



Assessing the Effectiveness of School-Based Health Education on Reproductive Health Knowledge

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Abstract

This study aimed to assess the effectiveness of a school-based reproductive health education program in improving adolescents' knowledge and attitudes toward reproductive health. The program was delivered to 400 students in a medium-sized Indonesian school, with a pre-test and post-test assessment to measure changes in knowledge. Qualitative interviews were also conducted to explore students' perceptions of the program. The results revealed a significant increase in reproductive health knowledge among students in the intervention group, particularly regarding contraception, sexually transmitted infections, and gender equality. Students also reported positive changes in their attitudes toward relationships and gender equality, though some cultural and socio-economic barriers remained. The study concludes that school-based reproductive health education is effective in enhancing adolescents' knowledge and attitudes, but further research is needed to address the cultural and access-related challenges that affect the full implementation of this knowledge. The findings contribute to the understanding of how school-based programs can improve adolescent reproductive health outcomes and highlight areas for future research to enhance their effectiveness.

INTRODUCTION

The increasing prevalence of reproductive health issues among adolescents globally highlights the need for effective educational interventions. Adolescents, especially in low- and middle-income countries, face significant challenges in accessing accurate information and appropriate services related to reproductive health. These challenges are compounded by societal taboos, limited healthcare access, and insufficient integration of reproductive health education into school curricula. In many settings, schools provide a crucial opportunity to address gaps in knowledge and promote healthy behaviors among young people, making school-based health education programs an essential tool for improving adolescent health outcomes (Nagy-Pénczes et al., 2022; Itriyeva, 2024; Suto et al., 2021; Szucs et al., 2022). With the rising concern over teenage pregnancies, sexually transmitted infections (STIs), and other reproductive health issues, there is a growing need to explore the role of school-based programs in equipping students with the knowledge and skills

necessary to make informed decisions about their sexual and reproductive health (Wilkins et al., 2022; Millanzi et al., 2022; Walker et al., 2022).

Recent studies have indicated that school-based reproductive health education can positively influence adolescents' attitudes and behaviors towards reproductive health. However, there remains a lack of consensus regarding the most effective methods for delivering this education and the specific content that should be prioritized (Olsen et al., 2021; Imran, 2023). Existing literature suggests that comprehensive sexual education programs that are culturally relevant, age-appropriate, and delivered in a supportive environment are most effective in enhancing students' reproductive health knowledge. For example, programs that incorporate both biological and socio-cultural aspects of reproductive health have been shown to result in improved knowledge, positive behavior change, and increased utilization of healthcare services among adolescents (McCallum et al., 2020; de Sousa et al., 2022; Obeagu et al., 2023). On the other hand, some studies have found that traditional approaches, which focus solely on abstinence or disease prevention, may fail to address the complex realities that adolescents face in their sexual lives (Jackson & Huebner, 2019; Matswetu & Bhana, 2024).

Despite the growing body of evidence on the effectiveness of school-based reproductive health education, gaps remain in understanding how these programs are implemented across different contexts and their specific impacts on adolescent populations. Many studies have focused on the effectiveness of these programs in Western countries, with fewer studies examining their effectiveness in non-Western contexts, particularly in Asia and Africa, where cultural norms and educational systems differ significantly. Furthermore, the variability in program design, content delivery, and assessment mechanisms makes it difficult to compare results across studies and draw generalizable conclusions about the most effective strategies for promoting reproductive health knowledge among adolescents (Narkarat et al., 2021; Janighorban et al., 2022; Mancone et al., 2024).

The key problem that this study aims to address is the lack of clarity regarding the specific components of school-based reproductive health education that lead to the most significant improvements in adolescents' reproductive health knowledge. While general consensus exists about the need for such programs, there is little understanding of the underlying mechanisms through which these programs achieve success or failure (Zhang et al., 2022). A critical gap in the literature is the insufficient attention to the evaluation and impact assessment of these programs, particularly in developing countries where resource constraints and cultural sensitivities may affect the implementation and success of school-based interventions.

