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## Health promotion in the age of artificial intelligence, climate change and misinformation: A framework for building digital and community resilience

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### ABSTRACT

Health promotion is entering a period of unprecedented complexity. Artificial intelligence, climate change and rapidly evolving misinformation ecosystems are transforming how individuals access information, perceive risks and make health-related decisions. Although these forces are often examined separately, they increasingly interact to influence health behaviour, public trust, mental wellbeing and community resilience. Artificial intelligence can expand access to personalised health information and scalable interventions, yet it can also amplify misinformation and widen inequities. Climate change is creating new health threats while increasing psychological distress, uncertainty and social vulnerability. Misinformation undermines health literacy, weakens trust in institutions and reduces adherence to evidence-based recommendations. We argue that health promotion must move beyond traditional information provision and individual behaviour-change models towards a resilience-oriented framework that addresses these interconnected challenges. We propose a Digital and Community Resilience Promotion Framework that integrates digital health literacy, artificial intelligence literacy and governance, climate-health literacy, misinformation resilience, trusted community networks, youth engagement, mental wellbeing promotion, social participation and equity-centred implementation. The framework positions resilience as a core health promotion outcome and offers a practical pathway for strengthening adaptive capacity in a rapidly changing technological, environmental and information landscape.

Keywords: health promotion; artificial intelligence; climate change; misinformation; digital health literacy; community resilience; health literacy; public health.

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### INTRODUCTION

Health promotion is concerned with enabling people and communities to increase control over the determinants of health and improve wellbeing. That mandate remains central, but the social, technological and environmental contexts in which health decisions are made have changed substantially. Artificial intelligence (AI), climate change and misinformation now shape how people access information, interpret risk, trust institutions and act on health advice. The World Health Organization (WHO) health promotion glossary emphasises empowerment, equity, participation and action on the determinants of health as core concepts for contemporary health promotion [1]. These concepts are increasingly important in an era of algorithmically mediated information, climate-related uncertainty and declining trust in public institutions.

Digital technologies are now embedded in health systems, health communication, surveillance and service delivery. The WHO global strategy on digital health argues that digital health can strengthen health systems and advance health for all when it is supported by governance, workforce capacity, interoperability and equity safeguards [2]. AI is becoming particularly influential in public health information, surveillance, communication, resource allocation and decision support. Recent public health scholarship highlights important opportunities for AI in public health practice, while also warning about

bias, accountability, transparency, regulation and institutional readiness [3]. WHO guidance on large multi-modal models similarly stresses safety, equity, transparency and responsible governance for health-related AI applications [4].

Climate change is also altering the conditions in which health is promoted and protected. The 2024 Lancet Countdown report documented record-breaking climate-related health threats, including heat exposure, food insecurity, air pollution, wildfire smoke and climate-sensitive infectious disease risks [5]. Climate change affects mental wellbeing through traumatic events, displacement, livelihood disruption, ecological grief and anticipatory distress [6-8]. These effects are socially patterned; communities with fewer resources, weak infrastructure, limited access to services and greater dependence on climate-sensitive livelihoods often face greater risks.

Misinformation adds a further challenge. WHO defines an infodemic as too much information, including false or misleading information, in digital and physical environments, which can cause confusion, encourage risk-taking behaviour, weaken trust and undermine public health responses [9]. During COVID-19, misinformation affected public health behaviour, vaccine confidence and adherence to preventive measures [10]. In the age of generative AI, health misinformation may become easier to produce, personalise and circulate at scale, particularly when AI-generated content appears fluent, authoritative and tailored to user concerns [11].

This Perspective argues that health promotion should no longer treat AI, climate change and misinformation as separate concerns. They are interacting forces that require a new model of digital and community resilience. The proposed framework is designed for health promotion researchers, practitioners, educators, community medicine teams, public health agencies and policy-makers seeking practical strategies for a rapidly changing information and environmental landscape.

### **Sources and approach**

This article is a narrative evidence synthesis rather than a systematic review or primary empirical study. Relevant literature was identified through targeted searches of PubMed, Scopus, Web of Science, Google Scholar, WHO publications, Lancet Countdown materials and recent public health reports. Search terms included “artificial intelligence and health promotion”, “digital health literacy”, “health misinformation”, “infodemic management”, “climate-health literacy”, “climate anxiety”, “community resilience”, “health literacy”, “health promotion” and “public health preparedness”.

