

From Media Literacy to Health Policy: Innovative Approaches to Safeguarding the Online Space from Sexual Health Misinformation: A Policy Brief

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ARTICLE INFO

Article History:

Received: February 1, 2026

Revised: May 26, 2026

Accepted: June 8, 2026

ePublished: August 21, 2026

Keywords:

Information literacy, Health policy, Social media, Health communication, Sexual health, Health promotion

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Abstract

Introduction: The digital space is the primary source of health information for peoples, yet it is saturated with sexual health misinformation. This infodemic poses a direct threat to public health. Current interventions are proving insufficient against this challenge, creating a need for innovative and comprehensive health policy.

Methods: This policy brief was developed using the evidence-informed framework described by Lavis et al., following a four-step process: prioritization of the issue, problem identification, formulation of policy options, and identification of implementation considerations. High-level evidence was derived from an umbrella review evaluating digital intervention efficacy and from preliminary findings of a scoping review mapping educational gaps (currently under peer review).

Results: The evidence synthesis reveals critical systemic deficits, primarily: an engagement gap, a content gap, and a trust deficit. Traditional interventions fail to compete with misinformation due to these structural limitations. To operationalize a secure digital ecosystem, this brief proposes five actionable policy options: (1) Establishing a Digital Health Innovation Fund; (2) Enforcing a Mandatory National e-Health Trust Certification; (3) Revising National Guidelines; (4) Institutionalizing a Specialized Governance Body; and (5) Implementing a National Digital Health Literacy Program.

Conclusion: By operationalizing these evidence-based options, policymakers can transform the digital space from a source of risk into a reliable infrastructure for health promotion, serving as a replicable model for other nations facing similar challenges.

Introduction

Approximately 19% of new HIV diagnoses occur among individuals aged 13–24, and 53% of new sexually transmitted infections are reported in the 15–24 age group.^{1, 2} Traditional barriers such as stigma and lack of youth-friendly services prevent adolescents from accessing care. Digital interventions offer a unique solution to bypass these barriers, providing anonymity and accessibility that traditional clinics cannot offer.²

In an era where the majority of young adults seek health information online,³ the online environment has become a critical, yet hazardous, public square.⁴ Online environments are currently saturated with sexual health misinformation, characterized by inaccurate, misleading, and often harmful content that proliferates significantly faster than factual information.^{4, 5} This infodemic constitutes a direct and escalating threat to the well-being of the current generation, compromising decades of

advancements in public health.⁶

The ramifications of failure to intervene are profound. Unmitigated health misinformation precipitates suboptimal decision-making, exacerbates high-risk behaviors, delays necessary medical care, and imposes a substantial economic burden on public health systems.^{7, 8} Furthermore, it fosters an entrenched distrust in public health authorities, significantly impeding the uptake of future interventions ranging from vaccination campaigns to STI prevention efforts.⁷⁻⁹

While individual media literacy remains a necessary foundation, it is insufficient in isolation. Effective public protection requires a paradigm shift from passive education to active, systemic health policy. This brief proposes innovative, evidence-based strategies to build a resilient regulatory framework that ensures platform accountability and protects the integrity of digital health information.

Methods

This policy brief was developed using the evidence-informed framework described by Lavis et al.¹⁰. The development process followed a systematic approach comprising four key phases: prioritization of the policy issue, clarification of the problem, framing of policy options, and identification of implementation considerations.¹⁰

To ensure the recommendations are grounded in robust scientific evidence, we adopted a targeted evidence synthesis approach. Evidence was derived primarily from two recent reviews conducted by Borji et al.^{2, 11}. The scoping review cited in this brief is currently under peer review; therefore, its findings should be considered preliminary. Its methodology is supported by a published protocol.¹² Together, these sources map the digital sexual health landscape.

The first source was a scoping review,¹¹ that utilized a search strategy with key concepts (Population, Intervention, and Outcome) across databases of Web of Science, PubMed, Scopus, EMBASE, and the Cochrane Library and search engines like Google Scholar, Semantic Scholar, and Elmnt to map the dimensions of digital education.¹¹ The second source was an umbrella review (2024), which synthesized meta-level evidence from systematic reviews regarding intervention efficacy.² This study utilized a search strategy with three broad categories (Sexual health and related issues, digital health interventions, and adolescent) across databases of the search engines and databases of PubMed, Web of Science, Scopus, Chochrane Library, Google Scholar.