One solution, based on previous research, is to incorporate a comprehensive, multi-component approach to school-based reproductive health education. Such an approach would integrate biological education about reproductive systems, contraceptive methods, and STI prevention with psychosocial education on gender equality, relationship dynamics, and consent (Bolin et al., 2021). Additionally, interactive teaching methods that foster critical thinking, communication, and decision-making skills have been shown to be more effective than traditional, lecture-based approaches (Amato et al., 2018). By employing diverse teaching strategies, including peer education, group discussions, role-playing, and multimedia tools, these programs can increase students' engagement and retention of information while addressing the varied learning needs of adolescents.

Empirical studies have shown that school based reproductive health education programmes incorporated under wider curricular frameworks has better rates of success as opposed to isolated and stand alone ones. As an example, the

incorporation of reproductive health content into the content on mental health, substance use, and nutrition creates a comprehensive paradigm that makes reproductive health knowledge relevant and applicable to the daily experiences of adolescents (Jenkins et al., 2021; Bune, 2024). In addition, it has been demonstrated that the engagement of parents, teachers, and the community in the planning and delivery of the program can maintain a positive environment that can encourage the dialogue of adolescents regarding sensitive issues and help-seeking behaviour (Gage et al., 2017). Therefore, a community-based and interdisciplinary approach would be potentially successful in promoting sustainable and effective health education interventions.

Despite a rich content of extant literature on the overall effectiveness of school-based reproductive health education, the literature falls short of the specific outcomes, especially on knowledge and behavioural change and long-term health outcomes. Most of the studies so far have used self-report as their primary research method thus risking bias effects whereas few of them have applied stringent experimental or quasi experimental research methodology to clarify causal effects. Also, little is known on the extent to which contextual factors like socioeconomic status, cultural beliefs, school infrastructure also could moderate the efficacy of school-based intervention. It is against this background that the current research aims to fill in these gaps by trying to find out the effectiveness of a school-based reproductive health education programme in improving their reproductive health literacy, especially the contextual determinants of programme effects.

The magnitude of the current study is to assess the success of school based reproductive health education programme in enhancing the knowledge of adolescents with regard to reproductive health. The study aims at contributing to the expanding body of evidence that demonstrates the importance of curriculum based on reproductive health education in schools by looking at the programme in relation to the understanding of the core concepts of reproductive health, including contraception, sexual health, and healthy interpersonal relationships, in students. The originality of this question lies in the fact that the target population, in this case, adolescents in a developing-country environment, inhabited by dominant cultural values and resource constraints, might influence the planning and implementation of reproductive health education programs. Furthermore, the study will examine the effect of such factors as the quality of programme implementation, engagement of the learners, and instructional support on intervention efficacy. The results of the proposed research will provide to the practical information about the optimisation of school reproductive health education programmes and, therefore, lead to the improvement of reproductive health outcomes in adolescents.

METHODS

This study aims to assess the effectiveness of school-based reproductive health education on adolescents' knowledge of reproductive health. To achieve this, a mixed-methods approach was employed, combining quantitative and qualitative data collection methods to provide a comprehensive understanding of the impact of the program. The study design integrates pre- and post-intervention assessments to measure knowledge acquisition, as well as qualitative interviews to explore participants' perceptions and experiences. The methodology is designed to evaluate not only the direct outcomes of the intervention but also the contextual factors that may influence its success.

Study Design

The study adopts a quasi-experimental pre-post design with a control group, which allows for comparison between the intervention group and a group that does not receive the program. This design is chosen due to the practical limitations of

randomly assigning participants to intervention and control groups in school settings, while still providing a strong basis for evaluating the effectiveness of the intervention. The pre-test assesses students' reproductive health knowledge before the intervention, while the post-test measures the same knowledge after the intervention. Additionally, a control group of students who do not participate in the intervention is assessed at both time points to account for any external factors that may influence students' knowledge, such as concurrent media exposure or peer discussions.

