

Evaluating the role of health education in sexually transmitted infections prevention through the lens of the health belief model

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Abstract

Sexually transmitted infections (STIs) remain a pressing global public health concern, particularly among vulnerable populations such as adolescents and young adults. Health education serves as a tool for preventing the spread of STIs by promoting informed decision-making and encouraging safer sexual behaviours. This paper explores the effectiveness of health education in STI prevention through the theoretical framework of the Health Belief Model (HBM). By analysing constructs of the HBM, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy, this paper demonstrates how tailored health education interventions can foster behavioural change. It adopts a narrative literature review methodology, drawing on empirical studies, programme evaluations, and theoretical analyses to synthesise current evidence on the application of HBM in STI prevention. Drawing from existing literature, this paper highlights the importance of culturally sensitive, accessible, and sustainable educational strategies. Challenges such as stigma, limited access to services, and cultural constraints are also examined. The findings underscore the necessity of integrating behavioral theories like the HBM into health education initiatives to enhance their impact and long-term effectiveness in reducing STI prevalence. Recommendations include integrating HBM into sex education curricula, adapting culturally appropriate content, using digital technologies for broader engagement, and improving access to testing and treatment services.

Keywords: Health Belief Model (HBM); Health Education; STI Prevention; Sexual Health; Behavioral Change

1. Introduction

Sexually transmitted infections (STIs) represent a persistent global public health challenge, with far-reaching consequences for individual well-being, population health, and healthcare systems (1). According to the World Health Organization (WHO), over one million new cases of STIs are acquired each day worldwide, encompassing infections such as chlamydia, gonorrhoea, syphilis, and trichomoniasis (2). When left untreated, these infections can result in serious complications including infertility, chronic pelvic pain, adverse pregnancy outcomes, and an elevated risk of human immunodeficiency virus (HIV) acquisition (2, 3). Despite notable advancements in medical diagnostics, therapeutic interventions, and preventive strategies, the global burden of STIs remains disproportionately high, particularly among adolescents, young adults, and other vulnerable populations (4). Contributing factors include systemic healthcare inequalities, inadequate access to sexual health services, insufficient or non-comprehensive sexual education, and pervasive social stigmas that continue to shroud open discussions on sexual health.

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Against the backdrop of rising STI prevalence and entrenched health disparities, health education assumes an indispensable role in both the prevention and mitigation of sexually transmitted infections. Fundamentally, health education is not limited to the transmission of information; rather, it endeavours to equip individuals with the requisite knowledge, competencies, and motivation to engage in behaviours that minimise their risk of infection (5). The most impactful educational interventions transcend mere factual instruction, deliberately addressing the psychological, sociocultural, and environmental determinants that influence individual health choices. In this regard, behavioural theories serve as essential tools, providing structured frameworks for interpreting how people assess health risks, internalise health messages, and translate awareness into sustained behavioural change.

Among these theoretical models, the Health Belief Model (HBM) has garnered substantial empirical support and practical utility in relation to STI prevention. Originally developed in the 1950s to explain public participation in tuberculosis screening, the HBM posits that health behaviour is a function of individual perceptions related to susceptibility, severity, benefits, and barriers, as well as cues to action and self-efficacy (6, 7). These constructs offer a robust lens through which to design, implement, and evaluate health education programmes tailored to influence decision-making processes in high-risk populations. When integrated thoughtfully into STI prevention efforts, the HBM can enhance the behavioral impact and long-term effectiveness of educational strategies.

This study evaluates the role of health education in preventing STIs through the conceptual lens of the HBM. By synthesizing evidence from peer-reviewed literature and empirical studies, it seeks to demonstrate how HBM-informed interventions can shape individuals' perceptions and reduce behavioral barriers to STI prevention. The objectives are twofold: first, to assess the effectiveness of health education in modifying psychological constructs, namely, perceived susceptibility, severity, benefits, and barriers, associated with STI-related behaviors; and second, to offer practical, evidence-based recommendations for integrating the HBM into public health education strategies aimed at reducing STI transmission. In so doing, the study aims to support the development of contextually relevant, theory-driven interventions that can achieve lasting behavioral change across diverse populations.

