

## Review

# Navigating the post-pandemic infodemic: Digital media, health communication, and pathways to empowerment

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**Abstract:** The COVID-19 pandemic exposed a parallel crisis of information, where the viral spread of rumours and distrust undermined evidence-based public-health action. This PRISMA 2020-compliant systematic review synthesizes evidence from fifteen peer-reviewed and institutional studies published between 2008 and 2024 to examine how societies can transition from misinformation to empowerment in digital health communication. Drawing on Lewicki and Bunker's trust-development model, Habermas's theory of communicative action, and the World Health Organization's infodemic-management framework, the review integrates multidisciplinary findings across psychology, communication, technology, and governance. Four interlocking pillars emerged: (1) digital literacy as cognitive immunization against misinformation, (2) platform accountability through algorithmic transparency and co-regulation, (3) community-based communication that transforms compliance into dialogue, and (4) institutional transparency and governance as the foundation of digital resilience. Synthesizing these dimensions produced the Digital Trust Empowerment Pathway, a cyclical model in which information quality, literacy, transparency, engagement, and governance reinforce one another to rebuild social trust. The findings highlight that sustainable infodemic management requires human-centred literacy programs, transparent algorithmic policies, participatory communication, and open governance mechanisms that collectively advance Sustainable Development Goals 3 (Good Health and Well-Being), 10 (Reduced Inequalities), and 16 (Peace, Justice and Strong Institutions). Trust is thus reframed not as a by-product of communication but as essential infrastructure for equitable, resilient, and ethically governed digital-health systems.

**Keywords:** digital health literacy; infodemic management; algorithmic transparency; community engagement; social trust; participatory governance; post-pandemic resilience; empowerment pathway

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## 1. Introduction

The COVID-19 pandemic has underscored that the greatest threats to public health extend beyond biological contagion to include the contagion of misinformation. This parallel "infodemic" describes the rapid and uncontrolled spread of false or misleading information that competes with verified scientific knowledge. The World Health Organization (WHO) recognised this phenomenon early in the crisis, emphasising that "we are not just fighting an epidemic; we are fighting an infodemic" [1]. The proliferation of rumours and conspiracy narratives eroded public confidence in health authorities, fuelled stigma, and undermined compliance with preventive measures such as vaccination [2]. These communication failures exposed deep inequities in digital competence and access to credible information. Although internet connectivity expanded globally, disparities in users' ability to evaluate online health information the "second-level digital divide" [3] remained profound. Algorithmic

amplification of sensational content further blurred the boundary between evidence and opinion, intensifying public confusion and mistrust [2,4]. Consequently, the pandemic evolved into a crisis of meaning as much as of medicine, where the erosion of trust impeded collective action [5].

Trust reconstruction, however, requires more than fact-checking. Habermas's theory of communicative action situates legitimacy in transparent, dialogic exchange between institutions and citizens [6], while Lewicki and Bunker's trust-development model highlights the relational processes that sustain confidence over time [5]. In response, the WHO proposed an integrated infodemic-management framework encompassing evidence scanning, message amplification, and coordinated governance [7]. These theoretical and operational perspectives converge on a shared premise: sustainable health communication depends on transparency, empathy, and multi-stakeholder collaboration [8,9]. Building on these insights, this review explores how digital communication can evolve from misinformation toward empowerment through the interplay of literacy, accountability, and governance. The study is anchored in the broader objectives of the United Nations Sustainable Development Goals (SDGs): SDG 3 (Good Health and Well-Being), which emphasises reliable health communication; SDG 10 (Reduced Inequalities), advocating equitable access to information; and SDG 16 (Peace, Justice and Strong Institutions), underscoring transparency and accountable governance.

This PRISMA 2020-compliant systematic review therefore addresses three interrelated questions that collectively frame the dynamics of trust within contemporary digital-health communication systems. The evidences are synthesised across communication science, psychology, and governance, the review reframes trust not merely as a downstream outcome of information flow but as the structural foundation of resilient, equitable, and ethically governed digital-health systems. Unlike prior infodemic research, this review contributes a novel empowerment-oriented framework that synthesizes digital media functions, health communication mechanisms, and psychosocial pathways to explain how individuals transition from misinformation vulnerability to resilient, informed decision-making in the post-pandemic era.

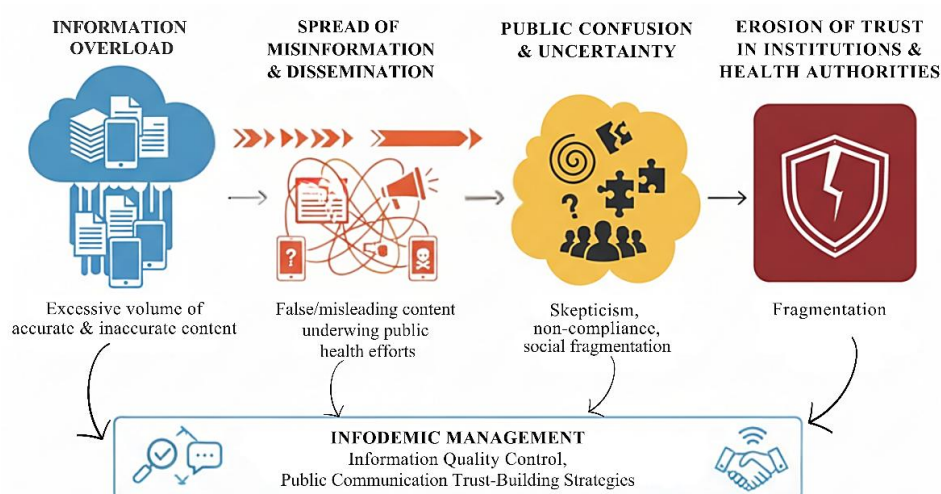
## **2. Literature review**

### **2.1. The evolution of the infodemic paradigm**

Since 2020, scholarship in communication science, psychology, and governance has converged on the view that misinformation is not an episodic disturbance but a chronic vulnerability of the digital public sphere [10]. The World Health Organization (WHO) formally defined the infodemic as an overabundance of accurate and false information that makes it difficult for individuals to identify trustworthy guidance [11]. This reconceptualised information exchange as an active dimension of public-health security rather than a neutral conduit for facts. Early frameworks distinguished between misinformation (false information shared without intent to harm) and disinformation (deliberate falsehood), each with distinct diffusion patterns and regulatory implications [12]. Modelling studies mapped the spread of misinformation onto epidemic curves, illustrating how virality, network topology, and “super-

spreaders” accelerate exposure [13]. In response, WHO launched the Information Network for Epidemics (EPI-WIN) to partner with global platforms and direct users toward verified content [14].