Participants and Setting

The study was conducted in a high school in a medium-sized city in Indonesia, where the school-based reproductive health education program is being implemented as part of the broader health curriculum. The target population for the study includes adolescents aged 15 to 18 years, as this age group is particularly vulnerable to reproductive health risks such as early pregnancy and sexually transmitted infections (STIs). A total of 400 students were recruited to participate in the study, with 200 students in the intervention group and 200 in the control group. Participants were selected using stratified random sampling to ensure that the sample was representative of the school's demographic characteristics, including gender, age, and socio-economic status. The intervention group received the reproductive health education program, while the control group continued with the standard curriculum without additional reproductive health education.

Intervention Description

The reproductive health education program was designed to provide students with comprehensive knowledge about reproductive health, including topics such as contraception, sexually transmitted infections, menstrual health, gender equality, and healthy relationships. The program was delivered over a period of four weeks, with two 60-minute sessions per week. The content of the program was developed based on national health guidelines and adapted to the local cultural context. The program incorporated a variety of teaching methods, including lectures, group discussions, role-playing activities, and multimedia presentations, to engage students and cater to different learning styles. Additionally, peer educators were involved in the delivery of the program to increase peer engagement and create a supportive learning environment.

The program was delivered by trained teachers who received professional development in reproductive health education before the study began. The curriculum was designed to be both informative and interactive, with a focus on promoting critical thinking, communication skills, and decision-making. The aim was not only to increase students' factual knowledge but also to encourage them to reflect on their attitudes and behaviors related to reproductive health. The program was evaluated in terms of its content, delivery, and student engagement, with feedback gathered from both students and teachers to assess its effectiveness.

Data Collection Methods

Data collection for the study was conducted in two phases: baseline (pre-intervention) and follow-up (post-intervention). Both quantitative and qualitative data were gathered to provide a comprehensive evaluation of the intervention's impact.

Quantitative data were collected using a structured questionnaire that assessed students' knowledge of reproductive health before and after the intervention. The questionnaire was developed based on key learning objectives outlined in the reproductive health education program, ensuring that it aligned with the content taught during the sessions. The questionnaire included multiple-choice, true/false,

and Likert scale questions, which covered topics such as contraceptive methods, sexually transmitted infections, menstrual health, and gender equality. The questionnaire was pre-tested with a sample of students outside the study group to ensure clarity and reliability of the questions.

The pre-test was administered to both the intervention and control groups prior to the start of the program, and the post-test was administered at the end of the intervention. The difference in knowledge scores between the pre- and post-test for the intervention group was compared to the change in knowledge scores for the control group to determine the effect of the intervention. The data were analyzed using paired t-tests to compare the mean scores for the intervention group and the control group, and independent t-tests were used to assess differences between the two groups.

In addition to the quantitative assessments, qualitative data were collected to explore students' perceptions and experiences of the reproductive health education program. Semi-structured interviews were conducted with a purposive sample of 20 students from the intervention group. These students were selected to represent a range of demographic characteristics, including gender, socio-economic status, and academic performance. The interviews focused on students' attitudes towards reproductive health education, their perceptions of the program's content and delivery, and how the program influenced their knowledge and behaviors. The interviews were conducted in a private setting to ensure confidentiality and encourage open and honest responses. All interviews were audio-recorded with the participants' consent and transcribed verbatim for analysis.

In addition to the student interviews, focus group discussions (FGDs) were held with teachers involved in delivering the program to gather their perspectives on the effectiveness of the intervention. The teachers were asked about their experiences with teaching reproductive health topics, the challenges they faced, and the feedback they received from students. These FGDs provided valuable insights into the implementation of the program and the factors that contributed to its success or limitations.

Data Analysis

Quantitative data were analyzed using SPSS version 26. Descriptive statistics were used to summarize the demographic characteristics of the participants, as well as the pre- and post-test scores. Paired t-tests were conducted to compare the pre- and post-test scores for the intervention and control groups, while independent t-tests were used to compare the changes in knowledge scores between the two groups. The level of statistical significance was set at $p < 0.05$.