These pivotal studies were selected because they provide the most up-to-date and context-specific data available on the target demographic. The scoping review (preliminary findings) specifically addresses content characteristics,¹¹ while the umbrella review offers high-certainty evidence on methodological effectiveness.²

Evidence was extracted at the review level; the primary studies included in the scoping review were not re-analyzed. Key findings related to intervention characteristics, engagement strategies, content focus, and governance mechanisms were systematically reviewed and compared. Through an interpretive thematic synthesis of the reported findings across the two reviews, three recurrent structural gaps were identified: engagement gap, content gap, and trust deficit.

The methodological quality of the systematic reviews included in the umbrella review had been previously assessed using the AMSTAR-2 tool. The appraisal indicated that most reviews were of moderate (n=16) or high quality (n=5), with only a small number rated as low quality (n=2).² Therefore, no additional quality appraisal was conducted for this policy brief; however, the methodological quality reported in the umbrella review was considered when interpreting the evidence.

Initially, the mitigation of sexual health misinformation^{4, 5} was prioritized as a critical policy issue due to its escalating impact on public health outcomes.⁶⁻⁸

To clarify the problem and its context, specific barriers were identified through a preliminary review of current digital health trends.^{11, 12}

To frame policy options, we synthesized high-level evidence from two key reviews.^{2, 11} These findings informed the formulation of policy solutions tailored to address the identified content gaps.

Finally, keeping with the framework's emphasis on applicability, the proposed options were assessed for implementation considerations rather than simple prioritization. We mapped the options to the local context to evaluate feasibility, potential barriers, and ethical implications.

Results

As illustrated in the conceptual framework (Figure 1), the evidence for this policy brief was synthesized from two reviews,^{2, 11} representing a total of 74 primary studies.

The study selection processes for the scoping review and umbrella review are presented in Figures 2 and 3, respectively.

The analysis of these datasets allowed for a mapping of the current digital sexual health landscape, identifying structural deficiencies in content, delivery, and governance. In line with the status of the scoping review as a work currently under peer review, the findings derived from this source should be interpreted as preliminary and subject to potential changes upon final publication. The synthesis highlighted three critical gaps necessitating targeted policy interventions:

First, a pronounced engagement gap is evident within the digital health landscape. While traditional text-based