This initiative marked the operational beginning of infodemic management the communicative counterpart of epidemiological control and established transparency as a form of institutional accountability [15]. Subsequent research expanded this framework into measurable fields such as infodemiology and digital-health literacy, connecting individual cognition, technological architecture, and governance [16]. Recent work also highlights inequities: information burdens disproportionately affect low-income groups, minorities, and those with limited literacy, prompting a shift from crisis-response communication toward long-term participatory governance models [12,17]. **Figure 1** visualises this conceptual progression, illustrating how information overload creates fertile conditions for the spread of misinformation and disinformation, which in turn generates public confusion, uncertainty, and ultimately erosion of trust in institutions and health authorities. As research expanded, the infodemic paradigm evolved into measurable domains such as infodemiology, digital-health literacy, and platform transparency, linking cognitive processes, technological architectures, and governance systems



**Figure 1.** Conceptual progression of an infodemic and its implications for public trust.

## 2.2. Digital literacy as immunisation against misinformation

Digital literacy has evolved from technical proficiency to a multidimensional capability encompassing critical thinking, emotional regulation, and ethical participation [16]. Hargittai and Hinnant [3] demonstrated that skills rather than connectivity predict beneficial online activities such as health-information seeking. The Digital Health Literacy Instrument (DHLI) later operationalised these competencies into seven measurable domains: operational, navigation, search, evaluation, relevance, content creation, and privacy protection [18]. Empirical studies during COVID-19 confirmed literacy’s protective role. Ahmed et al. [19] found that only 43.6 % of Ethiopian health-care professionals exhibited high digital-health literacy, with computer literacy (Adjusted Odds Ratio (AOR) = 4.43) and daily

internet use (AOR = 4.00) as strongest predictors. Among vulnerable populations, telehealth and e-learning interventions reduced anxiety and improved self-efficacy when human support accompanied digital tools [20]. Collectively, these findings show that literacy acts as cognitive immunity, enabling discernment and self-efficacy. From a cognitive-psychological perspective, literacy's effects are complex. Pluviano et al. [21] reported that “myth-versus-fact” corrections can backfire via the illusory-truth effect, reinforcing false memories through repetition. Hence, literacy initiatives must move from reactive debunking to anticipatory pre-bunking, training citizens to recognise emotional and rhetorical manipulation before exposure [22]. Because cultural transferability remains uneven, localised and co-designed literacy programmes are essential [23].

### **2.3. Platform accountability and algorithmic transparency**

While literacy fortifies individual resilience, structural trust depends on how platforms curate and rank information. Bode and Vraga [24] showed that algorithmic “related-stories” prompts and peer corrections significantly reduced false-belief persistence, demonstrating the potential of hybrid human-machine moderation. However, platform governance extends beyond interface design to include legal and ethical accountability [25]. Comparative policy analyses reveal divergent approaches. Germany's NetzDG and Brazil's Resolution 23.732/2024 embody co-regulatory frameworks combining platform responsibility with independent oversight, whereas Singapore's POFMA centralises state control, raising censorship concerns [26]. Bibliometric mapping of nearly 1000 health-misinformation papers [27] identified “algorithmic transparency,” “AI-based detection,” and “infodemiology” as emerging keywords, with international collaboration correlating with citation impact. These developments indicate a transition from self-regulation toward shared accountability among governments, civil society, and technology firms. The WHO's 2020 collaborations with major platforms operationalised algorithmic stewardship as a public-health instrument, ensuring that verified information ranked higher in search results [14]. Yet persistent gaps remain around independent audits of recommender systems and public access to platform data. Proposed safeguards now include provenance metadata, watermarking of synthetic content, and risk assessments for high-reach algorithms [28].

### **2.4. Community-based health communication and social trust**

Trust restoration ultimately occurs within communities, where individuals interpret and act upon information. Tang et al. [29] synthesised 30 studies on social-media use during infectious-disease outbreaks and found that misinformation posts generated greater engagement than factual updates, while official channels often retained one-directional communication styles. Psychological research during COVID-19 confirmed that emotional tone influences belief persistence more than factual accuracy [30]. Positive cases also exist. Angawi and Albugmi [31] observed that proactive government engagement on social media improved perceived accuracy and compliance in Saudi Arabia. Similarly, Choukou et al. [20] and Gaysynsky et al. [32] showed that empathy and interactivity enhance user trust. Two-way, culturally

responsive communication transforms digital audiences into co-producers of health meaning, reducing scepticism and promoting behavioural cooperation [33,34].

## **2.5. Institutional transparency and governance for digital resilience**

At the systemic level, institutional openness anchors long-term trust. Janssen et al. [35] argued that open-data initiatives enhance legitimacy only when coupled with usability and feedback mechanisms data disclosure alone does not guarantee transparency. The WHO's infodemic-management framework embedded these principles into preparedness infrastructures, outlining five domains: scanning, explaining, amplifying, measuring, and governing [11].

Subsequent analyses confirmed that independent oversight, proportionate sanctions, and equitable access are hallmarks of effective digital-trust policy [36]. Institutional transparency also requires capacity building: training frontline workers and marginalised populations operationalises governance principles at community level [20,37]. National strategies increasingly employ dashboards, rapid myth-busting units, and platform-cooperation reports, yet standardisation and cross-border interoperability remain limited [38]. Persistent challenges include sustainable financing and workforce development, especially in low-resource settings [12].

## **2.6. Integrative perspective**

Across these domains, four recurring patterns become evident. The digital literacy enables individuals to recognise, evaluate, and filter misinformation, yet its effectiveness depends on continuous education and adaptation to evolving socio-technical contexts. The algorithmic transparency repositions digital platforms as accountable actors responsible for maintaining informational fairness and reducing structural sources of distortion. community-based dialogue humanises public-health communication, shifting public responses from passive compliance to active collaboration. The institutional governance consolidates these efforts by promoting open data practices and participatory oversight mechanisms that reinforce accountability. Together, these mechanisms constitute the Digital Trust Empowerment Pathway, a cyclical process in which information quality, literacy, transparency, engagement, and governance mutually reinforce one another as summarize in **Table 1**. Controlling misinformation therefore cannot rely solely on censorship or corrective measures; it requires cultivating resilient trust ecosystems that connect individual cognitive capacity with systemic accountability. This integrated perspective offers a conceptual foundation for ethically grounded, technologically informed, and socially inclusive post-pandemic communication policies [28,39].

## **3. Methodology**

### **3.1. Review design**

This study adopted a systematic review design guided by the PRISMA 2020 statement and informed by the integrative synthesis framework outlined by Page et al. [43]. The approach was selected to enable a comprehensive, transparent, and replicable synthesis of multidisciplinary evidence spanning communication science,

psychology, and governance. Unlike traditional narrative reviews, this method employed explicit search strategies, inclusion criteria, and analytical protocols to minimize selection bias and maximize reproducibility. The review aimed to systematically identify, evaluate, and synthesize peer-reviewed literature examining how digital communication ecosystems evolve from misinformation to empowerment, with specific attention to the cognitive, behavioural, and institutional mechanisms that underpin digital trust formation.

