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Narrative Review

VIRTUAL SOCIETY AND HEALTH IN THE DIGITAL ERA: OPPORTUNITIES, RISKS, AND STRATEGIES FOR DIGITAL HEALTH LITERACY

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ABSTRACT

Background: Type 2 diabetes mellitus (T2DM) is an important public health concern, and prevention-related behaviors can begin during childhood.
Objectives: This study examined to critically synthesize evidence on virtual society, digital health literacy, and institutional responses in Indonesia.
Methods: This narrative review draws on targeted PubMed-indexed literature and WHO, Indonesian Ministry of Health, APJII, and digital-use institutional sources, primarily from 2021–August 2026. Evidence was organized by source type and synthesized across participation, behavior, misinformation, equity, and governance.
Results: Online communities may improve support and patient activation, but evidence for sustained behavior change and clinical outcomes is less consistent. Digital health literacy requires source appraisal, uncertainty interpretation, privacy awareness, and appropriate referral. The authors propose five linked institutional functions: credibility, participation, literacy, governance, and evaluation.
Conclusion: Indonesia needs inclusive, professionally supported digital health communication, distinguished from health-data infrastructure such as SATUSEHAT. The proposed framework requires contextual evaluation.

Keywords: Virtual Society, Digital Health Literacy, Social Media, Health Misinformation, Online Health Community.

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INTRODUCTION

The concept of community has historically been associated with shared territory, repeated social interaction, common norms, and collective identity. The original manuscript used this territorial conception as a point of departure and then described the emergence of "cyber" or virtual communities, in which interaction is no longer dependent on physical co-presence. It also emphasized that the internet enables interaction across place and time and creates communities around shared interests rather than geographical proximity. These ideas remain relevant, but the contemporary digital environment is substantially more complex than the early web described in the source manuscript, which focused on websites, chat rooms, blogs, and early social networking. Today, virtual society is shaped by mobile-first access, platform algorithms, creator economies, artificial intelligence, telehealth, patient portals, online peer-support groups, and integrated health-data ecosystems.

This transformation is particularly important for health. Health information is no longer produced and distributed only by governments, hospitals, universities, professional organizations, or mass media. Patients, caregivers, health professionals, influencers, commercial actors, and automated systems simultaneously produce, remix, rank, recommend, and contest health claims. Consequently, the virtual community has become both a social infrastructure and an information environment in which people interpret symptoms, seek emotional support, compare treatments, assess professional advice, and make decisions about prevention and care. WHO's current digital-health strategy places equitable, person-centred and sustainable digital transformation at the centre of health-system development, and the strategy was extended through 2027 as digital health became increasingly integral to resilient health systems (World Health Organization [WHO], 2025a, 2025b).

Indonesia provides a highly relevant setting for this discussion because internet and social-media use are embedded in everyday communication, while health services are simultaneously undergoing digital transformation. APJII continues to publish national internet surveys, and DataReportal's 2025–2026 country profiles describe a large digitally connected population with extensive social-platform use (Asosiasi Penyelenggara Jasa Internet Indonesia [APJII], 2026; DataReportal, 2026). In the health sector, SATUSEHAT has been developed as a national health information exchange intended to connect health facilities, regulators, payers, and digital service providers through standardized data exchange (Kementerian Kesehatan Republik Indonesia, 2024a). Thus, the Indonesian "virtual society" is increasingly linked not only to communication but also to health-service infrastructure.

The benefits of this shift are substantial. Digital interventions and online health communities can strengthen patient activation, social support, self-management, and access to health knowledge. A 2024 systematic review and meta-analysis found that digital interventions, including online health communities, improved patient activation, while also noting that equity challenges remained insufficiently addressed (Abdelraheem et al., 2024). Social media can also disseminate research evidence to health professionals and support public health campaigns, although effects depend on content, platform, audience, and the outcome being measured (Roberts-Lewis et al., 2024; Draganidis et al., 2024). In Indonesia, a randomized controlled trial demonstrated that social-media advertising could encourage diabetes self-screening, illustrating the potential for carefully designed digital nudges to support preventive behavior (Fritz et al., 2024).