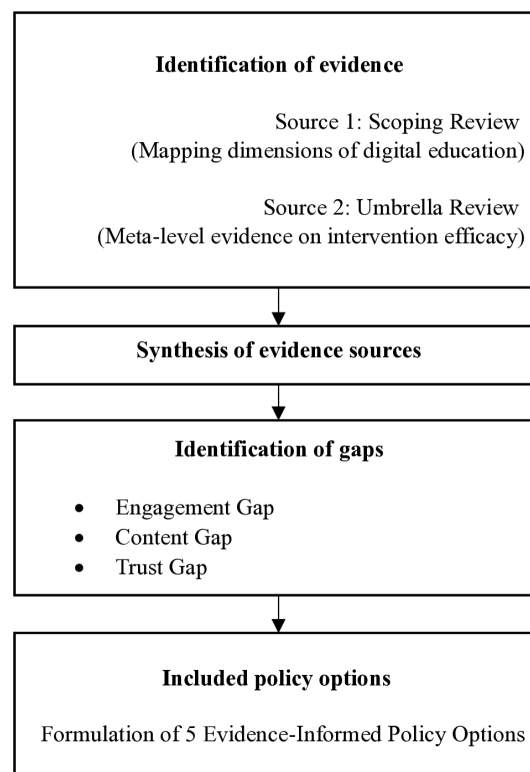
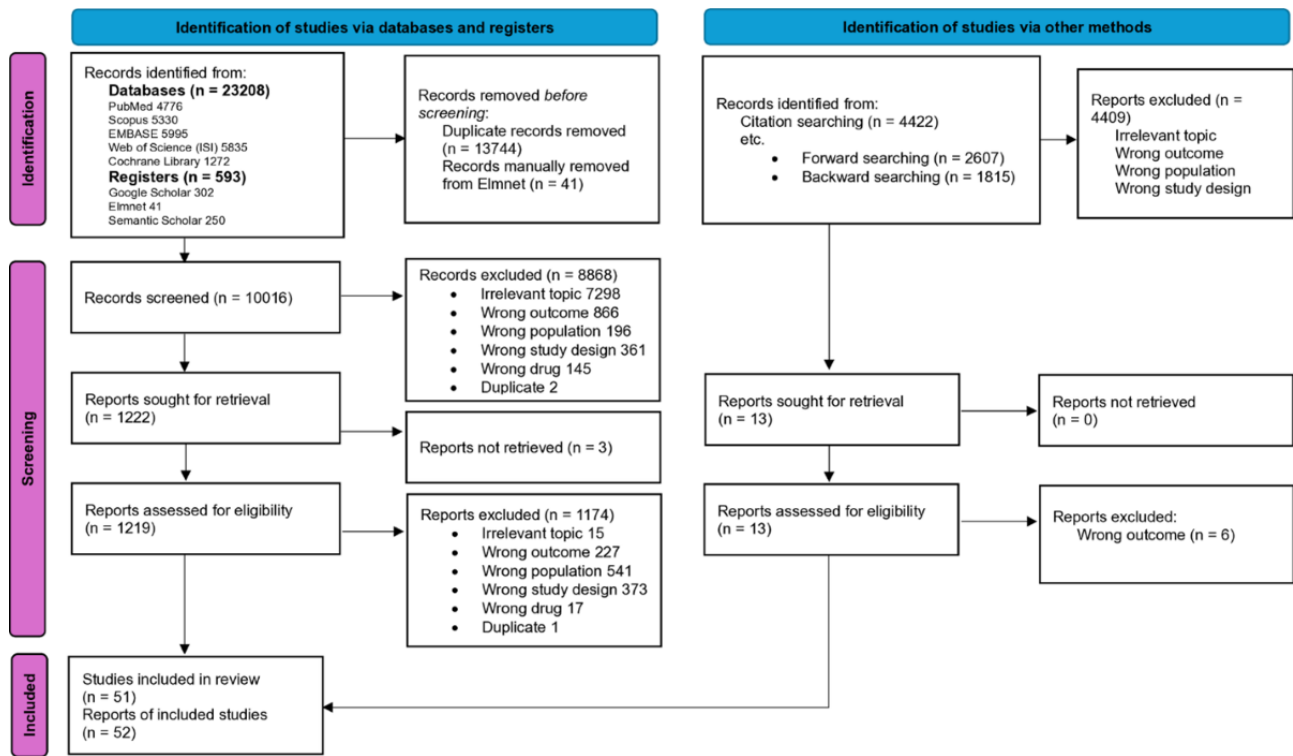
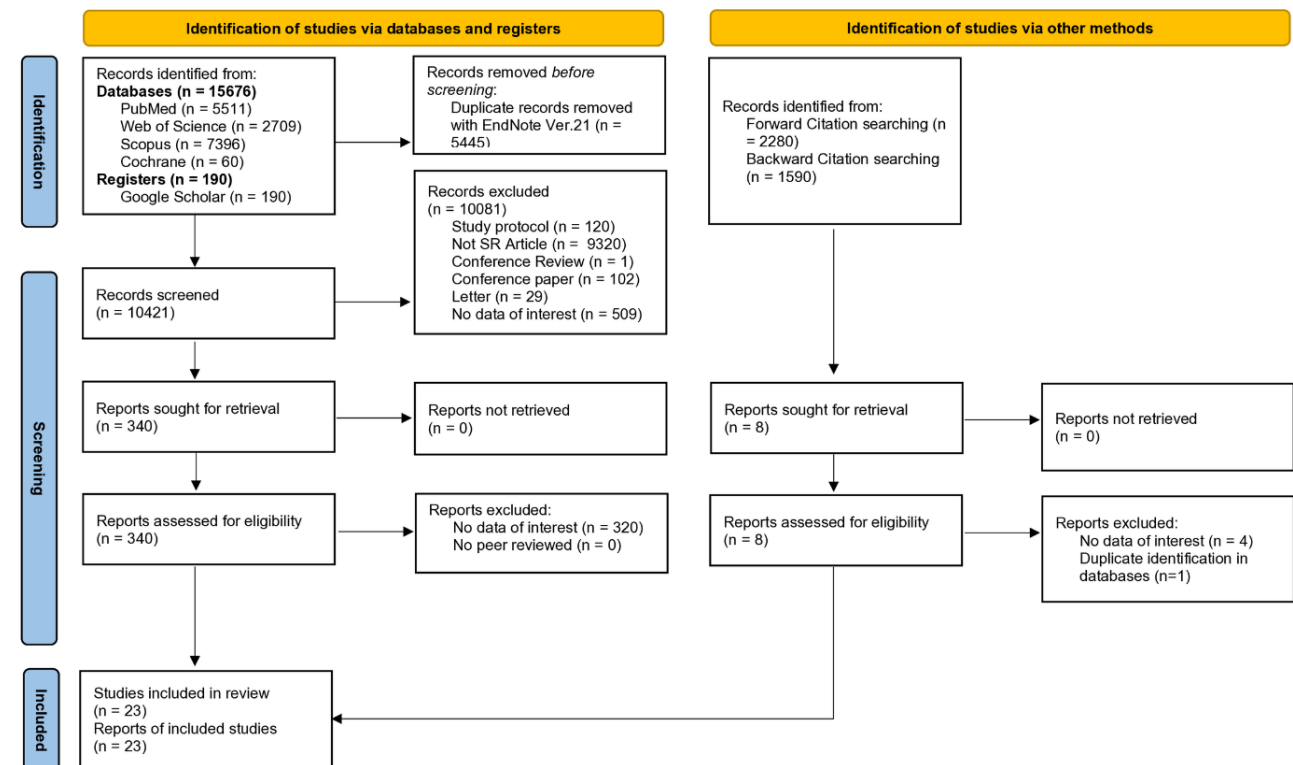