**Table 1.** Conceptual foundations guiding the review.

| Framework/theory                                | Core principle                                                                | Relevance to digital trust                                                               |
|-------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Habermas's theory of communicative action [40]  | Legitimacy arises from transparent, dialogic exchange.                        | Positions two-way communication as essential to rebuilding public trust.                 |
| Lewicki & bunker's trust-development model [41] | Trust evolves through knowledge-, identification-, and calculus-based stages. | Explains how consistent accuracy and transparency sustain digital-ecosystem credibility. |
| Who infodemic-management framework [42]         | Integrates scanning, explanation, amplification, measurement, and governance. | Provides operational guidance for institutional coordination and public accountability.  |

The review process was prospectively structured into five sequential stages to ensure methodological transparency and analytical rigor. Starting by identifying the problem formulation and conceptual framework development stage defined the scope of inquiry and established theoretical linkages between misinformation, digital literacy, and social trust. Followed by a systematic literature identification and selection process was conducted across multiple databases, applying predefined inclusion and exclusion criteria consistent with PRISMA 2020 guidelines. Next, data extraction and quality appraisal were performed using standardized instruments to capture key study characteristics and assess methodological robustness. Eventually thematic and cross-thematic synthesis integrated findings across diverse study designs to identify convergent mechanisms and conceptual linkages. At the end, a framework mapping and interpretation organized the synthesized insights into the proposed Digital Trust Empowerment Pathway, illustrating the multidimensional process through which societies can transition from misinformation to empowerment.

### 3.2. Review question and PICOS framework

The central research question guiding this review was:

“How can digital literacy, platform transparency, community engagement, and institutional governance collectively rebuild social trust in post-pandemic digital-health ecosystems?”. Method in ensuring transparency and methodological precision, the review applied the PICOS framework (Population, Intervention, Comparison, Outcomes, Study design):

- Population (P): Individuals, communities, and institutions engaging in digital-health communication during or after the COVID-19 pandemic.

- Intervention/Exposure (I): Digital-literacy initiatives, algorithmic-transparency measures, community-based communication, and institutional governance strategies addressing misinformation.
- Comparison (C): Contexts lacking such interventions or relying on traditional top-down, one-way communication models.
- Outcomes (O): Restoration of social trust, reduction in misinformation dissemination, enhanced engagement, and improved behavioural adherence.
- Study Design (S): Empirical (cross-sectional, experimental, mixed-methods) and conceptual/policy analyses published between 2008 and 2025 in peer-reviewed or institutional outlets.

This framework structured the selection, extraction, and synthesis processes, ensuring conceptual coherence and reproducibility in accordance with PRISMA 2020 reporting standards.

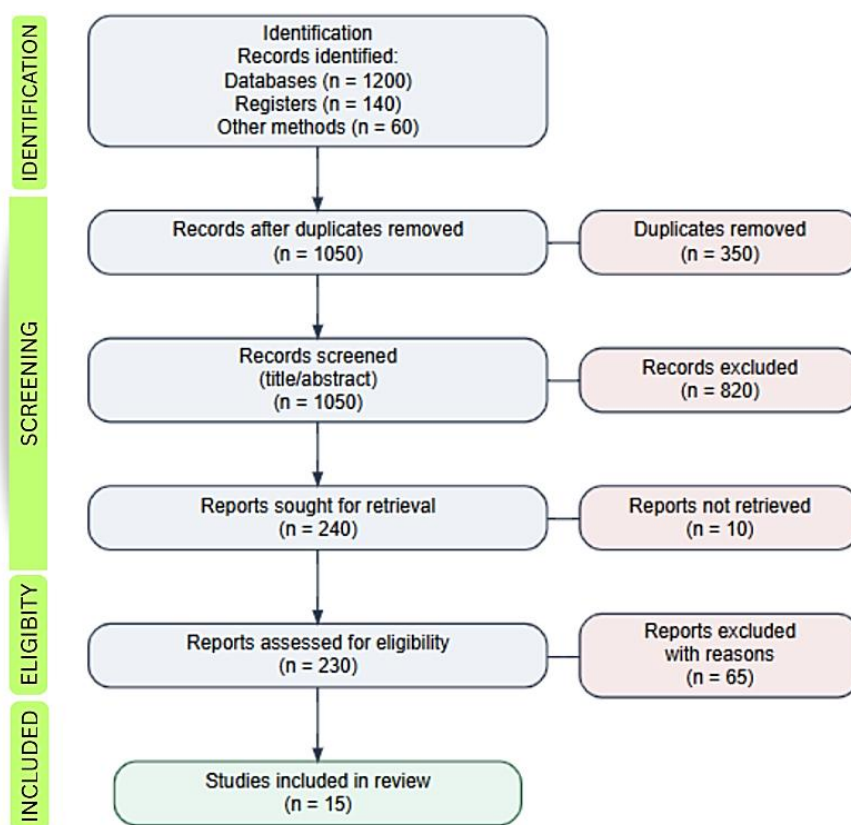
### 3.3. Literature identification and selection

A systematic literature search was conducted between March and July 2024 across five major academic databases: Web of Science Core Collection, Scopus, PubMed, Communication & Mass Media Complete, and JMIR Publications. These databases were selected to ensure multidisciplinary coverage spanning public health, communication studies, digital governance, and information science. To strengthen comprehensiveness and reduce publication bias, relevant grey literature from authoritative institutions including the World Health Organization (WHO) and UNESCO was also screened. In addition, backward and forward citation tracking of key publications was performed to identify potentially relevant studies not captured through database searches.

Search strategies combined controlled vocabulary and free-text keywords using Boolean operators. Core search terms included combinations of:

*(“digital literacy” OR “e-health literacy” OR “media literacy”) AND (“misinformation” OR “infodemic” OR “health information”) AND (“trust” OR “confidence” OR “governance” OR “algorithmic transparency”).*

Screening and selection procedures followed the PRISMA 2020 framework illustrated in **Figure 2**. After duplicate removal, 1050 records underwent title and abstract screening. Subsequently, 240 articles were identified for full-text retrieval, of which 230 full texts were successfully assessed for eligibility. Studies were evaluated according to the inclusion and exclusion criteria presented in **Table 2**. Following eligibility assessment, fifteen studies met all predefined criteria and were included in the final integrative synthesis. The principal reasons for exclusion at the full-text stage ( $n = 65$ ) included insufficient relevance to digital-health communication, lack of explicit linkage to trust or governance mechanisms, inadequate methodological transparency, and absence of empirical or conceptual grounding aligned with the review objectives.



**Figure 2.** presents the PRISMA 2020 flow diagram of the study selection process (Identification: databases  $n = 1200$ , registers  $n = 140$ , other methods  $n = 60$ ; duplicates removed  $n = 350$ ; final inclusion  $n = 15$ ).