Qualitative data from the interviews and focus group discussions were analyzed using thematic analysis. The transcripts were read multiple times to familiarize the researchers with the data, and initial codes were generated based on the themes that emerged from the responses. The codes were grouped into broader themes related to the effectiveness of the program, students' attitudes towards reproductive health, and the role of teachers in the intervention. The findings were then compared across different participant groups (students and teachers) to identify patterns and differences in perspectives.

RESULTS AND DISCUSSION

The purpose of this study was to assess the effectiveness of a school-based reproductive health education program in improving adolescents' knowledge of reproductive health. The results of the study are presented based on the quantitative and qualitative data collected during the pre- and post-intervention phases. In this section, the findings are organized into several key themes, focusing on the impact

of the intervention on knowledge acquisition, changes in attitudes and behaviors, and the influence of contextual factors on the effectiveness of the program.

Demographic Characteristics of Participants

Table 1. Demographic Characteristics of Participants

Characteristic	Intervention Group (n=200)	Control Group (n=200)
Gender	50% Male, 50% Female	50% Male, 50% Female
Age	15-18 years	15-18 years
Socio-economic Status	30% Low, 40% Middle, 30% High	32% Low, 38% Middle, 30% High
Academic Performance	Average: 75%	Average: 74%

A total of 400 students participated in the study, with 200 students in the intervention group and 200 in the control group. The participants were aged between 15 and 18 years, with an equal distribution of gender in both groups. The socio-economic background of the participants varied, with students coming from diverse family income levels, ranging from low-income households to those in middle-income brackets. The students were enrolled in the same school, which is located in a medium-sized city in Indonesia. This demographic data is summarized in Table 1.

Quantitative Results: Knowledge Improvement

Table 2. Knowledge Scores Before and After the Intervention

Group	Pre-test Mean Score (%)	Post-test Mean Score (%)	Mean Difference (%)	p-value
Intervention Group	65.2	84.7	19.5	<0.001
Control Group	66.1	68.3	2.2	0.248

The primary outcome of this study was the improvement in reproductive health knowledge among adolescents in the intervention group, compared to the control group. The pre- and post-intervention test scores were analyzed using paired t-tests to determine if there was a significant difference in the knowledge scores of the intervention group before and after the program. The results, summarized in Table 2, show a significant increase in the intervention group's mean score from 65.2% (pre-test) to 84.7% (post-test), representing a 19.5% improvement in knowledge ($p < 0.001$).

In contrast, the control group showed only a marginal increase in knowledge, with the pre-test score at 66.1% and the post-test score at 68.3%, reflecting a minimal improvement of just 2.2%, which was not statistically significant ($p = 0.248$). These results indicate that the school-based reproductive health education program had a significant impact on students' knowledge of reproductive health, while the control group showed no substantial change.

The post-test results for the intervention group also revealed significant improvements across all areas of reproductive health knowledge. Specifically, students showed a notable increase in their understanding of contraception methods (from 70% to 90%), sexually transmitted infections (STIs) (from 60% to 80%), and menstrual health (from 75% to 85%). The largest improvement was observed in students' knowledge of gender equality and healthy relationships, with scores rising from 55% to 75%. This suggests that the comprehensive approach of the program, which covered both biological and socio-cultural aspects of reproductive health, was effective in enhancing students' overall understanding.

Students' Perceptions of the Program

The semi-structured interviews with the 20 students from the intervention group provided additional insights into the overall effectiveness of the reproductive health education program. Many students expressed that the program had a significant impact on how they viewed their reproductive health and well-being. One of the recurring themes in the interviews was the increased self-awareness and empowerment that students felt after participating in the program. A female student stated,

"I feel more in control of my health now. I learned how to protect myself from diseases, and I know how to talk about these issues without feeling ashamed."

In terms of specific topics, students reported that the section on contraception was particularly impactful. Students expressed that they had little to no prior knowledge about various contraceptive methods, including hormonal methods, barrier methods, and emergency contraception. One participant commented,

"Before the program, I thought contraception was only about condoms, but now I know there are many options, like birth control pills, injections, and implants. It's good to know that we have choices."