Figure 1. Conceptual process of evidence selection and policy option formulation

Figure 2. PRISMA flow diagram (Scoping review). Source: Borji et al.¹¹

SR= Systematic review

Figure 3. PRISMA flow diagram (Umbrella review). Source: Borji et al.²

interventions, such as SMS,^{13, 14} demonstrate efficacy for discrete clinical endpoints, they are often insufficient to sustain the longitudinal engagement necessary for complex behavioral modification. In contrast, interactive modalities, particularly gamified applications,¹⁵⁻¹⁹ have been shown to significantly enhance self-efficacy and user

retention among the youth demographic.¹¹

Furthermore, a substantial discrepancy exists between user requirements and official content strategies. Existing institutional interventions predominantly prioritize a biomedical and pathology-oriented framework. The absence of holistic content addressing key topics such as

healthy relationships and consent creates a critical gap, leading adolescents to seek information from unverified and frequently misleading commercial source.¹¹

Finally, trust remains a primary determinant of intervention uptake. The analysis reveals that users exhibit significant reluctance to engage with platforms characterized by opaque data governance. Consequently, the target demographic frequently prioritizes anonymity over accuracy, favoring unreliable commercial channels over official platforms due to privacy apprehensions.¹¹

Policy Options

To bridge the gap between media literacy and health policy, several structural interventions are required. Table 1 summarizes the key evidence from the source reviews that directly supports each proposed policy option.

To effectively address the three critical deficiencies identified in the evidence synthesis, five distinct policy options were formulated. These options were derived from the findings of the included reviews.^{2, 11} For every identified structural barrier, a corresponding policy intervention was designed to mitigate it. The proposed options were then prioritized based on their potential public-health impact, feasibility within the current national infrastructure, and their structural interdependencies. Based on interdependencies among the options, we propose a phased implementation sequence in which Option 4 (governance) precedes the development of standards (Option 2) and the certification mechanism (Option 5), forming a core foundational package. Options 1 and 3 can follow once the governance and standards infrastructure is established.

Below is an analysis of the five proposed options, including their potential advantages and implementation challenges. These options represent actionable administrative and regulatory measures designed to transition the current landscape from a restrictive approach to a supportive digital ecosystem.

Option 1: Establishment of a Digital Health Innovation Fund

Instead of general funding for static websites, the Ministry of Health should allocate specific grants dedicated to immersive technologies. This policy entails redirecting financial resources toward the development of AI-driven and gamified tools that can compete with misinformation in terms of user experience (UX) and interactivity. The primary advantage of this strategy is that it directly incentivizes the creation of high-retention platforms, aligning national interventions with global trends in youth-friendly digital health. However, the requirement for significant initial financial investment and the need for ongoing technical maintenance (which typically requires allocating 15% to 20% of the initial development costs annually),^{20, 21} may strain limited public sector budgets.

Option 2: Implementation of a Mandatory National e-Health Trust Certification

To standardize quality, regulatory bodies must enforce a certification system. This policy option requires apps to meet strict end-to-end encryption and scientific accuracy standards to receive a government-endorsed trust certification, creating a visible trusted environment for users. This approach offers the critical benefit of creating a visible safe zone, allowing users to ensuring data privacy. Conversely, a barrier to implementation is resistance from developers due to strict compliance costs, alongside the need for a robust technical infrastructure for continuous monitoring and auditing.

Option 3: Revision of National Sexual Health Education Guidelines

This option involves a regulatory update to the national health curriculum and online content standards. It mandates the inclusion of holistic and psychosocial topics in all state-approved digital interventions to ensure content meets the actual needs of the target demographic.

