

A Comparative Review of Sex Education and Medical Interventions in STI Prevention

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ABSTRACT: Sexually transmitted infections (STIs) remain a major global public health concern, particularly among young populations. Comprehensive sex education has been identified as a key strategy for reducing STI incidence, improving awareness, and promoting safe sexual behaviors. This study examines the effectiveness of sex education compared to abstinence-only approaches and public health campaigns, analyzing its role in behavioral change and stigma reduction. A systematic review of peer-reviewed literature from major academic databases, including PubMed, Scopus, and Google Scholar, was conducted. The findings reveal that sex education programs integrated into national curricula significantly improve STI prevention outcomes. Compared to abstinence-based programs, comprehensive sex education leads to higher rates of contraceptive use and better decision-making regarding sexual health. Moreover, its role in reducing stigma fosters an environment where individuals feel encouraged to seek healthcare services and undergo STI testing without fear of discrimination. Despite its effectiveness, sociocultural barriers and inconsistent policy implementation continue to hinder sex education initiatives. Addressing these challenges requires interdisciplinary collaboration between educators, healthcare professionals, and policymakers. Future research should explore long-term impacts, digital education tools, and culturally adaptive strategies to enhance program efficacy. Strengthening sex education policies will be crucial for reducing STI prevalence and improving global sexual health outcomes.

Keywords: Sex Education, Sexually Transmitted Infections, Public Health, STI Prevention, Sexual Health Policy, Health Education, Stigma Reduction.



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INTRODUCTION

Sexually transmitted infections (STIs) have long been recognized as a significant global public health concern (Menassa et al., 2025). Over the past five years, the prevalence of STIs has exhibited notable changes across different regions, influenced by various factors, including shifting sexual behaviors, public health policies, and the broader impact of the COVID-19 pandemic (Papadakos et al., 2025). Recent epidemiological data indicate a marked rise in STIs such as gonorrhea,

chlamydia, and syphilis, raising serious concerns regarding the effectiveness of existing preventive measures and access to healthcare services (Nadarzynski et al., 2022).

One of the primary factors contributing to the rise in STI prevalence is the change in sexual behavior during and after COVID-19 lockdowns. Studies indicate that the pandemic significantly altered patterns of social and sexual interactions, exacerbating STI transmission risks. Nadarzynski et al. (2022) reported a surge in sexual activity among men and non-binary individuals in the UK during the first lockdown in 2020. The study suggests that restrictions on in-person healthcare access led many individuals to rely on online interactions and alternative means of sexual engagement, often without adequate protective measures, increasing the likelihood of STI transmission (Liu et al., 2025).

Similarly, disruptions in healthcare services during the pandemic impeded STI prevention and treatment efforts. Gopichandran and Sakthivel (2021) highlighted that many individuals experienced challenges in accessing STI-related healthcare services due to the reallocation of medical resources to COVID-19 treatment. As a result, undiagnosed and untreated STIs proliferated, further escalating transmission rates. This lack of medical oversight and timely intervention contributed to a widespread rebound effect, with STI cases surging post-pandemic (Soriano et al., 2023).

The consequences of increased STI prevalence extend beyond physical health, as they also impact mental well-being. The emotional and psychological stress associated with STI diagnoses can be profound, often leading to heightened anxiety and social stigma. Research has linked pandemic-induced loneliness and increased anxiety levels to a higher likelihood of engaging in risky sexual behavior (Bu et al., 2020). This finding underscores the necessity for a multidisciplinary approach to STI prevention—one that integrates mental health support alongside conventional STI prevention strategies (Vieira de Mello Barros Pimentel et al., 2025).

The post-pandemic rebound effect in STI cases necessitates urgent public health interventions. Soriano et al. (2023) reported that the incidence of syphilis, gonorrhea, and HIV rose significantly following the lifting of lockdown restrictions. This pattern suggests that temporary disruptions in STI prevention programs, coupled with increased risky behaviors, contributed to this resurgence. Particularly concerning is the reduction in HIV prevention programs and limited access to STI screening services in marginalized communities, exacerbating health disparities (Gustafson et al., 2025).