Priority was given to peer-reviewed articles, major reviews and policy documents published between 2020 and 2025. Older sources were retained only where they were conceptually important to health promotion, health literacy or misinformation science. The purpose was not to estimate pooled effects, but to develop a practical framework for health promotion research, policy and implementation.

### **From fragmented health literacy to digital and community resilience**

Many health promotion systems still rely on information provision, awareness campaigns and individual behaviour-change messages. These approaches remain useful, but they are insufficient when communities face information overload, climate-related uncertainty, AI-generated content and algorithmically mediated health communication.

Health literacy has evolved from a narrow focus on individual reading skills towards a broader understanding of how people access, understand, appraise and use health information in social context [12]. Digital health literacy extends this challenge into online environments, where people must navigate search engines, social media, telehealth platforms, symptom checkers, chatbots and algorithmically curated content. Recent conceptual work emphasises that digital health literacy includes not only access to digital tools, but also the ability to evaluate, communicate and use digital health information safely and effectively [13,14]. Climate-health literacy adds another layer by requiring communities and health professionals to understand the health implications of extreme heat, flooding, air pollution, food insecurity and climate-sensitive diseases [15,16].

These literacies are increasingly inseparable. A young adult searching online for heat-related symptoms may encounter public health guidance, AI-generated summaries, climate misinformation and commercial health content within the same information pathway. A community affected by flooding may need to interpret evacuation warnings, disease prevention messages, relief information and rumours about government neglect or humanitarian assistance. A patient using an AI chatbot may receive useful information but may struggle to judge accuracy, uncertainty or source quality.

Health promotion therefore needs a resilience-oriented approach. Resilience in this context refers to the capacity of individuals, groups and systems to access trustworthy information, adapt to changing risks, maintain psychosocial wellbeing, participate in collective action and resist harmful misinformation. This moves health promotion beyond fragmented literacy programmes towards a broader model of digital and community resilience.

### **Why AI, climate change and misinformation belong together**

Artificial intelligence, climate change and misinformation interact through several pathways. First, climate change increases uncertainty and risk perception. People exposed to heatwaves, floods, droughts, food insecurity or wildfire smoke often seek rapid information about symptoms, safety, disease risks, food access, shelter and recovery. In these moments, digital channels can either strengthen or undermine health promotion.

Second, AI increasingly shapes information access. Search algorithms, recommender systems, automated translation, generative chatbots and personalised messaging influence what people see, believe and share. These tools may improve access

to health information, particularly where services are scarce, but they may also reproduce bias, generate inaccurate responses or make false claims appear authoritative [3,4]. The health-promotion value of AI will therefore depend on governance, transparency, quality assurance and the ability of users to interpret AI outputs critically.

Third, misinformation exploits fear, uncertainty and distrust. Reviews show that false beliefs may persist after correction, particularly when misinformation is repeated, emotionally salient or aligned with identity, mistrust or prior beliefs [17,18]. In climate-related emergencies, misinformation may minimise risk, exaggerate conspiracy narratives, misrepresent public health interventions or discourage adaptive behaviour. Online interventions such as education, correction, inoculation and platform-level responses are promising, but evidence remains heterogeneous and context-dependent [19].

Fourth, the combined effect is likely to be inequitable. People with limited digital access, lower literacy, language barriers, disability, poverty or low institutional trust may be more exposed to poor-quality information and less able to verify claims. Digital resilience should therefore be treated as an equity issue, not merely a communication skill.

### **A Digital and Community Resilience Promotion Framework**

A practical health promotion response should combine eight linked functions. First, digital health literacy should become a core health promotion competency. Communities need support to identify credible sources, recognise misleading claims, compare information across trusted platforms and understand uncertainty in health advice [12,13].

Second, AI literacy and governance should be incorporated into public health education. Individuals should understand that AI-generated health information can be useful but may be incomplete, biased or incorrect. Public health agencies should develop transparent rules for AI use in health communication, including disclosure, quality assurance, human oversight and accountability [3,4].

