents [4]. In India, adolescents also face high risks due to teenage pregnancy. Such as the risk of unsafe abortion and even sexually transmitted infections among adolescents, education is one of the important ways to reduce the prevalence of teenage pregnancy through appropriate interventions [5].

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Many countries have implemented reproductive health education intervention programmes. Still, their implementation is often not optimal due to a lack of integration with health services, cultural barriers, and limited resources [6,7]. In addition, many programmes fail to effectively engage parents and communities, especially in cultural contexts where the topic of sexuality is considered taboo [8]. Traditional approaches, such as lectures, are considered less effective in improving adolescents' skills on pregnancy prevention [9]. In addition, gaps in access and information also affect the success of educational intervention programmes on reproductive health.

Several studies have tested new intervention methods such as digital technology through mobile applications (MPA) to access SRH information, web-based platforms (BITKZ), and M-Health interventions [10,11,12]. Interactive education has also been implemented by various countries, such as problem-based learning (PBP) for condom negotiation skills and the use of entertainment media (telenovelas) for adolescent-parent communication [9,13]. This study aimed to identify past models of educational interventions to prevent teenage pregnancy and address implementation gaps identified in the literature.

2 Methods

This study uses a scoping review method to identify and map the various models of reproductive health education interventions that have been carried out to prevent adolescent pregnancy. The guidelines followed used PRISMA 2020. The stages of the scoping review, based on Arksey & O'Malley, are six steps [14]. The first step identifies the review question. In formulating research questions, this study applied the PCC Framework (Population, Concept, Context). Second, identify relevant articles. The literature search used databases including Scopus, Science Direct, Springer Link, PuBMed, and Google Scholar. Third, study selection is conducted after the articles are collected, and screening is done to select studies that meet the inclusion and exclusion criteria. Inclusion criteria include searching for keywords "intervention OR education AND reproductive health OR prevention of early marriage", original articles from 2020 - 2024, open access, and covering the field of sexual and reproductive health. The fourth step is data mapping. At this stage, data mapping is made into a table that includes title, author, year, intervention, method, results, and limitations. During the scoping review process, data extraction was conducted to identify and categorize key characteristics of educational intervention models aimed at preventing adolescent pregnancy. The following information was extracted from the include article that is Basic study information (author (s), year of publication and country or region of study), study objectives (the main focus and aims of each intervention,), study design and methodology (qualitative, quantitative, mixed-method) data collection method and target population, Types of interventions such as mobile applications, web based platforms, problem based learning or entertainment media, outcome and impact such as effectiveness of interventions in improving knowledge, condom negotiation skills and adolescent parent communication and barriers and challenges (implementation challenges, including issues related to access, cultural norms and community acceptance). This data extraction process enabled the identification of trends, gaps, and effective approaches in adolescent reproductive health education interventions. The fifth step includes managing and reporting the results; the data that has been mapped is then summarised and analysed. The last step is to consult with experts in their fields.

2.1 Identifying Questions

Table 1. Research Question Framework

P (Population)	Adolescents in areas with high early marriage rates
C (Concept)	Health education intervention programme
C (Context)	Global with a focus on developing countries

In the framework above, the focus of the scoping review was to map the most effective types of educational interventions by identifying evidence gaps in the literature. Thus, the scoping review question that arises is "How are Health Education Interventions implemented for adolescents to prevent pregnancy in Developing Countries? What are the barriers and weaknesses of these interventions?". Therefore, the keywords in the literature search were "intervention OR education AND reproductive health OR prevention of early marriage" to find articles relevant to the research question [15].