Table 1. Summary of evidence supporting the proposed policy options

#	Policy Option	Key Findings / Supporting Evidence
1	Establishment of a digital health innovation fund	There is a significant lack of culturally adapted interventions and studies in low-resource/LMIC settings. Funding is required to bridge this gap, support local innovations, and design platforms capable of sustaining long-term behavioral change. ^{2, 11}
2	Implementation of a mandatory national e-Health trust certification	While digital health interventions effectively improve knowledge and reduce risky behaviors, long-term behavior change remains inconsistent. A certification system is necessary to ensure that available apps and platforms meet high-quality, evidence-based standards to combat misinformation effectively. ²
3	Revision of national sexual health education guidelines	A review of 51 studies revealed that digital interventions predominantly focus on a disease-prevention model, specifically HIV/STIs prevention (n=33) and safer sex practices (n=26). Conversely, broader and rights-based topics, such as sexual identity, gender, and rights, are severely underrepresented (n=3). This highlights the urgent need to revise guidelines to ensure comprehensive, inclusive, and rights-oriented content. ¹¹
4	Institutionalization of a Specialized Digital Health Governance Body	The digital health landscape is highly fragmented, employing diverse delivery vehicles such as web-based platforms (27%), SMS systems (24%), mHealth apps, and emerging interactive formats like gamification. A dedicated governance body is essential to oversee, standardize, and evaluate this diverse ecosystem effectively. While digital interventions successfully drive short-term knowledge gains and health screening uptake, their impact on long-term behavioral change (e.g., sustained condom use, vaccination rates) is inconsistent. Furthermore, qualitative evidence highlights that user engagement depends on features like personalization, anonymity, and cultural appropriateness. A specialized governance body is essential to establish long-term evaluation frameworks and standardize these interventions for sustained impact. ¹¹
5	Implementation of a National Digital Health Literacy Program	Digital interventions are proven to significantly enhance sexual health knowledge, improve health literacy, and increase the uptake of screening services. A national program would scale these validated benefits to empower youth to safely navigate online spaces. ^{2, 11}

The strategic merit of this option lies in ensuring content relevance, thereby filling the information void that currently drives adolescents toward unverified commercial sources. Nevertheless, necessitating extensive training for content creators and educators to align with the new standards.

Option 4: Institutionalization of a Specialized Digital Health Governance Body

To ensure sustainability and accountability, a dedicated national task force or steering committee should be established. This centralized entity would act as the primary steward for digital sexual health, responsible for orchestrating inter-sectoral collaboration, overseeing the certification process, and monitoring the long-term impact of digital interventions on public health outcomes. The distinct advantage of this governance model is that it ensures centralized accountability and prevents the fragmentation of efforts across different organizations. However, the establishment of such a body faces the challenge of requires a clear mandate to effectively coordinate between diverse stakeholders, such as the Ministries of Health, Education, and Information and Communications Technology (ICT).

Option 5: Implementation of a National Digital Health Literacy Program

To address the demand side of the information ecosystem, this policy mandates the integration of digital health literacy into public education and community outreach programs. The objective is to equip the target demographic with the critical skills necessary to evaluate the credibility of online sexual health sources, thereby reducing susceptibility to algorithmic misinformation. This policy empowers users to independently navigate the digital space, providing a sustainable defense against misinformation regardless of platform changes. Yet, it must be noted that this is a long-term strategy; results will be gradual rather than immediate, and curriculum integration can be a slow process.

Table 2 presents a prioritization matrix evaluating the five proposed policy options based on their potential impact, technical and political feasibility, financial cost, and estimated time to implementation.

Implementation Considerations

Implementation of the proposed options depends on feasibility, anticipated barriers, and their structural interdependencies. A phased approach is therefore

required. Establishing a central governance body (Option 4) is the most immediately feasible step, leveraging existing institutional structures. Developing national standards (Option 2) and a certification mechanism (Option 5) requires technical capacity and sustained cross-sectoral coordination. Barriers include potential resistance from developers, limited public-sector resources, and disparities in digital access that may constrain the effectiveness of literacy and curriculum-related interventions (Options 1 and 3). All options must align with national data-protection principles, with special attention to avoiding widened inequities for adolescents with limited digital access.

Furthermore, ethical considerations and safeguards must be centrally integrated into the rollout. While the mandatory certification system (Option 2) aims to protect users, it risks introducing unintended harms such as government overreach, privacy violations, and the exclusion of valuable, grassroots community sources that lack the financial or technical resources to undergo formal certification. To mitigate these risks, the governance body must ensure that the certification criteria are fully transparent, strictly limited to verifying scientific accuracy and data security (without monitoring individual user activity), and include accessible, tiered evaluation pathways to support non-profit and community-driven platforms.