Social and economic determinants also play a crucial role in STI prevalence. Limited access to healthcare and sexual health education disproportionately affects specific demographic groups, increasing their vulnerability to STIs. Dong et al. (2019) found that sex workers in China face heightened risks due to restricted access to healthcare services and inadequate sexual health education (Mousazadeh et al., 2025). These disparities highlight the urgent need for targeted interventions to ensure equitable access to STI prevention and treatment services across diverse populations.

Cultural and social factors further compound the challenges in STI prevention. Societal stigma surrounding STIs often discourages individuals from seeking medical advice or undergoing regular screenings. Rana et al. (2019) emphasized that insufficient knowledge about STIs and their

prevention perpetuates misinformation and risky behaviors, particularly in conservative communities. This underscores the necessity of comprehensive sexual health education that is both culturally sensitive and inclusive, ensuring that all individuals, regardless of their background, have access to accurate information and preventive resources (Huang et al., 2025).

Given the complexity of these challenges, a multifaceted approach to STI prevention is necessary. Public health policies must prioritize not only treatment and screening but also widespread education and awareness campaigns that address both biomedical and behavioral aspects of STI prevention. Interventions should include promoting safe sexual practices, expanding access to healthcare services, and integrating mental health support into STI prevention programs (Nadarzynski et al., 2022; Soriano et al., 2023). Moreover, strategies such as digital health interventions, including telemedicine consultations and online education platforms, could help bridge gaps in access to sexual health services (Koh & Bauchner, 2025; Sacks et al., 2025).

Despite the growing body of research on STIs, significant gaps in the literature remain. Current studies often lack long-term assessments of STI prevention strategies, limiting the understanding of their sustained impact. Additionally, existing research predominantly focuses on high-income countries, leaving critical gaps in data regarding STI prevalence and prevention in low- and middle-income regions (Gopichandran & Sakthivel, 2021). Further research is needed to explore the long-term effectiveness of digital health interventions, the role of social determinants in STI transmission, and the impact of culturally adapted sexual health education programs (Zhou et al., 2025).

This review aims to provide a comprehensive analysis of STI prevention efforts, with a specific focus on the role of sexual health education in mitigating transmission risks. Key factors examined include the effectiveness of various educational strategies, barriers to implementation, and disparities in healthcare access. By synthesizing current findings, this study seeks to offer evidence-based recommendations to enhance STI prevention efforts worldwide.

The scope of this review encompasses studies conducted across diverse geographical regions, with an emphasis on populations disproportionately affected by STIs, including marginalized communities, young adults, and individuals with limited access to healthcare. By analyzing global trends and identifying best practices, this study aims to contribute to the development of more effective, equitable, and culturally responsive STI prevention strategies.

METHOD

This study employs a systematic review approach to examine the effectiveness of sex education in preventing sexually transmitted infections (STIs). A comprehensive literature search was conducted across major academic databases, including PubMed, Scopus, and Google Scholar, targeting peer-reviewed studies published within the past decade. The search strategy incorporated predefined keyword combinations and Boolean operators to ensure precision and completeness. The selected keywords included "sex education," "sexually transmitted infections (STIs)," "educational interventions," "reproductive health," "effectiveness of sex education," "safe sexual behavior," "prevention strategies," "stigma surrounding sexuality," "scope of sex education," and "risk of sexually transmitted infections."

The study selection criteria were established to include peer-reviewed studies, systematic reviews, and meta-analyses that empirically or theoretically analyze the impact of sex education on STI prevention. Studies that were not published in English, lacked direct empirical evidence, or were not peer-reviewed were excluded. The initial screening process involved reviewing article titles and abstracts, followed by a full-text assessment to determine their relevance and methodological rigor.