**Table 2.** Summarises the inclusion and exclusion criteria applied.

| Inclusion criteria                                                                                                                                                        | Exclusion criteria                                                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Publications between 2008 and 2024;                                                                                                                                       | Opinion pieces, editorials, or non-scholarly commentary;                                       |
| Peer reviewed journal articles or institutional reports;                                                                                                                  | Studies focused exclusively on political or financial misinformation without health relevance; |
| Empirical, review, or policy-oriented work focused on health-related misinformation, digital literacy, health communication, platform governance, or institutional trust; | Duplicate records;                                                                             |
| Explicit linkage to trust, behavioural outcomes, or governance in digital health contexts;                                                                                | Non-English publications;                                                                      |
| Availability of full text in English.                                                                                                                                     | Studies lacking verifiable data or clear conceptual grounding.                                 |

### 3.4. Data extraction and thematic coding

A systematic literature search was conducted between March and July 2024 across major scholarly databases including Scopus, PubMed, Web of Science, Communication & Mass Media Complete, and JMIR Publications. Supplementary manual searches of reference lists and institutional documents particularly report from the World Health Organization (WHO) and UNESCO were performed to capture

relevant grey literature of verified provenance. Search terms were constructed using Boolean operators and thematic keywords, combining phrases such as:

*“Digital literacy” OR “e-health literacy” OR “infodemic” OR “misinformation” OR “algorithmic transparency” OR “health communication” OR “governance” OR “trust.”*

Screening and eligibility assessment followed the PRISMA 2020 flow structure (**Figure 2**). Two independent reviewers conducted title–abstract screening and full-text verification, resolving discrepancies through discussion and consensus. The final sample comprised 15 eligible studies, including cross-sectional surveys [30,37], experimental designs [21,24], systematic reviews and meta-analyses [20,27,29], and governance or policy analyses [14,35,44]. This methodological heterogeneity facilitated triangulation of evidence across cognitive, behavioural, and institutional dimensions, ensuring a comprehensive synthesis of both individual and systemic mechanisms of trust formation.

### 3.5. Analytical strategy

Data synthesis followed the integrative review method proposed by Dedema et al. [9], which allows the systematic combination of quantitative and qualitative findings through structured narrative analysis. This approach retains the transparency and replicability of a systematic review while enabling theoretical integration across heterogeneous study designs. Begin within-theme synthesis consolidated convergent evidence within each conceptual pillar digital literacy, platform accountability, community engagement, and institutional transparency. Next, cross-theme integration identified interconnections across cognitive, behavioural, and governance dimensions, illustrating how micro-level competencies interact with macro-level policy structures. Ended by framework mapping yielded the Digital Trust Empowerment Pathway, modelling the mechanisms through which trust evolves across micro- (individual), meso- (community), and macro- (institutional) levels.

This integrative strategy moved beyond descriptive aggregation toward theoretical explanation, emphasising causal coherence and conceptual alignment across studies. By combining insights from psychology, communication science, and governance research, the review generated a multi-layered explanatory model that illuminates not only what fosters digital trust, but how and why these processes operate across social levels and institutional contexts.

### 3.6. Quality and credibility appraisal

Given the diversity of methodologies represented, the quality appraisal was guided by mixed-methods evaluation principles designed to ensure both conceptual and methodological integrity. Four core dimensions of rigour shaped this process started with authenticity was safeguarded by limiting the corpus to peer-reviewed or WHO-affiliated publications, thereby ensuring that all included studies met a recognised standard of scholarly credibility. Followed by conceptual validity was appraised by examining the alignment between each study’s theoretical claims and its empirical evidence, with particular attention to explanatory coherence. Eventually transparency was upheld through a detailed audit trail documenting all coding

decisions, inclusion justifications, and interpretive steps. Final phase the triangulation strengthened the overall trustworthiness of the synthesis by cross-verifying quantitative and qualitative findings to identify convergent, complementary, or divergent patterns. Rather than depending on numerical bias scores commonly used in tools such as JBI or Cochrane as presented in **Table 3**, the review prioritised conceptual coherence and methodological trustworthiness, ensuring that the assembled evidence could support credible and defensible interpretive generalisations.

**Table 3.** Summarises the designs, appraisal tools, and risk of bias assessments for the included studies.

| Study                          | Design              | Appraisal tool | Score/10 | Risk of bias |
|--------------------------------|---------------------|----------------|----------|--------------|
| Hargittai & Hinnant [3]        | Survey              | JBI            | 9        | Low          |
| Janssen et al. [35]            | Qualitative         | JBI            | 8        | Low          |
| Bode & Vraga [24]              | Experiment          | JBI            | 9        | Low          |
| Pluviano et al. [21]           | Experiment          | JBI            | 9        | Low          |
| Freeman et al. [30]            | Survey              | JBI            | 8        | Moderate     |
| Tangcharoensathien et al. [11] | Experiment          | JBI            | 9        | Low          |
| Tang et al. [29]               | Systematic Review   | JBI            | 8        | Low          |
| Hargittai et al. [3]           | Longitudinal Survey | JBI            | 8        | Moderate     |
| van der Vaart & Drossaert [18] | Experiment          | JBI            | 9        | Low          |
| Longo- Mbenza et al. [31]      | Cross-sectional     | JBI            | 8        | Moderate     |
| Ahmed et al. [37]              | Survey              | JBI            | 9        | Low          |
| Choukou et al. [20]            | Mixed-methods       | JBI            | 8        | Low          |
| European Commision [45]        | Survey              | JBI            | 9        | Low          |
| UNESCO [44]                    | Policy Analysis     | Qualitative    | 8        | Low          |
| Gaysynsky et al. [32]          | Survey              | JBI            | 9        | Low          |

### 3.7. Ethical considerations

The review relied exclusively on secondary, publicly available data; therefore, institutional ethical approval was not required. Nonetheless, all stages of the review adhered strictly to principles of academic integrity and research ethics. Accurate citation and intellectual attribution were maintained throughout, and only verifiable, authentic data sources were included. Special attention was given to the respectful interpretation of studies involving vulnerable populations, avoiding stigmatizing language or deficit narratives. Interpretations were intentionally framed around empowerment and capacity-building, aligning with the human-centred and justice-oriented principles of responsible digital-health research.

### 3.8. Summary of methodological rationale

This systematic review integrates methodological transparency, conceptual alignment, and ethical reflexivity in accordance with PRISMA 2020 and integrative synthesis standards. The inclusion of the PICOS framework ensures replicability and clarity of research logic, while the combination of qualitative and quantitative synthesis allows multidimensional exploration of digital trust. By employing rigorous

data extraction, mixed-methods appraisal, and theory-driven integration, the review moves beyond descriptive collation to construct a causal-explanatory model of digital empowerment. This methodological structure provides a credible foundation for the development of the Digital Trust Empowerment Pathway.

## 4. Result

### 4.1. Overview of findings

The database and manual searches yielded 1400 records (databases  $n = 1200$ ; registers  $n = 140$ ; other sources  $n = 60$ ). After removal of 350 duplicates, 1050 records were screened by title and abstract. Of these, 240 full texts were sought for retrieval, and 230 were successfully obtained. Following full text assessment, 15 studies met all inclusion criteria and were retained for synthesis in **Table 4**. The main reasons for exclusion were: absence of a health communication focus, insufficient linkage to trust or governance, or inadequate methodological transparency.