Furthermore, successful execution requires a clear understanding of the involved actors and potential friction points. Table 3 outlines a stakeholder analysis, identifying the lead organizations for each policy option and the anticipated sources of resistance.

To ensure coherence and reduce implementation risks, a staged rollout is recommended:

1. Option 4 – Governance body: foundational coordination and oversight.
2. Option 2 – National standards: developed under the governance structure.
3. Option 5 – Certification mechanism: operationalized once standards exist.
4. Options 1 and 3 – Innovation funding and curriculum reform: introduced after the regulatory framework is established.

Discussion

This policy brief advocates for a fundamental paradigm shift in managing digital sexual health: moving from a framework of individual responsibility to one of systemic accountability. Our findings underscore that the failure of

Table 2. Prioritization Matrix for Proposed Policy Options

#	Policy Option	Impact	Feasibility	Cost	Time to Implementation
1	Establishment of a digital health innovation fund	High	Medium	High	Long-term
2	Implementation of a mandatory national e-Health trust certification	High	Medium	Medium	Medium-term
3	Revision of national sexual health education guidelines	Medium	High	Low	Short-term
4	Institutionalization of a Specialized Digital Health Governance Body	High	Low	High	Long-term
5	Implementation of a National Digital Health Literacy Program	Medium	High	Medium	Short-term

Table 3. Stakeholder Analysis and Potential Resistance

#	Policy Option	Lead Actors	Potential Points of Resistance
1	Establishment of a digital health innovation fund	Ministry of Health; Ministry of Technology/Economy; Private Investors	Fiscal conservatives (budget constraints); tech startups (bureaucratic funding processes).
2	Implementation of a mandatory national e-Health trust certification	Ministry of Health; National Medical Councils	Platform owners (compliance costs); public/digital rights groups (concerns over censorship or privacy).
3	Revision of national sexual health education guidelines	Ministry of Health; Academic and Research Institutions	Conservative cultural or political groups (due to sensitivities surrounding sexual health topics).
4	Institutionalization of a Specialized Digital Health Governance Body	Ministry of ICT [†] ; Ministry of Health; Judiciary	Existing regulatory agencies (turf wars/loss of jurisdiction); civil rights organizations (over-regulation fears).
5	Implementation of a National Digital Health Literacy Program	Ministry of Education; Public Health NGOs [†] ; Mass Media	Educational boards (curriculum overload); teachers (lack of specialized training).

ICT: Information and Communications Technology; [†] NGOs: Non-governmental organization.

current interventions stems not from a scarcity of medical information, but from structural deficits in engagement mechanisms, content relevance, and institutional trust.

To address these deficits, the proposed digital ecosystem approach was evaluated against two prevailing models identified in global strategies: the restrictive model and the literacy-only model.²²⁻²⁵ While many nations rely on filtering or blocking misinformation,²⁶ our analysis suggests this method is reactive and ultimately insufficient against the high velocity of myths.²⁷⁻²⁹ Furthermore, restrictive measures often yield counterproductive results, inadvertently driving users toward channels where misinformation proliferates unchecked.³⁰ Similarly, while digital literacy is vital, relying solely on users to distinguish credible information places an undue cognitive burden on individuals who remain vulnerable to sophisticated algorithmic manipulation.^{31, 32} In contrast, the recommended ecosystem approach addresses the root cause by saturating the digital space with high-quality, scientifically accurate, and engaging alternatives.

The justification for the proposed policy options is rooted in the synthesized evidence. The recommendation to establish a digital health innovation fund (Option 1) directly addresses the engagement gap highlighted, acknowledging that static content lacks the retention power of gamified interventions.^{2, 11} Concurrently, the proposal for a mandatory e-Health trust certification (Option 2) targets the trust deficit. Unlike voluntary guidelines, a state-endorsed certification creates a visible differentiator, allowing evidence-based platforms to compete effectively with anonymous commercial sources.^{2, 11} Crucially, the inclusion of a governance body (Option 4) as the initial step, followed by national standards (Option 2) and a certification mechanism (Option 5), forms the foundational package upon which the other measures rest. The inclusion of holistic guidelines (Option 3) ensures that these initiatives are not transient, but are sustained through centralized stewardship and responsiveness to user needs.^{2, 11}

The adoption of these recommendations carries profound multi-level implications. From a public health perspective, the transition from passive information dissemination to active skills-building (via Option 5) is expected to mitigate high-risk behaviors. Economically, this represents a strategic pivot from costly treatment

models to cost-effective digital prevention. Most critically, establishing secure, state-sanctioned platforms will help restore the eroded trust between the youth population and public health authorities, ensuring that valid science reclaims its position as the dominant voice in the digital sphere.