2.2 Identifying Relevant Articles

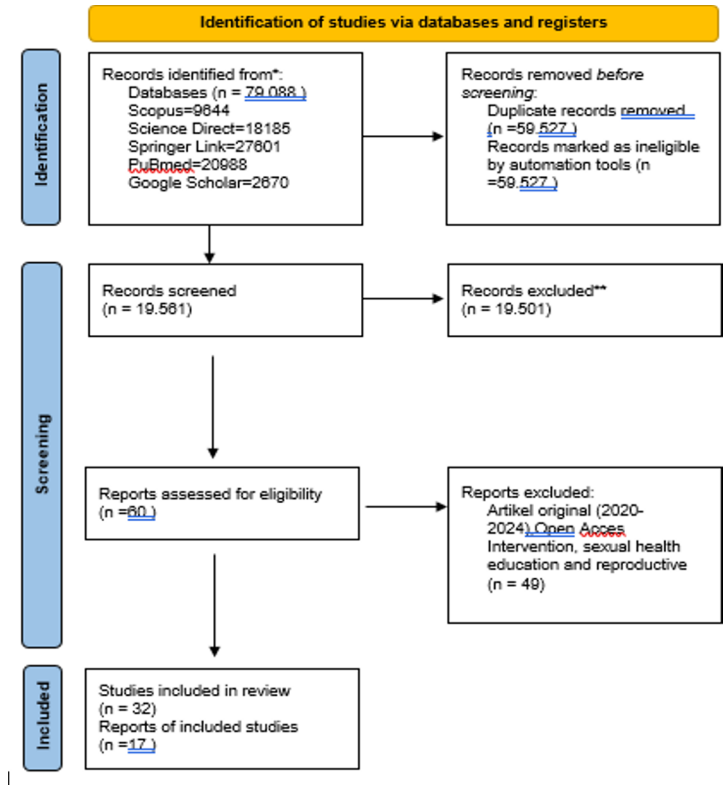

Fig. 1. Flow Diagram of Research Article Selection

The search strategy in identifying relevant articles is using databases including Scopus, Science Direct, PubMed, Google Scholar, and Springer Link, using predetermined keywords in identifying research questions, obtained 79,088 articles and 19,561 after deduplication and automatic screening. Then, filtering was carried out with the criteria of original articles from 2020 to 2024 that had open access and used subject areas including health education and sexual and reproductive health.

2.3 Conducting Study Selection

The screening process was conducted by two independent reviewers. Both reviewers screened the titles and abstracts of all identified records according to the predetermined inclusion and exclusion criteria. Any disagreements between the reviewers were resolved through discussion and if consensus could not be reached, a third reviewer was consulted. To manage references, process according to the PRISMA diagram, obtained 59,527 records, which were automatically deleted because they were not relevant. Screening titles/abstracts used Rayyan QCRI software, with the results of 19,501 did not meet the criteria so full text assessment obtained 60 articles, resulting in 32 eligible articles with 17 inclusion study reports. Inclusion criteria included health education interventions, targeting adolescents with outcomes related to pregnancy prevention, while exclusion criteria included studies without effectiveness evaluation, non-intervention, non-open access.

2.4 Conducting Data Mapping

Table 2. Data Mapping of Reproductive Health Education Interventions

No	Title & Author	Type of Intervention	Method	Main Results	Limitations
1	Acceptability of Youth Clubs (Chirwa et al., 2020)	CSRHE youth clubs	Case study	Increased acceptance of the programme by students and teachers.	Only implemented in rural Zambia.
2	Engaging Parents in Digital SRH Education (Aventin et al., 2020)	Digital animated film + parent training	RCT	Improves parent-adolescent communication about SRH.	Parent participation is still low.
3	Community Score Card (CSC) (Mgoli et al., 2021)	Social accountability approach	Longitudinal study	Adolescents actively monitor health services.	Requires government support for sustainability.

4	Mobile Phone App (MPA) Uganda (Nalwanga et al.,2021)	Condom ordering app & SRH info	RCT	81% of users find SRH access easier.	Only available for Android users.
5	Community Dialogue Approach (Zulu et al., 2022)	Interactive dialogue + media	Qualitative study	Change in social norms about early marriage.	Takes a long time (27 months) to see an impact.
6	Problem- Based Pedagogy (Millanzi et al., 2022)	Problem-based learning	RCT	Improved condom negotiation skills and refusal of unsafe sex.	Only tested in Tanzania; not yet integrated into the national curriculum.
7	Economic Support + CSE (Hegdahl et al., 2022)	Economic support + SRH education	Cluster RCT	Decrease in early marriage, but not significant in teenage pregnancy.	High cost; difficult to replicate in other areas.
8	Telenovela "Overcome the Fear" (Montoya et al., 2022)	Educational entertainment (TV + social media)	Cross-sectional	Increased parent-adolescent discussion about contraception.	Does not measure long- term behaviour change.
9	Web-Based App "BITKZ" (Sharma et al., 2022)	Interactive web application	Mixed methods	Improved condom knowledge and SRH rights.	Only reaches adolescents with internet access.