At the same time, virtual society creates a new public-health vulnerability: the same architecture that accelerates credible information also accelerates misinformation. WHO defines an infodemic as an overabundance of information, including false or misleading information, that can generate confusion, risky behavior, distrust, and weakened public-health response (WHO, 2024a). Reviews consistently show that health misinformation is not a marginal phenomenon; its visibility is shaped by emotional salience, social endorsement, user susceptibility, platform design, and algorithmic amplification (Borges do Nascimento et al., 2022; Nan et al., 2022; Ziapour et al., 2024). The emergence of generative artificial intelligence further increases the speed and scale at which persuasive but inaccurate health content can be produced.

The key research gap is therefore conceptual and practical. Earlier discussions often framed the internet primarily as a communication medium and asked whether online interaction strengthens or weakens social relationships. Current health research requires a broader question: under what conditions does virtual society improve health capability, and under what conditions does it increase informational, behavioral, psychological, or equity-related risk? This review aims to update the original discussion of virtual communities by synthesizing contemporary evidence on virtual society and health, with particular attention to online health communities, health communication, digital health literacy, misinformation, equity, and institutional strategies relevant to Indonesia.

Development

This narrative review critically reinterprets the relationship between virtual society and health using contemporary research and institutional documents. It does not aim to estimate a pooled effect or claim systematic-review completeness. The unit of synthesis was a finding relevant to health-information production, interpretation, trust, action, or governance. Empirical studies, systematic reviews and meta-analyses, and official policy or technical documents were considered distinct evidence categories; policy documents were used to describe institutional arrangements rather than to establish intervention effectiveness.

The original review describes targeted identification of PubMed-indexed literature and institutional materials from the World Health Organization (WHO), Indonesian Ministry of Health/SATUSEHAT, APJII, and national digital-use reports, emphasizing publications from 2021 to August 2026. Its reported concepts were virtual community, online health community, social media, digital health literacy, health misinformation, infodemic, patient activation, peer support, health promotion, and Indonesia. A reproducible example search expression for a future search update is: ("online health communit*" OR "social media" OR "virtual communit*") AND ("digital health literacy" OR misinformation OR "patient activation" OR "health promotion"). This expression is proposed for verification and is not represented as a verbatim record of the original searches. The precise search dates, full search histories, and retrieval counts were not documented in the source manuscript and cannot be reconstructed reliably.

Sources were included in the narrative synthesis when they addressed virtual health interaction, peer support, health promotion, misinformation, digital health literacy, equity, or institutional governance and supplied interpretable findings or authoritative policy context. Relevance was judged against these domains, with preference for peer-reviewed syntheses and

empirical designs for effect-related claims and official documentation for national systems. Anecdotal material without an identifiable source and material unrelated to health communication were not used as evidence of effectiveness. No formal duplicate screening, quality scoring, or independent-reviewer agreement was documented. Accordingly, the review reports a critical thematic interpretation rather than a reproducible systematic selection. Conflicting findings and differences in populations, platforms, study designs, and outcome measures were explicitly considered; engagement outcomes were distinguished from behavior and clinical outcomes.

This review used publicly available published literature and policy documents and did not involve human participants, identifiable personal data, or primary data collection; therefore, formal research ethics approval was not required.

DISCUSSION

From Virtual Community to Platform-Mediated Health Society

Virtual health participation encompasses explicitly joined patient communities and less visible algorithmically assembled audiences. Across the literature, social endorsement and accessible communication can increase interaction, but platform visibility is not evidence of medical accuracy. Indonesian qualitative research on physician content creators illustrates the potential for professional counter-messaging, while its design does not establish causal improvements in clinical outcomes (Anjelia et al., 2024).

This networked structure changes authority. In traditional health communication, institutional status strongly influenced credibility. In virtual communities, perceived authenticity, relatability, frequency of posting, peer endorsement, and visual presentation can compete with formal expertise. Studies of social-media engagement show that supportive, emotive, and accessible communication can increase interaction with health-professional content (Moorhead-related evidence updated by systematic synthesis; see Roberts-Lewis et al., 2024). Indonesian qualitative evidence likewise shows that physicians acting as content creators can play an important role in countering health hoaxes, myths, and stigma, but their effectiveness depends on communication style as well as professional credibility (Anjelia et al., 2024).