2. Conceptual clarification

2.1. Sexually Transmitted Infections (STIs)

STIs are a broad category of infections that primarily spread through sexual contact, including vaginal, anal, and oral sex (8). They are caused by a range of pathogens, including bacteria, viruses, and parasites, and can lead to health complications if left untreated (8, 9). Common STIs include chlamydia, gonorrhoea, syphilis, human papillomavirus (HPV), herpes simplex virus (HSV), and HIV (10, 11, 12). These infections not only cause immediate health problems, such as genital lesions, pain, and discomfort, but also contribute to long-term consequences, including infertility, chronic pain, and increased vulnerability to co-infections like HIV (12, 13).

Globally, STIs continue to impose a substantial public health burden, particularly among adolescents and young adults (2, 3, 4). This burden is often exacerbated by poverty, limited access to healthcare, and persistent social stigma surrounding sexual health. The World Health Organization highlights the significant prevalence of STIs worldwide, underlining the urgency of adopting preventive measures through education and access to care (2). Untreated STIs can result in complications such as ectopic pregnancies, stillbirths, and neonatal infections.

Preventing STIs depends largely on the adoption of protective behaviours, such as condom use, regular testing, and reduction in multiple sexual partnerships (14). Health education is pivotal in promoting these behaviours by equipping individuals with the necessary knowledge and tools to make informed choices. Addressing STIs through health education is therefore a foundational component of global public health strategies aimed at reducing transmission rates and improving population health outcomes.

2.2. Health Education and Its Importance in STI Prevention

Health education is a systematic and evidence-informed process that aims to empower individuals and communities with the knowledge, skills, and motivation necessary to make informed decisions about their health (15). The WHO defines health education as 'any combination of learning experiences designed to help individuals and communities improve their health, by increasing their knowledge or influencing their attitudes' (16). It encompasses a range of strategies, from classroom instruction and community outreach to digital media campaigns, designed to influence health behaviors and promote well-being (16, 17).

In relation to STI prevention, health education plays an indispensable role. It enhances public understanding of transmission routes, such as vaginal, anal, and oral sex, and encourages protective practices including consistent condom use, limiting the number of sexual partners, and regular testing (18, 19). These educational efforts are particularly vital for populations at heightened risk, such as adolescents, young adults, and marginalized groups, who often face barriers to accessing sexual health services.

A notable function of health education is its capacity to reduce the stigma surrounding STIs. Misconceptions and social taboos often prevent individuals from discussing sexual health, seeking diagnosis, or accessing care (20). By fostering open dialogue and normalizing conversations around sexual health, health education initiatives can help to dismantle stigma and encourage timely health-seeking behavior. This is especially important in cultural settings where discussing sexuality is socially restricted.

Moreover, effective health education promotes equitable access to STI-related services. By informing individuals about the availability, affordability, and locations of STI testing and treatment, education efforts can bridge the gap between knowledge and action (21). Programmes that incorporate culturally tailored content, community-specific risk factors, and local healthcare pathways are more likely to achieve sustained behavioral change.

Health education also enhances self-efficacy by equipping individuals with practical skills, for example, correct condom usage, negotiation of safer sex, and understanding test procedures (22). When people feel confident in their ability to perform preventive behaviors, they are more likely to do so consistently.

By and large, health education is not only a vehicle for information dissemination but a transformative intervention capable of reshaping perceptions, reducing behavioral barriers, and ultimately lowering STI transmission rates. Its role is foundational to any comprehensive public health strategy targeting sexual health, and its effectiveness is maximized when grounded in behavioral frameworks such as the HBM.

2.3. Prevention in Public Health

Prevention in the public health refers to proactive measures aimed at preventing the onset of disease and promoting overall health and well-being (23). Public health interventions are designed to address health issues before they manifest, thereby reducing the burden of disease and its associated social and economic costs. In the case of STIs, prevention involves not only addressing the direct risk factors (e.g., unprotected sex, multiple sexual partners) but also the underlying social determinants of health, such as access to education, healthcare services, and social support (24, 25).