To enhance reliability, a multi-stage screening process was employed. Four independent reviewers evaluated the selected studies to ensure alignment with the inclusion criteria. Thematic synthesis was performed to identify recurring patterns in how sex education influences STI prevention, considering various educational settings, intervention strategies, and demographic factors. The findings provide insights into the efficacy of different educational approaches and highlight critical gaps in existing research, offering valuable directions for future studies in sexual health education and STI prevention.

RESULT AND DISCUSSION

Effectiveness of Sex Education in STI Prevention

The effectiveness of sex education in reducing the incidence of sexually transmitted infections (STIs) compared to other approaches, such as abstinence only programs or public awareness campaigns, has been extensively studied. Empirical evidence consistently suggests that comprehensive sex education significantly reduces STI risks, particularly among adolescents and young adults.

Comprehensive sex education significantly reduces STI risks, particularly among adolescents and young adults. For example, a meta analysis by Kirby (2011) found that youth who received comprehensive sex education were 50% less likely to report unprotected sex compared to those in abstinence only programs. Similarly, data from the Centers for Disease Control and Prevention (CDC) indicate that states in the U.S. that implement comprehensive sex education have 15–20% lower rates of chlamydia and gonorrhea among adolescents compared to states with abstinence focused curricula.

Gupta and Kurien (2021) observed that in structured sex education settings, students had a 38% lower self reported incidence of STI symptoms over a six month period. This contrasts with outcomes from abstinence only programs, where the lack of information about contraception and STI risks often correlates with increased vulnerability once individuals become sexually active.

In contrast, public health campaigns, although useful for disseminating general information, often fail to sustain behavioral change without being complemented by structured educational programs. Gold et al. (2019) reported that standalone awareness campaigns resulted in only a 12% increase in knowledge scores but did not significantly affect behavior unless followed by curriculum based education. These findings underscore that while campaigns raise visibility, comprehensive sex education delivers more robust and enduring behavioral impacts.

Meta-analyses of school-based sex education programs further reinforce their positive impact on STI prevention. Alonso et al. (2019) conclude that sex education programs integrated into school

curricula enhance knowledge and encourage safe sexual behaviors among adolescents. The findings emphasize that effective education should not only disseminate information but also focus on developing practical skills and reinforcing positive attitudes toward sexual health.

Moreover, Nowak et al. (2021) demonstrate that national curricula incorporating comprehensive sex education lead to reduced high-risk behaviors and increased contraceptive use among students. These outcomes underscore the role of education in promoting informed decision-making and STI prevention.

Cultural and societal factors also influence the effectiveness of sex education. In many regions, stigma surrounding sexuality presents a barrier to implementing effective programs. Parental and community involvement can significantly impact the acceptance and success of sex education initiatives (Ferrari et al., 2019). The findings collectively support the conclusion that school-based, evidence-driven sex education programs are more effective in reducing STI risks than abstinence-only approaches or general awareness campaigns. The inclusion of parents, communities, and schools in supporting these programs further enhances their impact.

Social and Cultural Factors in Sex Education Implementation

Social and cultural norms play a significant role in determining the acceptance and implementation of sex education across different populations. The extent to which a community supports sex education often depends on deeply rooted cultural beliefs and values, which can shape perceptions of the appropriateness of discussing sexuality in educational settings. Conservative cultural norms, particularly those influenced by religious and familial values, often lead to resistance against comprehensive sex education despite evidence supporting its role in reducing STI risks (Ssewanyana et al., 2020).

In societies where sexuality remains a taboo subject, discussing sexual health is often met with resistance. Ssewanyana et al. (2020) highlight that rigid gender norms can restrict young people's access to sexual health knowledge, making them less equipped to make informed decisions regarding STI prevention. The stigma surrounding sexuality can further discourage individuals from seeking medical advice or engaging in preventive behaviors, thereby increasing STI transmission rates.