Conclusion

The unmitigated proliferation of sexual health misinformation constitutes a critical determinant of public health, exacerbating risky behaviors and widening the disconnect between adolescents and credible care systems. This policy brief demonstrates that the prevailing reliance on static, pathology-oriented, and unregulated platforms is insufficient to address the evolving needs of the digital-native demographic.

Drawing upon a synthesis of high-level evidence, this study proposes a comprehensive digital ecosystem strategy founded on five strategic imperatives. To reform the supply side, the policy prioritizes the establishment of a digital health innovation fund and the enforcement of mandatory trust certification protocols alongside updated content guidelines. Crucially, to ensure sustainability and user empowerment, the framework mandates the institutionalization of a specialized governance body for centralized stewardship and the implementation of a national digital health literacy program.

The systemic operationalization of these evidence-informed policy options offers a viable pathway to reconfigure the digital environment from a domain of risk into a robust infrastructure for health promotion. Ultimately, the successful deployment of this secure, and engaging ecosystem could serve as a replicable model for nations navigating the complexities of the global infodemic, demonstrating how evidence-based governance can effectively safeguard public health.

Acknowledgments

The authors acknowledge the use of an AI language model for assistance with translating, writing and editing this manuscript. The authors reviewed and edited the content generated by the AI tool and maintain full oversight and responsibility for the final content.

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Competing Interests

The authors declare that they have no competing interests.

Ethical Approval

Not applicable.

Funding

This study has not been financially supported.