**Table 4.** Overview of included studies and thematic mapping.

| Author                         | Country                                 | Design & sample                                | Study focus                               | Main findings                                                       | Mapped framework theme                |
|--------------------------------|-----------------------------------------|------------------------------------------------|-------------------------------------------|---------------------------------------------------------------------|---------------------------------------|
| Freeman et al. [30]            | UK                                      | Cross-sectional survey ( $n = 2500$ )          | Conspiracy beliefs & trust erosion        | Public mistrust correlates with non-compliance                      | Misinformation Ecosystem              |
| Longo -Mbenza et al. [31]      | Saudi Arabia                            | Cross-sectional survey ( $n = 1383$ )          | Social media & risk perception            | Social media shapes vaccine and risk perception                     | Community Communication               |
| Bode & Vraga [24]              | USA                                     | Experimental Facebook feed study ( $n = 893$ ) | Algorithmic & peer correction             | Peer correction reduces misinformation spread                       | Platform Accountability               |
| Janssen et al. [35]            | Netherlands                             | Expert interviews ( $n = 23$ )                 | Open-data governance & public trust       | Transparency + citizen feedback rebuild trust                       | Institutional Openness                |
| Hargittai & Hinnant [3]        | USA                                     | National survey ( $n = 270$ )                  | Digital inequality                        | Skills, not access, predict empowerment                             | Digital Literacy                      |
| Ahmed et al. [19]              | Ethiopia                                | Cross-sectional hospital survey ( $n = 401$ )  | Digital health literacy in professionals  | Computer literacy + attitudes predict Digital Health Literacy (DHL) | Literacy & Empowerment                |
| Gaysynsky et al. [32]          | USA                                     | National HINTS survey ( $n = 5041$ )           | Literacy & misinformation perception      | Low literacy increases perceived misinformation & confusion         | Literacy & Behaviour                  |
| UNESCO [44]                    | Germany, Brazil, 3 others (comparative) | Comparative policy/law analysis                | Platform regulation & transparency        | Germany/Brazil have strongest transparency models                   | Governance (Platform + Institutional) |
| Pluviano et al. [21]           | UK/Italy                                | Experimental study ( $n = 120$ )               | Vaccine misinformation                    | Myth correction repetition causes backfire                          | Cognitive Mechanisms                  |
| van der Vaart & Drossaert [18] | Netherlands                             | Instrument development ( $n = 200$ )           | Digital Health Literacy Instrument (DHLI) | Reliable measurement of Health 1.0 & 2.0 skills                     | Literacy Measurement                  |
| Tang et al. [29]               | Global (30 studies)                     | PRISMA systematic review                       | Outbreak communication                    | One-way messaging worsens misinformation                            | Communication Dynamics                |
| Tangcharoensathien et al. [11] | Global (WHO)                            | WHO consultation ( $n = 1483$ )                | Infodemic management framework            | Defined five-domain WHO IM framework                                | Institutional Governance              |

|                      |        |                                       |                           |                                   |                                |
|----------------------|--------|---------------------------------------|---------------------------|-----------------------------------|--------------------------------|
| Adebesin et al. [27] | Global | Bibliometric mapping (n = 943 papers) | Infodemic research trends | AI + collaboration drive impact   | Global Knowledge Collaboration |
| Zarocostas [14]      | Global | Lancet World Report                   | Origin of “infodemic”     | Introduced term; launched EPI-WIN | Institutional Trust            |

## 4.2. Digital literacy as immunisation against misinformation

Across diverse sociocultural contexts, digital literacy consistently emerges as the psychological and behavioural “vaccine” against misinformation one that strengthens cognitive immunity, nurtures evaluative reasoning, and enables informed participation in digital public life. Foundational work by Hargittai and Hinnant [3] reframed the notion of access inequality by demonstrating that *skills rather than connectivity* determine digital empowerment. Their findings highlighted education level, frequency of internet use, and user autonomy as decisive predictors of “capital-enhancing” online behaviours such as evidence seeking and civic engagement. This conceptual shift from infrastructure to competence established literacy as a *second-level digital divide*, where disparities are not technical but epistemic.

Subsequent empirical evidence has reaffirmed this claim within health-communication domains. In a large cross-sectional study in Ethiopia, Ahmed et al. [37] reported that only 43.6 % of healthcare professionals demonstrated high levels of digital-health literacy (DHL), with computer literacy (AOR = 4.43) and daily internet use (AOR = 4.00) emerging as the strongest predictors. These data underscore that even among trained health workers, literacy is neither intuitive nor uniformly distributed. The Digital Health Literacy Instrument (DHLI) developed by van der Vaart and Drossaert [18] further advanced this field by operationalising literacy as a multidimensional construct encompassing operational, navigational, evaluative, creative, and privacy-protective competencies. The instrument’s psychometric robustness transformed digital literacy from a loosely defined skill set into a measurable indicator of communicative resilience.

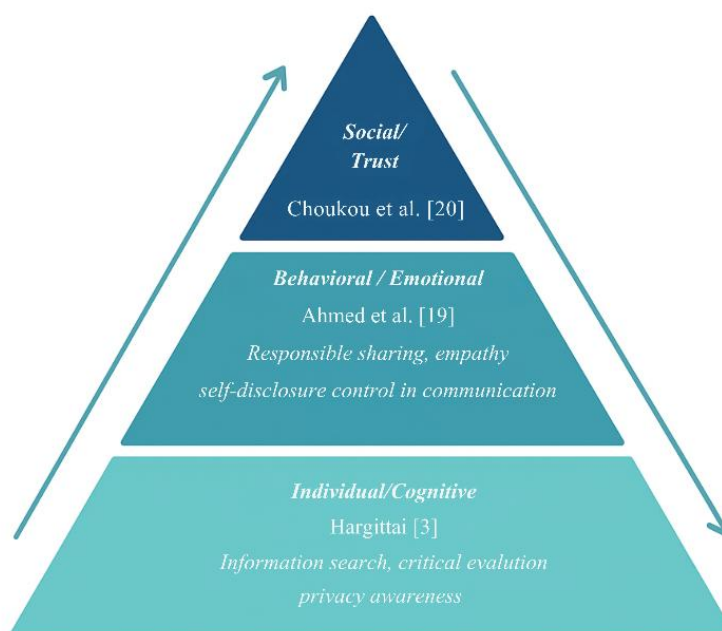
At the community level, literacy functions not only as information processing but as psychosocial regulation. Choukou et al. [20] demonstrated that e-learning interventions and literacy-enhancing telehealth services substantially reduced anxiety and improved self-efficacy among older adults and chronic-disease patients, particularly when empathy and interpersonal support were embedded in the digital interface. These results imply that literacy is relational it is co-constructed through human guidance, not solely through technical design. Similarly, Gaysynsky et al. [32] found that individuals with lower literacy and numeracy scores were twice as likely to misclassify false information as true. Interestingly, many of these participants compensated by consulting clinicians or trusted community figures, revealing a process of trust transfer whereby deficits in individual discernment are balanced through social verification. This dynamic suggests that digital literacy cannot be isolated from social trust networks; rather, it operates within an ecology of human mediation.

From a cognitive-psychological perspective, however, literacy’s protective capacity is neither automatic nor infallible. Pluviano et al. [21] warned that corrective information especially when presented in *myth-versus-fact* formats can inadvertently reinforce false memories through the *illusory-truth effect*. Their experiments revealed

that repeated exposure, even in corrective contexts, enhances perceived familiarity and thereby credibility of misinformation. This finding exposes a paradox: debunking without metacognitive training may deepen, rather than dispel, false beliefs. Consequently, effective literacy initiatives must evolve from reactive debunking toward proactive pre-bunking strategies that strengthen anticipatory scepticism and emotional regulation before misinformation exposure.