The concept of prevention is often categorized into three levels: primary, secondary, and tertiary prevention (26).

- **Primary Prevention** focuses on preventing the occurrence of diseases or health issues before they arise. For STIs, primary prevention strategies include promoting safe sexual practices, such as consistent condom use, reducing the number of sexual partners, and encouraging early vaccination against preventable infections such as HPV and hepatitis B. Health education plays a central role in primary prevention by increasing knowledge about these preventive measures and encouraging their adoption.
- **Secondary Prevention** involves early detection and intervention to reduce the impact of diseases that have already occurred. For STIs, secondary prevention includes screening for infections in asymptomatic individuals and early treatment to prevent complications. Health education supports secondary prevention by informing individuals about the importance of regular STI testing and the need to seek timely treatment when symptoms arise.
- **Tertiary Prevention** focuses on managing the long-term effects of diseases and improving the quality of life for individuals with chronic conditions. In the case of STIs, tertiary prevention may include the management of complications such as infertility, chronic pelvic pain, or HIV-related conditions. While health education is not as directly involved in tertiary prevention, it can help individuals manage their health and navigate the healthcare system.

Prevention in the public health context, particularly in STI control, thus requires a combination of strategies at all levels of prevention to reduce transmission rates and improve overall public health.

3. The Health Belief Model (HBM)

3.1. Origin and Development of the HBM

The HBM emerged in the early 1950s as a response to the observed underutilization of preventive health services, particularly tuberculosis (TB) screening programs in the United States (27). Social psychologists Irwin M. Rosenstock, Godfrey M. Hochbaum, S. Stephen Kegeles, and Howard Leventhal, working with the U.S. Public Health Service, developed the model to understand why individuals failed to participate in available health interventions, even when they were free and easily accessible (28).

The initial focus was on TB screening, where mobile X-ray units were deployed to neighborhoods, yet participation rates remained low. The researchers hypothesized that individuals' decisions to engage in health behaviors were influenced by their perceptions of the threat posed by a health issue and the benefits of taking preventive actions (27, 28). This led to the formulation of the HBM, which posits that health-related behavior is primarily determined by personal beliefs or perceptions about a disease and the strategies available to decrease its occurrence (28).

Over time, the model has undergone refinements. In the 1970s, the concept of 'cues to action' was introduced to address the need for external stimuli that prompt individuals to take health-related actions (29). In later years, self-efficacy was added to the model to account for an individual's confidence in their ability to perform a specific health behavior (30). These additions have enhanced the model's applicability to a broader range of health behaviors beyond the initial focus on TB screening, including sexual health behaviors and STI prevention (30).

3.2. Components of the Health Belief Model

The HBM comprises six core constructs that explain why individuals engage, or fail to engage, in health-promoting behaviors:

- **Perceived Susceptibility:** This refers to an individual's belief about the likelihood of experiencing a health problem (31). In STI prevention, perceived susceptibility involves an individual's assessment of their risk of contracting an STI. Factors influencing perceived susceptibility include personal behaviors, such as the number of sexual partners, and demographic factors, such as age and sexual orientation (28).
- **Perceived Severity:** This component pertains to an individual's belief about the seriousness of a health problem and its potential consequences (31). Regarding STIs, perceived severity involves beliefs about the potential health complications associated with untreated infections, such as infertility, chronic pain, or transmission to others (32).
- **Perceived Benefits:** This refers to an individual's belief in the efficacy of the advised action to reduce risk or severity of impact. In STI prevention, perceived benefits encompass beliefs about the effectiveness of preventive measures, such as condom use or regular STI testing, in reducing the risk of infection and its associated complications (33).
- **Perceived Barriers:** This component involves an individual's assessment of the obstacles to behavior change. In the context of STI prevention, perceived barriers may include factors such as cost, embarrassment, lack of access to healthcare services, or misconceptions about the necessity of preventive measures (33).
- **Cues to Action:** These are external events or information that prompt individuals to take health-related actions. Cues to action in STI prevention may include reminders from healthcare providers, media campaigns, or personal experiences, such as a partner's diagnosis, that prompt individuals to seek testing or adopt preventive behaviors (34).
- **Self-Efficacy:** This refers to an individual's confidence in their ability to take action. In the context of STI prevention, self-efficacy involves an individual's belief in their ability to use condoms correctly, negotiate safer sex practices, or seek STI testing and treatment when necessary (30, 34).