Third, climate-health literacy should be embedded in health promotion. Communities should understand how climate hazards affect health and what protective behaviours reduce risk. This includes heat protection, safe water practices, air-quality precautions, disaster preparedness and awareness of mental health effects [5,15,16].

Fourth, misinformation resilience should be developed before crises. Health promotion programmes should use prebunking, inoculation strategies, social listening and community-based correction to reduce susceptibility to false claims [17-19]. Corrective messages should be timely, culturally relevant and delivered by trusted messengers.

Fifth, trusted community networks should be strengthened. Community health workers, teachers, faith leaders, youth organisations, local media, patient groups and civil society organisations can translate complex health information into credible local action. WHO's work on infodemic management and social participation highlights the importance of trust, participation and community engagement in health action [9,20].

Sixth, mental wellbeing promotion should be treated as part of digital and climate resilience. Climate anxiety, digital stress and misinformation exposure can worsen distress, helplessness and mistrust. Health promotion should normalise help-seeking, strengthen coping skills and support collective efficacy, especially among young people [7,8].

Seventh, youth engagement should be central. Young people are heavy users of digital platforms, are deeply affected by climate concern and can be powerful partners in peer education, digital citizenship and climate-health advocacy. Health promotion should position young people not only as a risk group, but as co-producers of solutions.

Eighth, social participation should guide implementation. Communities should be involved in identifying information needs, designing interventions, selecting communication channels and evaluating outcomes. Participation improves relevance, legitimacy and ownership, particularly in settings where trust in institutions is fragile [20].

### **Implementation, legitimacy and equity**

Digital and community resilience cannot be built through technology alone. A purely technological approach may widen inequities if it assumes that all people have reliable internet access, language-concordant information, digital skills or trust in official sources. Health promotion must therefore combine digital innovation with community relationships.

Implementation should begin with local mapping. Public health teams should identify trusted communication channels, digital access gaps, climate-health vulnerabilities, misinformation patterns and psychosocial needs. These data should inform community-specific interventions rather than generic awareness campaigns.

Legitimacy is central. People are more likely to act on health advice when it is delivered through trusted relationships and when communities have participated in shaping the message. Public health authorities should therefore invest in long-term community engagement, not only crisis communication.

Equity must also shape AI governance. Health promotion agencies using AI tools should evaluate whether these systems perform adequately across languages, literacy levels, cultural contexts and population groups. AI should support human judgement and community engagement rather than replace them.

### **Research and policy priorities**

Several priorities follow from this framework. First, measurement tools are needed. Researchers should develop and validate indicators that capture digital health literacy, AI literacy, climate-health literacy, misinformation resilience, trust, mental wellbeing and community participation within the same framework.

Second, intervention studies should test integrated programmes. Future research should examine whether combining digital literacy, climate-health education and misinformation inoculation improves health behaviour, trust and wellbeing more effectively than single-component interventions.

Third, health promotion workforce training should be updated. Practitioners need competencies in AI governance, digital communication, social listening, climate-health literacy, participatory methods and misinformation response.

Fourth, policy should support cross-sector collaboration. Health promotion in this era requires coordination across health, education, environment, technology, communication, youth development and social protection sectors.

Fifth, equity-focused implementation research is essential. Studies should assess whether digital and AI-enabled health promotion interventions reduce or widen disparities. Particular attention should be paid to low-resource settings, older adults, rural communities, linguistic minorities, displaced populations and people with disabilities.

#### **DISCUSSION**

Health promotion is at a turning point. The field cannot rely solely on traditional awareness campaigns when people increasingly encounter health information through AI systems, social media platforms and contested digital spaces. Nor can it promote wellbeing without addressing climate-related uncertainty and psychological stress. The proposed Digital and Community Resilience Promotion Framework reframes health promotion for this new context. Its central contribution is to bring digital health literacy, AI governance, climate-health literacy, misinformation resilience and community participation into one integrated model. This model is not intended to replace existing health promotion principles. Rather, it updates them for an era in which health behaviour is shaped by environmental disruption, technological mediation and information disorder. The framework is deliberately translational. It can inform school health programmes, community health-worker training, climate adaptation plans, digital health strategies, youth engagement initiatives and public health emergency preparedness. Its success will depend on whether health systems can move from fragmented communication to sustained resilience-building.