A key finding from the interviews was that the interactive, participatory approach used in the program particularly the role-playing exercises and group discussions allowed students to feel more comfortable asking questions and expressing their thoughts. As one student shared,

"The role-playing activities made it easier for me to talk about these things with my friends. It made me realize that we all have similar concerns."

This indicates that interactive activities helped to normalize conversations about reproductive health, reducing the stigma often associated with these topics.

However, despite the positive reception, some students expressed that they would have preferred more time to delve deeper into the topics covered, especially those related to healthy relationships and sexual consent. One student remarked,

"I wish we could have spent more time on how to have a healthy relationship and respect each other's boundaries. That's something we don't really talk about in our school."

This suggests that while the program was comprehensive, students felt that more focus could be placed on the relational and emotional aspects of reproductive health, particularly regarding consent, respect, and communication in relationships.

Teachers' Perspectives on the Program (Continued)

The focus group discussions with teachers provided further insights into the program's implementation and effectiveness. Teachers observed that students were initially hesitant to engage in discussions about sensitive reproductive health topics but became more open as the program progressed. One teacher stated,

"At the start, the students were shy, and some were giggling or avoiding eye contact, but as we moved through the sessions, they became much more open and interested. It was encouraging to see them participate actively in discussions."

However, teachers also noted that the success of the program was contingent on the level of support it received from the broader school community, including parents and school administrators. One teacher pointed out,

"Some parents were very supportive of the program, while others were more resistant. It was challenging to ensure that students felt comfortable discussing what they learned at home."

This suggests that while the program itself was effective in delivering key reproductive health content, its success was influenced by the degree to which the broader community, including families, embraced the program. Teachers emphasized the need for greater community involvement in future iterations of the program to ensure its continued success and acceptance.

In addition, teachers highlighted the importance of continuous professional development to ensure that educators are equipped to handle sensitive topics with the necessary care and expertise. As one teacher mentioned,

"The training we received helped us feel more confident in delivering the program, but it would be beneficial to have ongoing support and updates on new developments in reproductive health education."

This indicates that while the teachers felt adequately prepared at the outset, the dynamic nature of reproductive health education requires continuous professional learning to keep educators informed and effective.

Contextual Factors Influencing Program Effectiveness (Continued)

Another important theme that emerged from the data was the influence of cultural and social norms on the effectiveness of the program. Several students mentioned that while the program improved their understanding of reproductive health, discussing these topics outside the classroom remained difficult due to societal taboos. One male student explained,

"Even though I learned a lot in class, it's still awkward to talk about it with my friends. Our culture makes it difficult to have these conversations openly."

This sentiment was echoed by other students, particularly those from more conservative backgrounds, who indicated that they struggled to reconcile the knowledge gained in the program with the values they encountered at home and in their communities.

Teachers also reported that cultural barriers sometimes limited the full effectiveness of the program. As one teacher stated,

"There are certain topics, especially related to contraception and sexual behavior, that students are uncomfortable discussing openly because of cultural taboos. We try to address them, but it's clear that some students still feel embarrassed."

This underscores the importance of addressing cultural sensitivities when implementing reproductive health education programs, particularly in communities where discussing sexuality is often considered taboo.

Another contextual factor that influenced the program's effectiveness was socio-economic status. Students from lower-income backgrounds expressed concerns about their ability to access reproductive health services despite gaining knowledge from the program. One student mentioned,

"Now that I know about contraception, I want to use it, but I don't have the money or the support to get it. My family doesn't approve of it either."

This indicates that while knowledge is crucial, socio-economic barriers can limit the ability to apply that knowledge in practice. The disparity between knowledge and access highlights the need for comprehensive reproductive health education programs that are linked to affordable and accessible health services, especially for low-income adolescents.

Limitations of the Program

While the program showed promising results in improving reproductive health knowledge and attitudes, there were several limitations noted by both students and teachers. A common concern among students was the program's limited duration. Several participants suggested that the program could be more effective if it were extended over a longer period to allow for deeper exploration of sensitive topics. One student commented,

"It would be great if we could have more sessions where we discuss relationships and consent in more detail. It's something that affects us, but we don't always talk about it enough."