10	PAPM Model (Cho et al., 2022)	Psychological approach (stages of change)	RCT	Increases readiness for contraceptive use.	No significant impact on actual behaviour.
11	CSE + SRH services (Mbizvo et al., 2023)	Integration of CSE with health services	Cluster RCT	Decrease in unwanted pregnancies.	Teachers are uncomfortable teaching sensitive topics.
12	Life Skills Intervention (Godana et al., 2023)	Life skills training	CRT	Improved communication and decision-making skills.	No impact on contraceptive use.
13	School-Based SRH Education (Alekhya et al., 2023)	Comprehensive SRH education package	Cluster RCT	Improved knowledge of puberty, menstruation, and HIV.	Only tested in urban Indian schools.
14	Video Intervention "Plan A" (Jenner et al., 2023)	SRH education video (23 minutes)	RCT	Improved contraceptive and STI knowledge.	No change in LARC use*.
15	After-School CSE Clubs (Svanemyr et al., 2024)	After-school CSE clubs	Longitudinal study	Sustainability of the programme depends on teacher incentives	Dependence on external funding.

16	Sexual Health Model (SHM) (Kochakzai et al., 2024)	Holistic approach (biopsychosocial)	RCT	Improved sexual health of suburban women.	Only tested in a specific population (Iran).
17	M-Health Intervention (Akande et al., 2024)	App-based CSE module	Cluster RCT	Improved knowledge and attitudes, but not SRH practices.	Limited internet access in rural Nigeria.

3 Results and Discussion

Based on the mapping analysis of 17 articles, various models of reproductive health education interventions aimed at preventing adolescent pregnancy were found. The following are the main findings identified:

Table 3. Adolescent Reproductive Health Intervention Models

No	Type of Intervention	Study Example	Method	Key Results	Limitations
1	School-based	CSE Zambia, PBP Tanzania, Life skills Ethiopia	RCT, Qualitative Study	Improved knowledge, attitudes, communication, and negotiation skills	Cultural resistance, limited intervention time, has not targeted all levels of the school
2	Digital Technology Based	MPA Uganda, BITKZ Zambia, m-Health Nigeria	RCT, Quasi-experiment	Increased access to SRH information, easier use of SRH services	Access only for tech-savvy adolescents, long-term impact untested

3	Community Dialogue and Participatory	Community Dialogue Zambia, CSC Melawi, Youth Clubs	Qualitative study, FGDs	Social norms changed, parent-teen communication improved, and community support improved	Logistical barriers (transport, human resources), not all communities are open to SRH issues
4	Individualistic and Psychological Interventions	PAPM South Korea, SHM Iran	RCT, protocol study	Personalised approach is effective in improving individual readiness to face SRH risks	High cost and duration of intervention, need trained counsellors
5	Entertainment Education	Telenovela "Overcome the Fear", Video "Plan A"	Cross sectional, RCT	Improves parent and child community. Contraceptive Understanding, a wide reach through mass media	Behavioural effects are limited, generally only changes in knowledge and attitudes
6	Multicomponent Intervention	Economic support + CSE + Community dialogue in Zambia	Cluster RCT	Decreased teenage pregnancy, increased contraceptive use, higher school retention	Difficult to implement without cross-sector support (health, education, social)

In this review, several types of interventions were identified, each with distinct approaches and outcomes:

1. School-based interventions: These programs were primarily implemented through comprehensive sexuality education (CSE) and peer-based programs (PBP) in schools. They focused on improving adolescents' knowledge, attitudes, and life skills related to reproductive health. For example, CSE in Zambia and Tanzania significantly improved knowledge retention and behavioral intentions, although challenges such as cultural resistance and limited resources remained.
2. Community-based interventions: Community outreach and peer education models targeted adolescents outside the formal school system. These interventions

emphasized parent–child communication, peer mentoring, and involvement of community leaders to address cultural barriers. Studies showed positive effects on increasing awareness and reducing stigma, but sustainability was often limited due to funding and community engagement challenges.