#### **CONCLUSION**

Artificial intelligence, climate change and misinformation are reshaping the conditions of health promotion. These forces interact to influence health literacy, trust, behaviour, mental wellbeing and community resilience. Health promotion must therefore evolve from fragmented education campaigns towards integrated strategies that build digital and community resilience. A Digital and Community Resilience Promotion Framework provides a practical pathway for this shift. By integrating digital health literacy, AI literacy and governance, climate-health literacy, misinformation resilience, trusted community networks, youth engagement, mental wellbeing promotion and social participation, health promotion can remain relevant in a rapidly changing world. The future of health promotion will depend not only on giving people more information, but on enabling communities to judge, trust, adapt and act together.

**Table 1: Digital and community resilience priorities for health promotion in the age of artificial intelligence, climate change and misinformation**

<b>Preparedness domain</b>	<b>Current challenge</b>	<b>Resilience opportunity</b>	<b>Translational priority</b>
<b>Digital health literacy</b>	Individuals face information overload and variable source quality.	Communities can learn to identify credible information and evaluate online claims.	Integrate digital health literacy into community, school and primary-care health promotion programmes.
<b>AI literacy and governance</b>	AI-generated health information may be inaccurate, biased or difficult to verify.	Responsible AI use can support scalable, personalised and accessible health promotion.	Develop public AI literacy, disclosure rules, quality assurance and accountability mechanisms.
<b>Climate-health literacy</b>	Climate risks are often communicated as environmental rather than health promotion issues.	Communities can understand climate-health risks and adopt protective behaviours.	Embed heat, air quality, food security, water safety and disaster preparedness into health promotion.
<b>Misinformation resilience</b>	False claims spread rapidly and may persist after correction.	Prebunking, inoculation and trusted correction can reduce susceptibility to misinformation.	Establish social listening, community fact-checking and rapid correction systems.
<b>Trusted community networks</b>	Institutional messages may not reach or persuade all groups.	Local intermediaries can translate evidence into trusted action.	Strengthen partnerships with community health workers, teachers, faith leaders, youth groups and local media.
<b>Mental wellbeing promotion</b>	Climate anxiety, digital stress and misinformation exposure can worsen distress.	Health promotion can strengthen coping, agency and social support.	Integrate mental wellbeing, peer support and referral pathways into resilience programmes.
<b>Youth engagement</b>	Young people are highly exposed to digital content and climate concern but are often excluded from planning.	Youth can lead peer education, digital citizenship and climate-health action.	Co-design school, university and youth-led health promotion interventions.
<b>Social participation and equity</b>	Top-down campaigns may miss local realities and widen inequities.	Participatory approaches improve legitimacy, relevance and ownership.	Use co-design, local-language communication and equity monitoring in implementation.



**Figure 1: Conceptual framework for digital and community resilience in health promotion**

Artificial intelligence, climate change and misinformation are positioned as upstream forces shaping health literacy, trust, mental wellbeing and health behaviour. These forces interact through digital information systems, climate-related risk perception, psychological vulnerability and social trust. The proposed Digital and Community Resilience Promotion Framework includes digital health literacy, AI literacy and governance, climate-health literacy, misinformation resilience, trusted community networks, mental wellbeing promotion, youth engagement and social participation. Intended outcomes include improved health literacy, stronger public trust, reduced misinformation susceptibility, improved mental wellbeing, stronger adaptive capacity and more resilient communities as shown in Table 1 and Figure 1.

**Conflict of interest**

The authors declare that the manuscript was prepared in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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**Data availability statement**

No original datasets were generated or analysed for this article. All sources discussed are publicly available.

**Ethics statement**

This Perspective did not involve human participants, human data, animal subjects or clinical intervention. Ethics committee approval was therefore not required.

**Author contributions**

Emmanuel Ikechukwu Obi contributed to conceptualisation, original drafting, scientific interpretation and manuscript revision. Thaddeus Chijioke Asogwa contributed to public health framing, literature synthesis and critical revision. Victor Ositadinma Nvene contributed to health-promotion interpretation, manuscript editing and final approval. All authors reviewed and approved the final manuscript for submission.

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