Access, Peer Support, and Patient Activation

Evidence for online peer support is strongest for informational exchange, perceived support, and patient activation. The systematic synthesis of Abdelraheem et al. (2024) concerns activation across heterogeneous digital interventions; it should not be interpreted as uniform evidence of improved clinical outcomes. The chronic-pain forum study by Necaise and Amon (2024) describes interaction patterns in a specific community, with limited generalizability to other conditions or populations. Peer experience may complement professional advice but cannot independently validate treatment safety or efficacy.

The health value of virtual communities, however, depends on whether peer experience complements rather than substitutes for appropriate professional care. Experiential knowledge is valuable for coping and self-management, but individual anecdotes cannot establish treatment effectiveness or safety. This distinction is especially important when community norms become strong enough to discourage evidence-based care. Health professionals

therefore need to engage online communities without dismissing lived experience; a productive model is collaborative interpretation, in which professional evidence and patient experience are connected while their epistemic roles remain clear.

Health Promotion and Behavior Change

Social media and virtual networks can extend health promotion beyond the clinic. Systematic reviews report that social media can support dissemination of research evidence, mental-health campaigns, physical-activity promotion, oral-health promotion, and other preventive behaviors, although heterogeneity across interventions is substantial (Roberts-Lewis et al., 2024; Draganidis et al., 2024; Buja et al., 2024). The Indonesian randomized trial by Fritz et al. (2024) is particularly relevant: targeted Facebook messages increased engagement with diabetes self-screening, showing that digital platforms can be used not only to distribute information but also to create measurable pathways toward preventive action.

The reviewed health-promotion literature covers different audiences, formats, and outcomes. Roberts-Lewis et al. (2024) examined research dissemination among health and social-care practitioners, whereas Draganidis et al. (2024) addressed mental-health campaign engagement and help seeking; these outcomes are not directly interchangeable. Buja et al. (2024) focused on physical activity among university students. In Indonesia, Fritz et al. (2024) used a randomized design to examine diabetes self-screening responses to Facebook advertising. Taken together, the studies support context-specific opportunities for reach and action, not a general claim of sustained behavior change or clinical benefit.

Misinformation, Infodemics, and the Crisis of Trust

The principal risk of virtual health society is the collapse of traditional information gatekeeping without an equivalent increase in users' verification capacity. WHO emphasizes that misinformation and disinformation can harm decision-making and public health, while infodemics can intensify uncertainty and distrust (WHO, 2024a, 2024b). A systematic review of reviews found substantial variation in the prevalence of health misinformation across social media and identified vaccination, noncommunicable diseases, treatments, and outbreaks among recurrent domains (Borges do Nascimento et al., 2022). More recent reviews continue to identify misinformation as a persistent feature of digital health environments (Gram et al., 2025; Keikha et al., 2025).

Health misinformation refers to inaccurate or misleading content irrespective of intent; disinformation implies deliberate deception. Reviews identify variation by topic, platform, and study method (Borges do Nascimento et al., 2022; Nan et al., 2022). Repetition can increase familiarity, emotionally salient framing can attract attention, and social endorsement can substitute for independent source appraisal. These mechanisms are plausible explanations for amplification rather than proof that all users respond identically. Automated detection can help triage content but cannot replace context-sensitive professional review (Schlicht et al., 2023). Generative AI can assist translation and accessible explanation, yet fluent responses may contain errors or fabricated citations; human verification, provenance disclosure, and privacy safeguards are therefore necessary.

Generative artificial intelligence makes this problem more urgent. AI can support translation, personalization, summarization, and health education, but it can also produce fluent

falsehoods, fabricated references, and synthetic multimedia. In a virtual society, the appearance of professionalism can no longer be used as a proxy for validity. The emerging competence is therefore not simply the ability to find information, but the ability to evaluate provenance, evidence quality, uncertainty, conflicts of interest, and whether a recommendation is appropriate for an individual clinical context.

Digital Health Literacy and Inequality

Digital access does not automatically produce digital health capability. Digital health literacy includes the ability to search, understand, evaluate, and apply online health information while navigating privacy, platform, and communication risks. Indonesian studies show that digital health literacy varies across populations and is influenced by individual and contextual factors (Algifari et al., 2024; Sjamssuddin & Anshari, 2024). Studies among health-science students also indicate that frequent internet use does not guarantee strong competence in evaluating digital health information (Haikal et al., 2023).