3. Digital and mHealth interventions Mobile applications and online modules (such as app-based CSE programs in Nigeria): prove effective in increasing knowledge and changing attitudes. These interventions had the advantage of wide reach and flexibility. However, their impact on actual sexual and reproductive health practices was less consistent, partly due to limited internet access in rural settings.
4. Holistic/biopsychosocial interventions: Some interventions adopted a holistic approach, integrating biological, psychological, and social dimensions of adolescent health. For instance, the Sexual Health Model (SHM) applied in Iran showed improvements in sexual health outcomes among suburban women. While promising, these models were context-specific and might require adaptation for diverse cultural settings.

The results of this scoping review indicate that health education intervention programmes to prevent pregnancy among adolescents vary widely in terms of approach, delivery method and socio-cultural context. There is no single most effective approach, but the general pattern of the studies analyzed suggests that programme effectiveness depends on a combination of educational content, delivery methods and stakeholder involvement.

School-based interventions such as *Comprehensive Sexuality Education* (CSE), *Problem- Based Pedagogy*, and Life Skills training are the most widely used strategies proven to improve adolescents' knowledge, positive attitudes, and skills in dealing with sexual pressure and pregnancy risks. However, the success of these interventions is highly influenced by the support of school institutions, teacher training, and the courage to discuss sensitive topics in the classroom. Obstacles such as cultural resistance, taboos on discussing sex, and a lack of resources are major barriers to implementation [4,7,9].

On the other hand, app-based digital approaches and m-Health are emerging as promising innovations, especially among urban adolescents familiar with technology. Interventions such as *Be In The Know Zambia* and *MPA Uganda* are improving access to SRH information in a fast and private manner. However, limited internet access, the digital divide in rural areas, and insufficient duration of interventions to evaluate long-term impact are crucial issues to address[6].

Community-based and participatory intervention models such as the *Community Dialogue Approach* and *Community Score Card* have also shown effectiveness in changing social norms and increasing parental and community engagement. The success of these approaches lies in their ability to open safe, inclusive and culturally sensitive discussion spaces. However, logistical challenges, such as funding, facilitator training, and programme sustainability without donor support, remain barriers to implementation [12].

Studies have also shown the significance of individualised and psychological approaches, such as the *Precaution Adoption Process Model* (PAPM) and the *Sexual Health Model* (SHM), which consider adolescents' mental readiness and personal needs in the learning process. While these methods are highly individualised and successful in changing behaviour, their application requires considerable expertise and time, making them less efficient to implement on a large scale [15].

This discussion confirms that effective teenage pregnancy prevention interventions are multicomponent and contextualised. Programmes combining health education, adolescent health services, economic support, and family and community engagement tend to have stronger impacts. Key challenges such as cultural resistance, limited human resources, and

post-project sustainability need to be addressed through supportive policies and multisector collaboration.

Thus, efforts to prevent pregnancy among adolescents through health education must be implemented holistically, pay attention to cultural aspects, and involve the readiness and participation of all adolescent ecosystems, from schools, families, communities, to the technology used in their daily lives.

This review provides a comprehensive synthesis of recent studies from multiple databases with clear inclusion criteria, offering practical insights into various reproductive health education interventions. Its strengths lie in the breadth of sources and systematic screening process. At the same time, limitations include restriction to English and open access articles, heterogeneity of study designs that precluded meta-analysis and limited generalizability due to context-specific findings.

4 Conclusion

This review identifies various models of reproductive health education interventions aimed at avoiding adolescent pregnancy, with variations in success rates influenced by context and strategy. Successful interventions are generally multicomponent, involve local stakeholders, and utilize innovative methods. Recommendations for future research include long-term evaluation and development of intervention models that are more adaptive to cultural and resource challenges.

Thus, these findings strengthen the collaborative development between schools and health facilities, as well as the empowerment of adolescents through reproductive health clubs as a strategy to prevent teenage pregnancy. This can guide health practitioners, educators, and policy makers in designing more effective and sustainable teenage pregnancy prevention programmes.

Implications for future researchers are that interventions are tailored to local needs, such as the use of language and media that are relevant to local culture, increasing the capacity of teachers and facilitators who are key to the successful implementation of an intervention programme, and the need for multisector collaboration in expanding the impact of interventions.

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