These constructs serve as a theoretical foundation for designing and evaluating behavior change interventions, including those focused on STI prevention.

4. Application of HBM in STI prevention

The application of the HBM in STI prevention offers a methodologically grounded and psychologically informed framework for enhancing the effectiveness of health education interventions. By anchoring educational strategies in the model's constructs, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action,

and self-efficacy, public health practitioners can develop programmes that resonate with individual belief systems and sociocultural realities. These constructs serve not merely as theoretical abstractions but as actionable dimensions through which individual health behaviors may be interrogated, influenced, and ultimately transformed. The relationship and interplay among these constructs in shaping preventive behavior are depicted in Figure 1.

Perceived susceptibility pertains to an individual's subjective assessment of their vulnerability to contracting an STI. For example, health education interventions that effectively convey the epidemiological realities of STI prevalence, especially among high-risk groups such as adolescents, young adults, and men who have sex with men, can heighten awareness and prompt reflection on personal risk (35). Evidence from multiple intervention studies has demonstrated that individuals who acknowledge their susceptibility are more inclined to adopt preventive behaviors such as condom use and regular screening (36). Tailored messaging that localizes risk, using demographic data, peer testimonials, or community-level statistics, can amplify this perception and facilitate behavioral responsiveness.

Perceived severity, closely linked to susceptibility, involves an individual's evaluation of the potential consequences associated with STI acquisition. Many STIs, though initially asymptomatic, can result in chronic pain, infertility, complications during pregnancy, and heightened susceptibility to HIV (34). Health education that communicates these outcomes with clarity and empathy, through multimedia content, clinician narratives, or survivor accounts, tends to strengthen individuals' understanding of the stakes involved. A robust perception of severity, when coupled with an accurate understanding of risk, acts as a psychological catalyst for behaviour change (37).

Perceived benefits refer to the individual's belief in the efficacy of recommended preventive measures. For STIs, these include the consistent use of condoms, periodic testing, mutual monogamy, and open partner communication (33). Education programmes must go beyond promoting these behaviours in a generic manner; they must demonstrate their real-world impact in ways that are accessible, credible, and contextually relevant (33, 36). Peer-led sessions, visual demonstrations, and evidence-based testimonials can serve to validate the tangible benefits of protective practices, reinforcing their value within the lived experiences of target populations.

Conversely, perceived barriers, whether financial, social, cultural, or psychological, remain among the most significant impediments to preventive action. These may include the cost of testing, fear of judgement, embarrassment, misinformation, or limited access to health services (38). Effective HBM-based interventions identify and actively dismantle these barriers through a combination of structural support (e.g., free testing services, mobile clinics), normalisation strategies (e.g., community dialogues, public endorsements), and skills-based training (e.g., condom negotiation techniques). In doing so, they reduce friction between knowledge and action, allowing individuals to navigate their health choices with greater agency.

Cues to action operate as external or internal triggers that prompt health-related decisions. These may be as simple as a text message reminder for an upcoming test, a poster in a clinic, or a media campaign during national health week (29). Such cues, though often overlooked, are instrumental in bridging intention and behaviour. Well-designed health education programmes strategically integrate these cues within environments where health decisions are made, schools, clinics, online platforms, thus reinforcing the salience of preventive action (29, 39).

Self-efficacy, the final construct, denotes the individual's confidence in their ability to enact and sustain the recommended behaviours. This is particularly relevant in STI prevention, where stigma, interpersonal dynamics, and cultural constraints may challenge one's capacity to act (40). Interventions that build self-efficacy often employ participatory methods such as role-plays, peer mentoring, and behavioral rehearsals (41). These not only impart knowledge but cultivate a sense of competence, making it more likely that individuals will persist in health-promoting actions even in the face of adversity.