Digital literacy concerns general ability to use and critically navigate technologies; health literacy concerns accessing, understanding, appraising, and using health information; digital health literacy combines these capacities in technology-mediated health decisions. Operational competencies include identifying an author and institutional source, checking publication date and supporting evidence, distinguishing testimony from research, recognizing uncertainty and commercial conflicts, protecting personal information, and identifying symptoms or decisions requiring professional consultation. Indonesian studies describe heterogeneous competencies across general and student populations (Algifari et al., 2024; Haikal et al., 2023; Sjamssuddin & Anshari, 2024), but their different populations and measures preclude a single national prevalence estimate.

Indonesia: From Health Websites to an Integrated Digital Health Ecosystem

The original manuscript positioned an institutional website as a key information channel. That function remains important, but a contemporary institutional website should be understood as one node within a broader digital ecosystem. It should provide authoritative, searchable, mobile-responsive, accessible, and regularly updated health information; connect users to services; clarify authorship and review dates; and serve as a reference destination when content is redistributed through social media. Institutional credibility is strengthened when web content is consistent with clinical services, professional communication, and national health guidance.

SATUSEHAT is national infrastructure for interoperable health information exchange, not an online peer-support community or social-media channel (Kementerian Kesehatan Republik Indonesia, 2024a, 2024b). Social platforms primarily mediate public communication and discussion; SATUSEHAT instead raises requirements for standardized data exchange, data stewardship, confidentiality, and service continuity. In Indonesia, cost of connectivity, uneven geographic coverage, educational differences, language, disability accessibility, and limited availability of professionals may shape whether either digital communication or infrastructure produces equitable benefit. These are contextual implementation considerations, not measured effects of SATUSEHAT established by the cited policy documents.

For colleges of health sciences and health-service institutions, the implication is strategic. Websites should not merely function as static announcement boards. They can become evidence hubs that support virtual communities through health education, myth correction, referral information, public engagement, research dissemination, and links to verified national services. The institution should also maintain a coordinated social-media presence so that credible content is delivered in the same spaces where misinformation circulates.

The literature supports a conditional rather than technologically deterministic interpretation: peer support and tailored outreach may improve participation, while misleading claims and unequal appraisal skills can undermine informed decisions. Importantly, measures of views, shares, or patient activation are intermediate outcomes; they should not be presented as equivalent to verified clinical improvement. Evidence varies across randomized studies, observational accounts, reviews, and institutional documents, and cross-study comparison is constrained by heterogeneous outcomes and populations.

The authors developed a five-function institutional framework through interpretive thematic synthesis of the domains identified in this review; it is a proposed organizing model, not an externally validated intervention. Credibility addresses source transparency and correction, participation addresses responsive professional–community dialogue, literacy addresses critical appraisal and safe action, governance addresses privacy and institutional accountability, and evaluation addresses knowledge, appropriate service use, sustained behavior, and distributional equity. These functions are mutually reinforcing: credible content without participation may be ignored, while participation without literacy and governance can expose users to avoidable harm. Table 1 connects the functions to the evidence and practical indicators.

Table 1. Critical Thematic Synthesis and Proposed Institutional Functions.

Function / theme	Representative evidence	Evidence limitation	Institutional action / indicator
Credibility / misinformation	Borges do Nascimento et al. (2022); Nan et al. (2022)	Prevalence and susceptibility vary across topics and methods	Dated sources, evidence links, correction time
Participation / peer support	Abdelraheem et al. (2024); Necaise & Amon (2024)	Activation and interaction are not clinical endpoints	Moderated dialogue; appropriate referrals
Literacy / equity	Algifari et al. (2024); Haikal et al. (2023)	Population and assessment differences limit comparison	Scenario-based appraisal and privacy competency
Governance / infrastructure	WHO (2025a); Kemenkes (2024a, 2024b)	Policy documents do not establish intervention effects	Data stewardship, accessibility and escalation

Evaluation / health promotion	Fritz et al. (2024); Draganidis et al. (2024)	Designs and outcomes are heterogeneous	Comprehension, screening uptake, behavior, equity

For Indonesian institutions, initial priorities are to publish identifiable, dated, evidence-linked information; designate professional reviewers; provide plain-language and accessible formats; and establish pathways for escalation to clinical services. Health-professions educators can assess source checking, uncertainty communication, and privacy decisions through practical cases. Policymakers and platform providers should support transparency, accessible design, and privacy safeguards. Interventions should be adapted to low-bandwidth environments, regional languages, disability needs, and differing levels of educational attainment, rather than assuming uniform digital readiness.