The theoretical convergence of these studies supports a more nuanced interpretation of literacy as both cognitive immunity and socio-ethical capacity. Literacy empowers individuals to decode misinformation, yet its efficacy depends on contextual scaffolding transparent algorithms, culturally adaptive pedagogy, and empathetic design. Without these supports, literacy risks becoming a privilege of the educated few, reproducing informational inequity under the guise of empowerment. Thus, literacy and information quality are mutually reinforcing: well-designed systems enable discerning users, and discerning users in turn sustain system credibility through critical participation.

In the framework of this review, digital literacy represents the first pillar of the Digital Trust Empowerment Pathway. It bridges the micro-level of personal cognition with the meso-level of community engagement and the macro-level of institutional transparency. Using cultivating critical reasoning, reflexivity, and ethical awareness, literacy transforms the individual from a passive consumer of information into an active co-constructor of trustworthy knowledge. **Figure 3** illustrates this multi-layered interface, depicting how individual competence intersects with collective trust networks to form the foundation of digital-resilience ecosystems.



**Figure 3.** Multilevel structure of digital literacy and trust formation as the arrows indicate a dynamic, bidirectional relationship between the three layers.

### 4.3. Platform accountability and algorithmic transparency

While digital literacy strengthens individual capacity for discernment, platform accountability determines the structural architecture through which information circulates, is amplified, and ultimately legitimized in the digital public sphere as tabulated in **Table 5**. In the post-pandemic context, where algorithmic feeds have become the primary gatekeepers of visibility, transparency and responsibility are no longer technical luxuries but public-health imperatives. Experimental research by Bode and Vraga [24] provided early empirical confirmation of this relationship. Their study demonstrated that algorithmic “related stories” prompts and user-driven correction mechanisms significantly reduced the persistence of false beliefs on social media, suggesting that hybrid human–machine moderation can improve informational accuracy without suppressing open discourse. The significance of this experiment lies not only in its behavioural findings but in its broader implication that algorithmic design choices carry moral and epistemic consequences, shaping what societies collectively recognise as truth.

**Table 5.** Summarizes cross-national governance characteristics and their implications for digital trust.

| Country/law       | Definition of misinformation    | Oversight type           | Transparency mandate      | Sanctions            | Trust implication          |
|-------------------|---------------------------------|--------------------------|---------------------------|----------------------|----------------------------|
| Germany (NetzDG)  | Unlawful content via Penal Code | Independent oversight    | Public reporting required | Fines €5–50M         | Balanced compliance model  |
| Brazil (2024)     | Includes synthetic/AI content   | Judicial & fact-checkers | Public repository         | Civil liability      | Innovates in AI regulation |
| Singapore (POFMA) | “False statements of fact”      | Ministerial control      | Limited                   | Fines & imprisonment | Risks censorship           |
| Turkey (Law 7418) | “Untrue information”            | Government agency        | Restricted                | Bandwidth cuts       | Low trust, overreach       |

At the policy level, this relationship between governance and technological architecture has matured into a central regulatory dilemma: how to balance freedom of expression with the societal duty to prevent informational harm. UNESCO [44] conducted a comparative analysis of five national misinformation laws, revealing stark contrasts in accountability models. Germany’s NetzDG and Brazil’s Resolution 23.732/2024 exemplify co-regulatory frameworks that combine platform responsibility with independent oversight and judicial recourse. These systems mandate public transparency reports and clear avenues for appeal, thereby balancing enforcement with expression. In contrast, Singapore’s Protection from Online Falsehoods and Manipulation Act (POFMA) and Turkey’s Law 7418 centralize adjudicative power within executive agencies, enabling rapid takedown orders but raising legitimate concerns over censorship, surveillance, and democratic accountability. Brazil’s law stands out as a global innovation by explicitly including synthetic and AI-generated content within its regulatory scope an anticipatory step toward addressing the emerging frontier of generative misinformation.

Complementary large-scale bibliometric mapping by Adebessin et al. [27] further confirmed the global salience of algorithmic governance as an academic and policy concern. Analysing 943 Scopus-indexed publications on health misinformation, they identified exponential growth between 2020 and 2023, with algorithmic transparency,

AI-based detection, and infodemiology emerging as dominant thematic clusters. High international collaboration was strongly correlated with citation impact, suggesting that transparency and openness extend not only to technological systems but to the epistemic structures of research itself. These findings resonate with earlier documentation by Zarocostas [14] in *The Lancet*, which detailed the WHO's strategic partnerships with global technology platforms such as Facebook, Google, and TikTok at the onset of the COVID-19 pandemic. Through these collaborations, COVID-19 search queries were redirected toward authoritative sources, effectively transforming algorithmic visibility into a tool of public-health stewardship. This model of co-regulation where institutions and platforms share responsibility for the epistemic environment offers a viable counterpoint to both laissez-faire self-regulation and authoritarian state control.

Taken together, these strands of evidence converge on a critical insight: algorithmic transparency is not merely a technical criterion but a determinant of democratic legitimacy and social trust. Governance models that mandate reporting, enable independent oversight, and impose proportionate sanctions cultivate public confidence in the fairness of digital ecosystems. Conversely, opaque algorithms and punitive, state-centric regimes risk amplifying fear, self-censorship, and epistemic fragmentation. From a governance perspective, transparency should therefore be reframed as a form of informational justice a right of citizens to understand how visibility, virality, and credibility are algorithmically produced. Within the Digital Trust Empowerment Pathway, platform accountability occupies the meso-level link between individual literacy and institutional governance, ensuring that the digital environment itself becomes an ally rather than an adversary in the pursuit of informed, resilient societies.

#### **4.4. Community-based health communication and social trust**

The restoration of trust in post-pandemic societies depends not only on literate individuals or accountable digital architectures but on communities capable of sustained dialogue and collective sense-making. Trust is not merely transmitted through information; it is co-produced through communicative interaction, shared emotion, and perceived reciprocity between institutions and citizens. Empirical studies have consistently shown that the emotional texture of communication how messages feel as much as what they say shapes the trajectory of public belief far more powerfully than factual accuracy alone.

During earlier infectious-disease outbreaks, Tang et al. [29] conducted a meta-synthesis of thirty studies on social-media communication and identified a cyclical pattern of emotional contagion in online discourse. Public conversations oscillated between fear, humour, and frustration, with misinformation posts generating significantly higher engagement metrics than factual updates. Crucially, most official accounts employed *unidirectional messaging*, privileging information delivery over emotional attunement. This asymmetry data without dialogue created a vacuum in which rumours could thrive, revealing that the failure to communicate empathically is itself a structural form of misinformation.