Additionally, the cultural sensitivity of the program posed challenges in certain contexts. Although the program was adapted to fit the local culture, there were still topics such as contraception and sexual behaviour that some students found difficult to discuss, especially outside of school. This highlights the need for ongoing efforts to integrate reproductive health education within the broader cultural and societal framework to ensure that students feel comfortable applying what they have learned.

The current research reveals that the school-based system of reproductive health education scored statistically significant improvement in the knowledge of students in the areas of contraception, sexually transmitted diseases, menstruation, gender equity, and healthy relational interactions. Such achievements can be explained by an overall structure of instruction, which incorporated lecture-based instruction, learning-based interactive activities, as well as education through peers. It is empirically shown that these modes of instruction encourage engagement and support more intensive cognitive processes in students providing adolescents with the chance to discuss sensitive topics critical in an enabling environment as compared to traditional lecture-only teaching (McCallum et al., 2020; Nordmann et al., 2022; Chasteen, 2024). Interestingly enough, the effects of role-playing and group-discussion sections were also very strong, as they helped to alleviate anxiety and enhance open communication about reproductive health, which supported the findings of the previous studies that emphasize the importance of participatory learning as the means of developing better communicative and decision-making skills in adolescents (Amato et al., 2018; Ostroverkh & Tikhomirova, 2021).

The qualitative data also show that students noted an increased feeling of empowerment and increased awareness of personal health responsibility. This finding is the reason to believe that the intervention went beyond just cognitive acquisition and positively influenced the attitudes and perceptions which is also reflected in other studies of school-based health programmes (Jackson and Huebner, 2019; Cherukunnath & Singh, 2022; Wang & Yan, 2025). However, the existing cultural norms keep limiting the propensity of the adolescents to discuss issues related to sexuality outside the classroom. This cultural conflict is in line with the results obtained in non-Western settings, in which the discussion on the subject of reproductive health is often limited by taboos and conservative principles (Gage & Sanogo, 2017; Al-Naimi & Alistar, 2024). As a result, even though the programme was successful in terms of enhancing knowledge in academic settings, the lack of application of the acquired knowledge to everyday behaviour is still hampered by the wider expectations of society.

The socio-economic differences proved to be a relevant factor that influenced the practice of reproductive health knowledge. The respondents in the low-income households were also worried about poor access to reproductive health care, which can suppress the implementation of safe and informed health behaviours. This highlights how educational interventions are to be supported by easily available health services especially in the situations where resources are very limited so that the best results are achieved. In addition, teachers also emphasized the value of continuous professional growth and community involvement in order to maintain efficiency. Strong cooperation between schools, families and health providers is necessary in creating an interactive environment that strengthens the health choices of adolescents outside the classroom.

CONCLUSION

This study assessed the effectiveness of a school-based reproductive health education program in improving adolescents' knowledge and attitudes toward reproductive health. The results demonstrate that the intervention significantly increased students' understanding of key reproductive health topics, such as contraception, sexually transmitted infections, and gender equality. Notably, the program also fostered positive shifts in students' attitudes toward healthy relationships, gender respect, and reproductive health, indicating that educational interventions can be effective in changing adolescent behaviors and perspectives. However, the study also highlighted several challenges, particularly the cultural and socio-economic barriers that impede the full application of reproductive health knowledge outside of the school setting. These factors suggest that while the program successfully provided students with critical information, additional efforts are required to ensure that adolescents can access the services and support needed to act on that knowledge. The findings of this research contribute to the body of knowledge by confirming that school-based reproductive health education can lead to significant improvements in adolescents' health knowledge and attitudes. However, the study also emphasizes the need for further research to explore the long-term impacts of such programs, particularly in diverse cultural and socio-economic contexts. Future studies could investigate how community engagement, parental involvement, and access to reproductive health services influence the outcomes of school-based programs.

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