Collectively, the integration of the HBM within health education facilitates a holistic and person-centred approach to STI prevention. By engaging the cognitive, emotional, and contextual factors that shape health decisions, this model empowers individuals to move from awareness to action. Empirical evidence from diverse settings, including Iran, Indonesia, the United States, and sub-Saharan Africa, demonstrates that STI-focused interventions grounded in HBM principles consistently outperform those lacking theoretical underpinning, both in reach and in sustained impact (42).

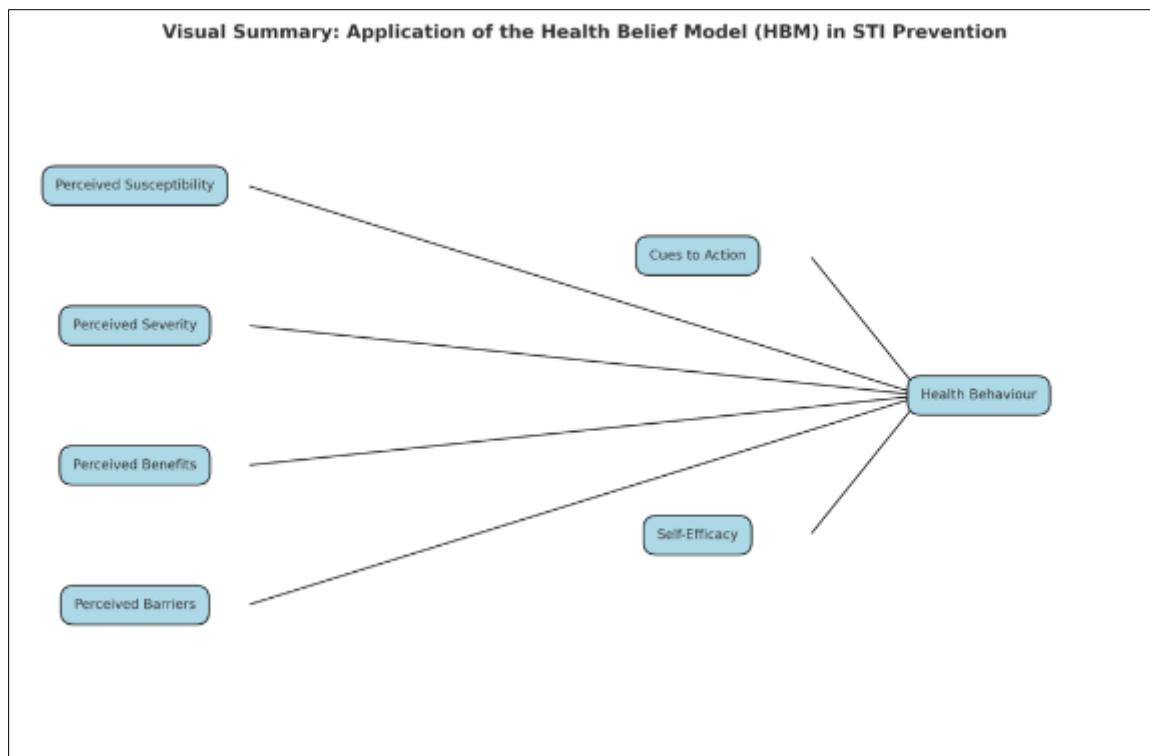


Figure 1 Health Belief Model Constructs in the Context of STI Prevention.

This diagram illustrates how the six core constructs of the Health Belief Model, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy, interact to influence individual decision-making and adoption of preventive behaviours, such as condom use and regular STI testing.

5. Challenges and limitations in health education for sti prevention

Despite the effectiveness of health education interventions, several challenges and limitations hinder their success in STI prevention. One major challenge is the stigma surrounding STI prevention, particularly related to condom use and STI testing. Many individuals feel embarrassed or ashamed to discuss these topics, which can prevent them from seeking help or adopting preventive behaviors (43). Health education programs must address and reduce the stigma associated with STIs to encourage more people to engage in preventative measures.

Another limitation is the accessibility of resources. In many communities, access to STI testing, treatment, and condoms may be limited due to financial, geographical, or social barriers (38). Health education efforts must be paired with increased access to these resources to ensure that individuals can act on the knowledge gained through educational interventions.