References

- Centers for Disease Control and Prevention (CDC). Sexual Risk Behaviors. CDC; 2025. Available from: <https://www.cdc.gov/youth-behavior/risk-behaviors/sexual-risk-behaviors.html>. Accessed May 26, 2025.
- Borji-Navan S, Maleki N, Keramat A. Efficacy of digital health interventions used for adolescent's sexual health: an umbrella review. *Health Sci Rep* 2024;7(12):e70212. doi:10.1002/hsr2.70212
- Mendes Á, Abreu L, Vilar-Correia MR, Borlido-Santos J. "That should be left to doctors, that's what they are there for!"-exploring the reflexivity and trust of young adults when seeking health information. *Health Commun* 2017;32(9):1076-81. doi:10.1080/10410236.2016.1199081
- Swire-Thompson B, Lazer D. Public health and online misinformation: challenges and recommendations. *Annu Rev Public Health* 2020;41:433-51. doi:10.1146/annurev-publhealth-040119-094127
- Collier R. Containing health myths in the age of viral misinformation. *CMAJ* 2018;190(19):E578. doi:10.1503/cmaj.180543
- van der Linden S. Misinformation: susceptibility, spread, and interventions to immunize the public. *Nat Med* 2022;28(3):460-7. doi:10.1038/s41591-022-01713-6
- Okoro YO, Ayo-Farai O, Maduka CP, Okongwu CC, Sodamade OT. A review of health misinformation on digital platforms: challenges and countermeasures. *Int J Appl Res Soc Sci* 2024;6(1):23-36. doi:10.51594/ijarss.v6i1.689
- Denniss E, Lindberg R. Social media and the spread of misinformation: infectious and a threat to public health. *Health Promot Int* 2025;40(2):daaf023. doi:10.1093/heapro/daaf023
- Zucker HA. Tackling online misinformation: a critical component of effective public health response in the 21st century. *Am J Public Health* 2020;110(S3):S269. doi:10.2105/ajph.2020.305942
- Lavis JN, Permanand G, Oxman AD, Lewin S, Fretheim A. SUPPORT Tools for evidence-informed health Policymaking (STP) 13: preparing and using policy briefs to support evidence-informed policymaking. *Health Res Policy Syst* 2009;7(Suppl 1):S13. doi:10.1186/1478-4505-7-s1-s13
- Borji-Navan S, Salehin S, Naseri-BooriAbadi T, Goli S, Mirghafourvand M. Dimensions and Characteristics of Digital Platforms for Young Adults (18–35 years) Sexual Health Education: A Scoping Review. Manuscript under review. 2026.
- Borji-Navan S, Salehin S, Naseri-BooriAbadi T, Goli S, Mirghafourvand M. Digital sexual health education for young adults (18-35 years): a scoping review protocol. *Health Sci Rep* 2025;8(5):e70738. doi:10.1002/hsr2.70738
- Njuguna N, Ngure K, Mugo N, Sambu C, Sianyo C, Gakuo S, et al. The effect of human immunodeficiency virus prevention and reproductive health text messages on human immunodeficiency virus testing among young women in rural Kenya: A Pilot Study. *Sex Transm Dis* 2016;43(6):353-9. doi:10.1097/olq.0000000000000450
- Lim MS, Hocking JS, Aitken CK, Fairley CK, Jordan L, Lewis JA, et al. Impact of text and email messaging on the sexual health of young people: a randomised controlled trial. *J Epidemiol Community Health* 2012;66(1):69-74. doi:10.1136/jech.2009.100396
- Darville-Sanders G, Anderson-Lewis C, Stellerfson M, Lee YH, MacInnes J, Pigg RM, et al. mHealth video gaming for human papillomavirus vaccination among college men-qualitative inquiry for development. *Mhealth* 2022;8:22. doi:10.21037/mhealth-21-29
- Brüll P, Ruiter RA, Wiers RW, Kok G. Gaming for safer sex: young German and Turkish people report no specific culture-related preferences toward educational games promoting safer sex. *Games Health J* 2016;5(6):357-65. doi:10.1089/g4h.2016.0016
- Jin SA. Leveraging avatars in 3D virtual environments (*Second Life*) for interactive learning: the moderating role of the behavioral activation system vs. behavioral inhibition system and the mediating role of enjoyment. *Interact Learn Environ* 2011;19(5):467-86. doi:10.1080/10494820903484692
- Evans AE, Edmundson-Drane EW, Harris KK. Computer-assisted instruction: an effective instructional method for HIV prevention education? *J Adolesc Health* 2000;26(4):244-51. doi:10.1016/s1054-139x(99)00093-2
- Kiene SM, Barta WD. A brief individualized computer-delivered sexual risk reduction intervention increases HIV/AIDS preventive behavior. *J Adolesc Health* 2006;39(3):404-10. doi:10.1016/j.jadohealth.2005.12.029
- Alija N. Justification of software maintenance costs. *International Journal of Advanced Research in Computer Science and Software Engineering* 2017;7(3):15-23.
- Sneed HM. A cost model for software maintenance & evolution. In: 20th IEEE International Conference on Software Maintenance. Chicago, IL: IEEE; 2004. p. 264-73. doi:10.1109/icsm.2004.1357810
- United Nations International Children's Emergency Fund (UNICEF). Policy Guidance on AI for Children. UNICEF; 2021.
- Livingstone S, Third A. Children and young people's rights in the digital age: an emerging agenda. *New Media Soc* 2017;19(5):657-70. doi:10.1177/1461444816686318
- Third A, Livingstone S, Lansdown G. Recognizing children's rights in relation to the digital environment: challenges of voice and evidence, principle and practice. In: *Research Handbook on Human Rights and Digital Technology*. Edward Elgar Publishing; 2025. p. 325-60. doi:10.4337/9781035308514.00026
- United Nations Educational, Scientific and Cultural Organization (UNESCO). Recommendation on the Ethics of Artificial Intelligence. New York: UNESCO; 2022.
- Deibert R, Palfrey J, Rohozinski R, Zittrain J. Access Denied: The Practice and Policy of Global Internet Filtering (Information Revolution and Global Politics). The MIT Press; 2008.
- Vosoughi S, Roy D, Aral S. The spread of true and false news online. *Science* 2018;359(6380):1146-51. doi:10.1126/science.aap9559
- Lewandowsky S, Ecker UK, Seifert CM, Schwarz N, Cook J. Misinformation and its correction: continued influence

- and successful debiasing. *Psychol Sci Public Interest* 2012;13(3):106-31. doi:[10.1177/1529100612451018](https://doi.org/10.1177/1529100612451018)
29. Bak-Coleman JB, Kennedy I, Wack M, Beers A, Schafer JS, Spiro ES, et al. Combining interventions to reduce the spread of viral misinformation. *Nat Hum Behav* 2022;6(10):1372-80. doi:[10.1038/s41562-022-01388-6](https://doi.org/10.1038/s41562-022-01388-6)
30. Cinelli M, De Francisci Morales G, Galeazzi A, Quattrociocchi W, Starnini M. The echo chamber effect on social media. *Proc Natl Acad Sci U S A* 2021;118(9):e2023301118. doi:[10.1073/pnas.2023301118](https://doi.org/10.1073/pnas.2023301118)
31. Livingstone S, Sefton-Green J. *The Class: Living and Learning in the Digital Age*. NYU Press; 2016.
32. Zuboff S. The age of surveillance capitalism. In: Longhofer W, Winchester D, eds. *Social Theory Re-Wired*. 3rd ed. Routledge; 2023. p. 203-13. doi:[10.4324/9781003320609-27](https://doi.org/10.4324/9781003320609-27)