The psychological consequences of such communicative asymmetry were made starkly evident by Freeman et al. [30], who found a direct correlation between conspiracy belief endorsement and non-compliance with COVID-19 health guidelines. Their study illuminated mistrust as both a psychological and behavioural contagion: once citizens perceive institutions as opaque or dismissive, collective adherence to preventive behaviours deteriorates, regardless of scientific evidence. Conversely, evidence from Angawi and Albugmi [31] in Saudi Arabia revealed the opposite dynamic. When governmental agencies actively engaged with citizens on social media responding to queries, acknowledging uncertainty, and using culturally resonant language public risk perception became more accurate, and compliance intentions strengthened. These findings suggest that governmental presence alone is insufficient; relational engagement is decisive.

Viewed through this lens, digital communication operates as a double-edged ecosystem. The same platforms that can amplify panic, polarization, and misinformation can also cultivate resilience, solidarity, and shared meaning depending on message framing, tone, and perceived authenticity. These dual potential underscores the necessity of *affective governance*, wherein emotional transparency complements informational accuracy. Supporting this view, Choukou et al. [20] demonstrated that emotionally responsive e-learning environments improved user trust and self-efficacy among older adults and individuals with chronic conditions. Similarly, Gaysynsky et al. [32] observed that individuals uncertain about information credibility often sought verification from healthcare professionals, transforming confusion into collaborative inquiry. Such behaviour exemplifies distributed trust a collective process in which verification is socially networked rather than individually confined.

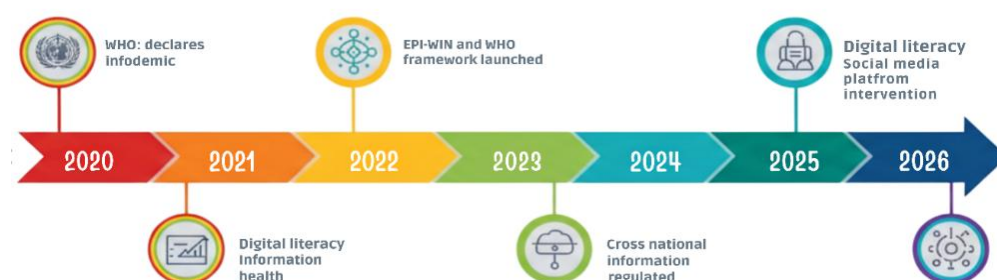
These patterns affirm Habermas's [40] theory of communicative action, which posits that legitimacy in modern societies arises not from authority or persuasion but from dialogue grounded in mutual understanding. In this view, two-way, empathy-based communication is not ancillary but constitutive of public trust. By enabling the public to participate in meaning-making rather than merely receiving instructions, health communication evolves from an instrument of compliance into a platform for empowerment. Communities become co-producers of health knowledge, transforming information exchange into social learning and civic solidarity. Thus, within the Digital Trust Empowerment Pathway, community-based communication functions as the connective tissue linking individual literacy and institutional transparency consumes time as presented in **Figure 4**. It transforms isolated acts of information reception into participatory deliberation, ensuring that public trust is not merely restored but continuously regenerated through dialogue, empathy, and shared accountability.

#### **4.5. Institutional transparency and governance for digital resilience**

Institutional trust represents the apex of the Digital Trust Empowerment Pathway, serving as the structural foundation upon which individual literacy and community dialogue ultimately depend. Trust at this level is not generated through rhetoric but earned through systems that are transparent, accountable, and responsive to public scrutiny. As Janssen et al. [35] compellingly argued, the legitimacy of open data is

contingent upon its usability, responsiveness, and interpretability. Their identification of five enduring “open-data myths” remains instructive more than a decade later chief among them, the misconception that mere data disclosure equates to transparency. Without mechanisms that enable comprehension, contextualization, and feedback, open data can paradoxically reproduce opacity by inundating citizens with inaccessible information. True transparency, therefore, is dialogic: it requires institutions not only to release information but also to translate, contextualize, and invite interpretation.

### Milestones in the evolution of health communication



**Figure 4.** Timeline of global community communication practices during the infodemic (2020–2025).

These principles were operationalized on a global scale through the World Health Organization’s Framework for Managing the COVID-19 Infodemic [11]. The framework articulated five interdependent domains scanning, explaining, amplifying, measuring, and governing each designed to embed evidence-based communication within institutional processes. Importantly, it reframed information management from a reactive function into a governance responsibility, emphasizing that crisis communication and democratic accountability are mutually reinforcing. Zarocostas [14] documented how these concepts materialized through the WHO’s *EPI-WIN* platform, which enabled real-time rumour tracking, cross-agency coordination, and multilingual dissemination of verified content. This initiative established an early prototype of institutional infodemic governance, in which transparency is operationalized as continuous public engagement rather than post hoc disclosure.

At the macro level, Adebesin et al. [27] provided bibliometric evidence that international collaboration and transparent data-sharing practices correlate not only with higher scholarly visibility but also with broader societal trust in public institutions. Similarly, UNESCO [44] revealed that policy frameworks emphasizing independent oversight and mandatory transparency reporting such as Brazil’s Resolution 23.732/2024 and Germany’s NetzDG enhance legitimacy through procedural fairness and public accountability. In contrast, state-centric regimes that centralize information control within executive agencies risk eroding trust by conflating communication management with censorship. At the micro level, institutional transparency is reinforced by frontline empowerment, a theme echoed in the studies of Ahmed et al. [37] and Choukou et al. [20]. Training healthcare professionals, educators, and community facilitators in digital-health literacy extends governance principles into

daily operational contexts, transforming transparency from policy rhetoric into practice. Such bottom-up inclusion democratizes the information environment, ensuring that citizens, not just policymakers, become stakeholders in the governance of truth.

Synthesizing across these scales reveals that effective digital-trust governance requires the alignment of three mutually reinforcing transparency mechanisms. First, open data and algorithmic auditability ensure that the evidentiary basis of public communication is verifiable and traceable. Second, independent oversight combined with proportionate sanctions institutionalizes fairness and prevents both overreach and negligence. Third, equity-driven capacity building guarantees that transparency is not an elite privilege but a collective capability shared across socioeconomic strata. When integrated, these mechanisms constitute an ethically grounded model of participatory governance a system in which institutions learn from their publics as much as they inform them. In this configuration, institutional transparency functions as both the culmination and the stabilizing force of the Digital Trust Empowerment Pathway. It transforms governance from a hierarchical instrument of control into a reflexive ecosystem of accountability, where information flow, citizen participation, and evidence-based decision-making reinforce one another. **Table 6** outlines these governance mechanisms and their respective contributions to post-pandemic digital resilience, illustrating how openness, oversight, and equity together sustain the credibility of modern information systems.