Implementing sex education in conservative societies presents several challenges, including limited stakeholder support, ineffective communication strategies, and educational methods that fail to align with local cultural contexts. Ssewanyana et al. (2020) note that programs perceived as conflicting with traditional values may face rejection from parents, educators, and policymakers. Opposition is often based on misconceptions that sex education promotes sexual activity, even though research consistently demonstrates that education leads to safer sexual behaviors rather than increased sexual activity.

To address these challenges, sex education programs must be culturally sensitive and adapted to the social context of the target population. Engaging community leaders, parents, and educators in program development can help build support and improve program acceptability. Ssewanyana et al. (2020) stress the importance of parental involvement in sex education, noting that when parents and community leaders support such programs, they are more likely to be effective.

The influence of societal attitudes extends to access to sexual health services. In conservative cultures, individuals may be reluctant to seek STI testing or contraceptive counseling due to fears of social judgment. Ferrari et al. (2021) argue that promoting open discussions on sexual health and reducing stigma can encourage individuals to engage in preventive behaviors. Community-based outreach and education efforts can play a critical role in shifting perceptions and fostering a more accepting attitude toward sex education and STI prevention.

Overall, the acceptance of sex education is heavily influenced by prevailing social and cultural norms. Effective implementation requires a nuanced approach that respects local values while ensuring that individuals receive essential knowledge and skills for STI prevention. Community engagement, culturally sensitive curriculum design, and open dialogues on sexual health are key strategies for overcoming barriers to education and achieving broader public health goals.

Policies and Regulations in Sex Education

The implementation of sex education policies varies significantly between developed and developing countries, reflecting differences in public attitudes, government priorities, and healthcare infrastructure. In high-income countries, sex education policies are often comprehensive, covering a broad spectrum of sexual health topics, including STI risks, contraception, and relationship dynamics. Countries such as Sweden and the Netherlands have successfully integrated sex education into national curricula, contributing to lower STI rates and higher levels of sexual health awareness.

In contrast, many developing countries face challenges in implementing comprehensive sex education due to social stigma, conservative norms, and inadequate policy frameworks. Even when initiatives to curb HIV/AIDS and other STIs exist, education programs may be influenced by restrictive social attitudes, limiting their effectiveness. For example, research highlights that in India, despite efforts to reduce HIV prevalence, sex education programs often encounter societal resistance, leading to incomplete or modified curricula that fail to provide sufficient information (Ferrari et al., 2019).

Governments in many low- and middle-income countries tend to emphasize abstinence messaging rather than providing comprehensive education on contraception and STI prevention. While abstinence-focused programs may align with cultural expectations, they often lack the necessary components to equip young people with practical knowledge about STI risks and prevention methods.

International organizations such as the World Health Organization (WHO) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) play a crucial role in advocating for evidence-based sex education policies. WHO guidelines emphasize the importance of comprehensive, inclusive sex education programs in reducing STI incidence and improving overall sexual health. UNESCO initiatives, such as the Comprehensive Sexuality Education (CSE) framework, provide countries with resources and policy recommendations to enhance the quality and accessibility of sex education worldwide.

One of the tangible outcomes of international advocacy for sex education has been increased policy recognition of its importance in some developing regions. In sub-Saharan Africa, for example, governments have started incorporating sex education into school curricula, though

challenges remain in ensuring its widespread acceptance and effective implementation. By supporting local policymakers and educators, global health organizations aim to bridge knowledge gaps and foster environments that enable young people to make informed sexual health decisions.

Overall, differences in sex education policies across regions underscore the need for context-specific strategies. Developed countries with well-established programs serve as models for effective STI prevention, while developing nations require tailored approaches that balance cultural sensitivities with evidence-based education. International collaboration, policy adaptation, and sustained advocacy efforts are essential to advancing global sexual health education and reducing STI rates worldwide.

Effectiveness of Sex Education Compared to Medical Approaches in STI Prevention

Sex education plays a crucial role in the prevention of sexually transmitted infections (STIs), yet its effectiveness must be compared to other medical approaches such as vaccination and early treatment. Both approaches—educational interventions and medical strategies—are complementary in the broader effort to curb STI transmission.