Furthermore, cultural and social norms can influence the success of health education interventions. In certain cultures, discussions around sexual health may be taboo, or gender norms may prevent individuals, particularly women, from taking preventive actions (44). Addressing these norms and promoting gender equality in sexual health education is crucial for achieving lasting behavior change.

6. Implications for future health education strategies

Moving forward, there are several key considerations for improving health education strategies aimed at STI prevention. First, integrating technology into health education can increase the reach and accessibility of STI prevention messages. Digital platforms, mobile health applications, and social media campaigns offer new opportunities to engage individuals and provide real-time information about STI prevention.

Second, tailoring interventions to specific populations based on their unique needs and characteristics will increase the effectiveness of health education efforts. Interventions that are culturally relevant and incorporate community input are more likely to resonate with target populations and produce meaningful behavior change.

Lastly, there is a need for long-term sustainability in health education efforts. While short-term campaigns may yield immediate results, sustained education and behavior reinforcement are necessary to reduce STI transmission in the long run. Ongoing education, supported by policy changes that increase access to preventive services, will be key to creating lasting improvements in public health.

7. Conclusion

This study affirms the centrality of health education in the prevention of STIs, foregrounding the HBM as a theoretically rigorous and behavioral framework for shaping sexual health interventions. A synthesis of the extant literature demonstrates that a broad spectrum of health education strategies, spanning public health campaigns, institutional sex education, grassroots outreach, and mediated communication, have tangibly enhanced public comprehension and practice of STI preventive measures. When deliberately aligned with the constructs of the HBM, such interventions not only elevate perceived susceptibility and severity but also fortify belief in the efficacy of preventive actions, dismantle psychological and structural barriers, and reinforce self-efficacy. Furthermore, the incorporation of timely and context-relevant cues to action, such as peer engagement or media prompts, has been shown to catalyze the internalization of protective norms and promote durable behavioral shifts, including routine condom use and regular screening.

Nevertheless, despite their documented utility, HBM-driven health education interventions continue to be encumbered by persistent implementation challenges. Foremost among these is the pervasive stigma surrounding STIs, which operates as a formidable deterrent to open discourse, voluntary disclosure, and timely utilization of health services. Cultural prohibitions and entrenched social mores, particularly in patriarchal or religiously conservative contexts, further inhibit access to sexual health education and care, disproportionately affecting women, adolescents, and sexual minorities. These socio-cultural constraints are exacerbated by structural inequities in healthcare access, resource distribution, and service affordability. Moreover, considerable heterogeneity in the quality, content, and contextual responsiveness of sex education curricula globally underscores the imperative for more locally embedded, culturally literate, and demographically calibrated approaches.

In response to these findings, several strategic recommendations are warranted. First, the development and institutionalisation of comprehensive, evidence-informed sex education programmes must be prioritised, programmes that are not only pedagogically sound but also responsive to cultural diversity and inclusive of marginalised identities, including LGBTQ+ and socio-economically disadvantaged populations. Second, there is a critical need to interrogate and reconfigure prevailing narratives surrounding STIs through targeted anti-stigma campaigns, community-based dialogue, and the mobilization of influential cultural intermediaries capable of reshaping dominant social discourses.

Third, equitable access to preventive sexual health services must be structurally embedded within broader healthcare delivery systems. This includes the decentralization of STI services, integration into primary care, and the expansion of community-based and digital modalities for screening, education, and treatment. Fourth, the mobilization of technology, particularly mobile platforms, interactive media, and AI-driven health communication tools, should be strategically deployed to extend the reach, precision, and personalization of health education interventions.

Finally, the design and deployment of STI-related health education must be accompanied by a robust monitoring and evaluation architecture. Impact assessments, participatory feedback mechanisms, and longitudinal behavior tracking should be institutionalized to ensure the adaptability and responsiveness of interventions. This evidence-generating approach is essential for refining pedagogical strategies, scaling effective models, and ultimately embedding STI prevention within a sustained culture of health literacy and agency.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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