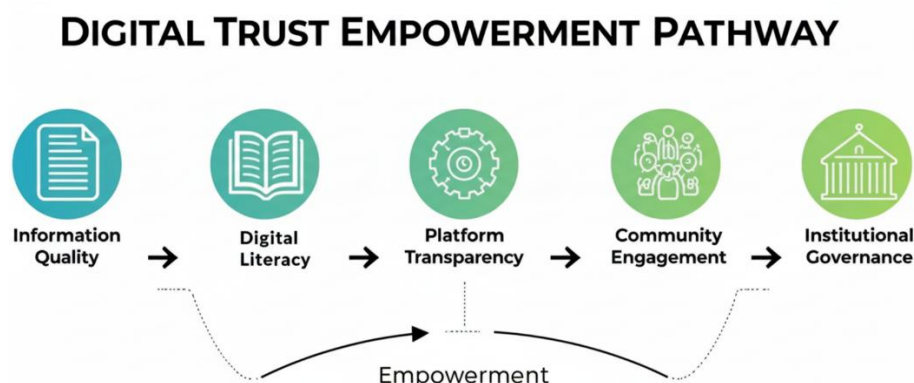
**Table 6.** Institutional transparency mechanisms for digital-trust governance.

| Stage                    | Expected impact                        | Mechanism                                  | Representative studies |
|--------------------------|----------------------------------------|--------------------------------------------|------------------------|
| Information quality      | Reduces rumour proliferation           | Evidence-based communication               | [11,29]                |
| Digital literacy         | Increases discernment & resilience     | Cognitive & skill-based empowerment        | [3,37,20]              |
| Platform transparency    | Restores fairness in visibility        | Co-regulation & algorithmic accountability | [24,27,44]             |
| Community engagement     | Rebuilds affective trust               | Two-way empathetic communication           | [30,31]                |
| Institutional governance | Institutional legitimacy & empowerment | Open data, infodemic management            | [14,35]                |

#### 4.6. Integrative discussion: The digital trust empowerment pathway

Synthesizing the four conceptual pillars yields a coherent and dynamic model the Digital Trust Empowerment Pathway which conceptualizes literacy, transparency, community dialogue, and governance as sequential yet recursive stages of societal resilience in **Figure 5**. This framework transcends linear communication models by positioning trust not as an end product but as a continuous process of co-construction among individuals, platforms, communities, and institutions. Within this cyclical architecture, information quality initiates trust formation by reducing rumour exposure and clarifying epistemic boundaries. Digital literacy subsequently transforms raw information into discernment, empowering citizens to critically evaluate sources and

resist manipulation. Platform transparency ensures that credible content remains equitably visible, mitigating the distortive effects of algorithmic opacity. Community engagement then translates cognitive understanding into collective efficacy, converting knowledge into coordinated behavioural change, while institutional governance consolidates these cumulative gains through accountability mechanisms and open-data stewardship.



**Figure 5.** Conceptual model of the digital trust empowerment pathway.

Crucially, feedback loops between each layer create a self-correcting ecosystem, allowing institutional learning to emerge from community responses and citizen experiences. This reflexivity ensures that governance remains adaptive rather than coercive, continuously integrating public sentiment into evidence-based decision-making. In this sense, the Digital Trust Empowerment Pathway functions as both a conceptual and operational framework one that integrates psychological, communicative, technological, and policy dimensions into a unified model of digital resilience. Empirical convergence across the reviewed literature provides robust support for this cyclical model. Studies employing multi-dimensional interventions consistently reported greater trust-restoration effects than those using single-factor approaches. For instance, Choukou et al. [20] demonstrated that the combination of literacy training and participatory communication reduced anxiety and improved self-efficacy among vulnerable users, while UNESCO [44] and Zarocostas [14] showed that coupling transparency mandates with algorithmic co-regulation enhanced both credibility and compliance in digital health communication. By contrast, narrow corrective interventions, such as unilateral myth-versus-fact debunking, often produced backfire effects [21], reinforcing false beliefs through familiarity and highlighting the insufficiency of purely cognitive remedies for complex socio-informational crises.

The integrative framework also aligns closely with global policy trajectories. UNESCO's media and information literacy initiative advocates the cultivation of critical digital competencies as a human right essential for democratic participation. The WHO's infodemiology program extends this principle into the health domain, emphasizing that information environments must be monitored and governed with the same scientific rigor as biological epidemics. At the macro-policy level, the framework directly supports the United Nations Sustainable Development Goals (SDGs) specifically, SDG 3 (Good Health and Well-Being) through evidence-based

communication; SDG 10 (Reduced Inequalities) through equitable access to literacy and trustworthy information; and SDG 16 (Peace, Justice, and Strong Institutions) through transparent and participatory governance.

Critically, the Digital Trust Empowerment Pathway reframes the infodemic not as a transient disruption but as a structural opportunity for civic renewal. Applying the embedding transparency, empathy, and critical literacy into everyday governance, societies can transform the informational vulnerabilities exposed by the pandemic into sustainable infrastructures of empowerment. In doing so, they shift the paradigm of communication from top-down persuasion to reciprocal deliberation, where citizens act as co-producers of knowledge rather than passive consumers of data. The model thus positions trust as both the currency and architecture of digital society an evolving social infrastructure that underpins equitable, ethical, and resilient governance in the post-pandemic era.

## **5. Conclusion**

This systematic review demonstrates that post-pandemic resilience hinges on transforming the digital information environment from a site of confusion and fragmentation into a system of empowerment grounded in trust, transparency, and participation. Synthesizing evidence from fifteen empirical and policy studies, the review identified four interdependent mechanisms digital literacy, platform accountability, community engagement, and institutional transparency that collectively form the Digital Trust Empowerment Pathway. This integrative model reframes information quality as both a determinant and a product of social trust, positioning communication not as a peripheral activity but as a structural element of public health, governance, and civic identity. At the cognitive level, digital literacy functions as a form of immunisation against misinformation, equipping individuals with the evaluative, emotional, and ethical capacities required to navigate algorithmic environments saturated with competing truth claims. At the architectural level, platform transparency institutionalises fairness by ensuring that credible knowledge remains visible, verifiable, and equitably distributed. Within the social domain, community-based communication transforms knowledge into relational trust through empathy, reciprocity, and two-way engagement, converting compliance into collaboration. Finally, at the systemic level, open and participatory governance consolidates legitimacy through accountability and reflexive learning, embedding transparency and inclusion within institutional routines. When these layers interact dynamically, they generate a self-reinforcing ecosystem of credibility, in which individual discernment, collective participation, and institutional openness continuously strengthen one another. Looking forward, digital health communication must be recognised as public infrastructure rather than a discretionary technical service. The sustainability of democratic and health systems now depends as much on the integrity of information as on the distribution of medicine. Governments, educators, and technology firms should therefore co-design frameworks that embed media- and information-literacy curricula across educational systems, mandate transparent algorithmic auditing as a condition of platform governance, and institutionalise inclusive decision-making that integrates citizen feedback into communication policy.

These measures align directly with Sustainable Development Goals 3 (Good Health and Well-Being), 10 (Reduced Inequalities), and 16 (Peace, Justice, and Strong Institutions), reaffirming that health, equality, and governance are inseparable in the digital era. In this model, trust becomes measurable, teachable, and governable a form of social capital that underwrites the legitimacy of digital governance and the resilience of post-crisis societies. Allowing embedding transparency, empathy, and literacy into everyday communication practices, nations can transform the infodemic from a chronic vulnerability into a catalyst for democratic renewal. Ultimately, the Digital Trust Empowerment Pathway offers not merely a framework for managing misinformation but a blueprint for building ethical, equitable, and cognitively resilient digital societies capable of withstanding the uncertainties of future global crises.

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