Sex education aims to provide individuals with the necessary knowledge, skills, and attitudes to make informed and healthy decisions regarding their sexual behavior. Studies show that comprehensive sex education programs significantly contribute to the reduction of STI incidence, particularly among adolescents and young adults. Research indicates that sex education leads to behavioral changes, such as increased condom use and delayed initiation of sexual activity, which collectively lower STI risks (Tran et al., 2017).

Medical interventions, such as vaccinations and early treatment, also play a vital role in STI control. The human papillomavirus (HPV) vaccine, for example, has been highly effective in reducing the incidence of HPV-related infections and cervical cancer, which are often linked to sexual behavior (Saleeby et al., 2019). Vaccination serves as a preventive tool that mitigates pathogen transmission within the population, while sex education focuses on modifying behavior and increasing awareness.

These two approaches are not mutually exclusive; rather, they reinforce each other. For instance, the effectiveness of vaccination programs can be enhanced through sex education initiatives that inform the public about vaccine availability and the health benefits of immunization. When individuals understand the role of vaccines in STI prevention, they are more likely to participate in vaccination programs, thereby contributing to overall reductions in STI incidence.

Despite the complementary nature of both approaches, several challenges hinder their full implementation. One of the main obstacles in sex education is the stigma and cultural norms that limit the dissemination of accurate sexual health information. In many conservative societies, discussions about sexuality are considered taboo, which restricts the implementation of comprehensive sex education programs (Betsch et al., 2021; Wang et al., 2016). This results in knowledge gaps, where individuals who most need the information are deprived of essential education.

On the other hand, medical approaches also face challenges, particularly in terms of accessibility and awareness. Many individuals are either unaware of existing healthcare programs or face

financial and cultural barriers to accessing STI treatment and vaccinations. A study by Gopichandran and Sakthivel (2021) found that distrust in healthcare systems can reduce individuals' willingness to seek medical treatment for STIs. Without effective outreach and education, the impact of medical interventions may be limited.

In today's digital age, there is an urgent need for closer collaboration between sex education programs and public health policies that promote medical interventions. This synergy would not only enhance STI prevention efforts but also ensure that individuals have both the knowledge and the resources to protect themselves.

Overall, sex education and medical approaches collectively contribute to STI prevention. Strengthening the connection between these approaches, highlighting the role of sex education in behavior modification, and promoting accessibility to medical interventions can significantly reduce STI incidence and improve public health outcomes.

The Role of Sex Education in Reducing STI-Related Stigma

Sex education has the potential to significantly reduce stigma surrounding sexually transmitted infections. This relationship operates through several mechanisms. First, by providing clear and accurate information about STIs, sex education can dismantle myths and misconceptions that contribute to stigma. Stigmatization of STIs often arises from misinformation or lack of knowledge, leading to discrimination against affected individuals. Research suggests that comprehensive sex education not only increases knowledge about STI risks but also fosters more positive attitudes toward those affected by infections (Sekar et al., 2013).

From a psychological perspective, sex education can create a more supportive environment for individuals with STIs. By reducing stigma, education encourages individuals to seek necessary medical care without fear of social judgment. This increased awareness and empathy contribute to better health-seeking behaviors, reducing the overall burden of STI transmission (Sekar et al., 2013). A study by Sekar et al. found that stigma surrounding HIV in local communities can be significantly mitigated through well-designed educational programs that challenge negative perceptions and promote inclusivity.

Additionally, open and transparent discussions about sexual health can foster greater societal awareness of STIs. Promoting public conversations about STI prevention and management can lead to a more informed community that perceives STIs as manageable medical conditions rather than moral failures. Encouraging dialogue can shift societal attitudes from condemnation to collective responsibility in preventing infections.