Misinformation responses should differentiate accidental sharing from intentionally deceptive campaigns and avoid treating every contested claim as equally false. Algorithmic ranking, repeated exposure, emotional cues, and influencer endorsement warrant monitoring, but corrections should be evaluated for comprehension and trust rather than reach alone. Generative AI may assist translation and drafting, provided that qualified humans verify clinical claims, disclose AI assistance where appropriate, review cited sources, and protect personal data. Neither AI-generated advice nor peer testimony substitutes for individualized clinical assessment.

The proposed pathway links verified institutional websites and responsive social channels to appropriate professional consultation. SATUSEHAT belongs to the complementary health-data infrastructure layer and should not be conflated with social-media engagement. Local evaluation should test whether the five functions improve comprehension, appropriate referral, service uptake, and equitable access among urban and rural communities and populations with different literacy and accessibility needs.

The emergence of AI requires an additional layer of institutional policy. Health organizations should define acceptable uses of generative AI, require human verification for public-facing clinical information, and establish procedures for correcting AI-amplified misinformation. AI-generated summaries should never replace clinical assessment when individual diagnosis or treatment decisions are required. At the same time, refusing AI entirely would overlook its potential to improve accessibility, translation, personalization, and information retrieval. The appropriate approach is governed augmentation: use AI to extend professional capacity while preserving accountable human oversight.

Finally, the Indonesian digital-health ecosystem creates an opportunity to connect institutional health communication with national infrastructure. A credible institutional website can function as a verified knowledge base; social media can extend reach and dialogue; telehealth can facilitate consultation; and interoperable systems such as SATUSEHAT can support continuity of information. These components should be designed as a coherent pathway rather than separate digital projects. The success criterion is not the number of platforms owned by an institution, but whether users can move safely from information to understanding, from understanding to appropriate action, and from action to accountable health services.

CONCLUSION

For health institutions in Indonesia, the appropriate response is not to retreat from virtual spaces but to participate in them more deliberately. Institutional websites should function as verified evidence hubs connected to responsive social-media communication and national digital-health services. Health professionals and students need digital communication and misinformation-management competencies, while organizations need clear governance for privacy, data, AI use, and correction of inaccurate content. The quality of virtual health society will ultimately depend on whether digital transformation is accompanied by trust, literacy, equity, and accountable professional participation.

SUGGESTION

Healthcare organizations should first establish accountable editorial review, transparent corrections, accessible information, and referral routes. Health professionals should participate in two-way communication and verify clinical claims, including AI-assisted material. Educational institutions should assess practical digital health literacy and privacy competencies. Policymakers and platform providers should address interoperability, data protection, algorithmic transparency, and inclusion. Future research should compare outcomes beyond engagement, including informed decisions, service use, sustained behavior, and equity across Indonesian settings.

LIMITATIONS

Health institutions should establish a digital health communication policy that integrates website governance, social-media management, evidence review, misinformation correction, and crisis communication. Health-professions curricula should include digital health literacy, digital professionalism, AI literacy, and public communication. Future Indonesian research should evaluate not only online engagement but also changes in knowledge, trust, health behavior, service utilization, and disparities across demographic and geographic groups. Collaboration among health institutions, professional associations, government, community leaders, and platform providers is needed to create a safer health-information ecosystem.

AUTHOR CONTRIBUTION

Risha Setyowati: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft, and Writing – Review & Editing.
Lalu Ristha Cahya Kurniawan: Conceptualization, Methodology, Validation, Investigation, Formal Analysis, Writing – Review & Editing, and Supervision.

Both authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

AI ASSISTANCE STATEMENT

The authors used Grammarly AI solely for language editing and refinement to improve the grammar, spelling, clarity, and readability of the manuscript. No AI tools were used to generate the research content, analyze data, interpret findings, or develop the scientific

arguments. The authors take full responsibility for the content and final version of the manuscript.

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