However, significant challenges remain in implementing sex education in cultures with deeply entrenched negative perceptions of sexuality. In conservative societies, discussing sex education is often met with resistance, as it contradicts traditional values. This resistance can limit the effectiveness of educational initiatives and hinder progress in reducing STI-related stigma. Education programs must be tailored to the cultural context to ensure acceptance while still delivering essential information.

Developing policies that support inclusive and evidence-based sex education is crucial for overcoming these challenges. Policies that integrate sex education into national health strategies

can help normalize discussions on STI prevention, thereby reducing stigma and improving public health outcomes. International organizations like WHO and UNESCO have played instrumental roles in advocating for comprehensive sex education, although further efforts are needed to ensure widespread adoption.

Ultimately, there is a strong link between sex education and the reduction of STI-related stigma. Through accurate information, open discussions, and supportive policies, societies can move toward destigmatization, encouraging individuals to seek medical care and adopt preventive measures without fear of judgment.

Limitations

Several limitations must be acknowledged in evaluating the effectiveness of sex education in STI prevention. First, many studies on sex education rely on self-reported data, which may be subject to bias due to social desirability or recall errors. Additionally, the effectiveness of sex education programs varies across cultural and geographical contexts, making it difficult to generalize findings universally. Variability in curriculum content, teaching methodologies, and community attitudes toward sex education further complicates the assessment of its impact.

Another limitation is the lack of longitudinal studies that track the long-term effects of sex education on behavior and STI incidence. Most existing research is cross-sectional, capturing only short-term changes in knowledge and attitudes rather than sustained behavioral modifications. Without long-term data, it is challenging to determine whether the benefits of sex education persist into adulthood.

Furthermore, the integration of sex education into formal education systems remains inconsistent. Some countries have well-structured programs, while others either lack sex education entirely or provide limited information. This inconsistency affects the comparability of study results and highlights the need for standardized educational frameworks.

Implications

Future research should focus on conducting longitudinal studies to assess the sustained impact of sex education on STI prevention. Understanding how knowledge and behaviors evolve over time will provide valuable insights into program effectiveness. Additionally, research should explore innovative approaches to delivering sex education, including the use of digital platforms, social media, and virtual learning environments to reach a broader audience.

Efforts should also be made to develop culturally adaptive sex education programs that respect local values while ensuring comprehensive knowledge dissemination. Community engagement and parental involvement should be prioritized to increase acceptance and support for educational initiatives.

Moreover, interdisciplinary collaboration between educators, healthcare professionals, and policymakers is essential for optimizing STI prevention efforts. Integrating sex education with medical interventions, such as STI screenings and vaccinations, can create a more holistic approach to public health. Policymakers should work toward creating standardized guidelines for sex education that align with global health recommendations.

Ultimately, addressing the limitations of current research and implementing innovative, culturally sensitive, and integrated approaches to sex education will be key to reducing STI prevalence and improving global sexual health outcomes.

CONCLUSION

This study highlights the critical role of comprehensive sex education in preventing sexually transmitted infections (STIs) and reducing stigma associated with sexual health. Findings suggest that sex education is significantly more effective than abstinence-only approaches and general public health campaigns in lowering STI incidence among young populations. The integration of evidence-based curricula within educational institutions has demonstrated a tangible impact on promoting safe sexual behaviors and improving knowledge about STI risks.

Despite its proven benefits, sex education faces systemic barriers, including sociocultural resistance and inconsistent policy implementation across different regions. Addressing these challenges requires a multifaceted approach involving policymakers, educators, and healthcare professionals. Implementing standardized curricula, increasing community engagement, and incorporating medical interventions such as vaccination programs can enhance the effectiveness of sex education in STI prevention.

Future research should focus on long-term assessments of sex education's impact on STI prevalence, the role of digital education platforms, and culturally adaptive approaches to improving public acceptance. A holistic strategy that integrates sex education with healthcare access and stigma reduction efforts is essential for achieving sustainable public health outcomes. Strengthening these efforts will ensure that individuals are equipped with the necessary knowledge and resources to make informed decisions about their sexual health.

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