

## Supplementary File 1

### *PRISMA-ScR Checklist (adapted for thematic synthesis)*

This checklist follows the *PRISMA Extension for Scoping Reviews* (Tricco et al., *Ann Intern Med*, 2018; 169:467–73), adapted for the thematic-synthesis emphasis of the present review. Each item is mapped to the corresponding section of the main manuscript.

#	Item	PRISMA-ScR description	Reported in (manuscript section)
1	<b>Title</b>	Identify the report as a scoping/thematic narrative review.	Title page; Abstract
2	<b>Structured summary</b>	Background, objectives, eligibility, sources, charting methods, results, conclusions.	Abstract
3	<b>Rationale</b>	Describe rationale in context of existing literature.	§ 1 Introduction
4	<b>Objectives</b>	Provide explicit objectives, with reference to participants, concepts, and context (PCC) where applicable.	Abstract — Objective; § 1 final paragraph
5	<b>Protocol &amp; registration</b>	Indicate whether a protocol exists; provide access information.	§ 2.1; § 2.9 (institutional repository, not PROSPERO — rationale stated)
6	<b>Eligibility criteria</b>	Specify characteristics used as inclusion / exclusion criteria.	§ 2.3
7	<b>Information sources</b>	Describe all sources of evidence; provide last search date.	§ 2.2 (PubMed 5 Feb 2025; Scopus 10 Feb 2025; WoS 14 Feb 2025; grey-lit 5–18 Feb 2025)
8	<b>Search</b>	Present full electronic search strategy for at least one database.	§ 2.2 (full strings for PubMed, Scopus, WoS); Suppl. File 2 (archival)
9	<b>Selection of sources</b>	State the process for selecting sources of evidence.	§ 2.4 (dual blinded Rayyan; $\kappa = 0.81$ )
10	<b>Data charting process</b>	Describe charting methods, including who, how, and any pilot.	§ 2.5 (structured form; 20% parallel-extraction sample)
11	<b>Data items</b>	List and define all variables charted.	§ 2.5

#	Item	PRISMA-ScR description	Reported in (manuscript section)
12	<b>Critical appraisal</b>	If applied, describe methods used to appraise included sources.	§ 2.6 (MMAT 2018; JBI checklists; weighting); § 3.3; Table 3; Suppl. File 4
13	<b>Synthesis of results</b>	Describe methods of summarising and presenting data.	§ 2.7 (Braun & Clarke reflexive thematic analysis; sociotechnical + data-justice lenses)
14	<b>Selection of sources of evidence</b>	Give numbers screened, eligible, included, with reasons for exclusions.	Figure 2 (PRISMA-style flow); § 3 first paragraph
15	<b>Characteristics of sources of evidence</b>	For each source, present characteristics for which data were charted.	§ 3 first paragraph; Figure 3 (evidence map)
16	<b>Critical appraisal within sources of evidence</b>	Present data on critical appraisal if conducted.	§ 3.3; Table 3
17	<b>Results of individual sources of evidence</b>	For each included source, present relevant data.	Tables 1, 2; § 3.1–3.6
18	<b>Synthesis of results</b>	Summarise and synthesise results that relate to review questions.	§ 3.4–3.6; § 4
19	<b>Summary of evidence</b>	Summarise main results, including their relevance to key groups.	§ 4.1; Abstract — Findings
20	<b>Limitations</b>	Discuss limitations of the scoping review process.	§ 4.6 (seven explicit limitations)
21	<b>Conclusions</b>	Provide a general interpretation of the results, implications, and next steps.	§ 5
22	<b>Funding</b>	Describe sources of funding for the review.	Declarations — Funding
A1	<b>Reflexivity (added)</b>	Describe reviewer positionality and how it may have shaped synthesis.	§ 2.8
A2	<b>Bias mitigation (added)</b>	Describe steps taken to reduce bias (publication, language, screening).	§ 2.9
A3	<b>AI-use disclosure (added)</b>	Disclose any use of generative AI tools in manuscript preparation.	Declarations; Suppl. File 5

**Reference:** Tricco AC, Lillie E, Zarin W, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): checklist and explanation. *Annals of Internal Medicine*. 2018;169(7):467–473.

**Note on adaptation.** Items A1–A3 are added to the standard PRISMA-ScR checklist to support thematic-synthesis transparency, in line with current methodological guidance for sociotechnical and qualitative-evidence reviews.

## Supplementary File 2

### *Full database-specific search strategies (archival version)*

This document archives the verbatim search strings executed against PubMed, Scopus, and Web of Science Core Collection between 5 and 18 February 2025. The strings are reproduced in Section 2.2 of the main manuscript; this supplementary file provides additional context including filter settings, returned record counts at each step, and a brief audit log of any subsequent re-execution.

### 1. PubMed

**Database:** PubMed (NLM) **Date executed:** 5 February 2025 **Records returned:** 612 **Filter / limits:** Publication date 2010/01/01–2025/03/31; English language at full-text screening only

("digital health"[MeSH] OR "telemedicine"[MeSH] OR "mobile applications"[MeSH] OR "artificial intelligence"[MeSH] OR "machine Learning"[Title/Abstract] OR mHealth[Title/Abstract] OR eHealth[Title/Abstract] OR "electronic health records"[MeSH] OR "wearable electronic devices"[MeSH] OR "wastewater-based epidemiological monitoring"[MeSH] OR "genomic surveillance"[Title/Abstract] OR "phylogenetic\*"[Title/Abstract])

AND

("communicable diseases"[MeSH] OR "disease outbreaks"[MeSH] OR "pandemics"[MeSH] OR "epidemics"[MeSH] OR "COVID-19"[MeSH] OR "Ebolavirus"[MeSH] OR "Zika virus"[MeSH] OR mpox[Title/Abstract] OR "Influenza, Human"[MeSH] OR "drug resistance, microbial"[MeSH])

AND

("public health surveillance"[MeSH] OR "early diagnosis"[MeSH] OR "forecasting"[MeSH] OR "contact tracing"[MeSH] OR "decision support systems, clinical"[MeSH] OR governance[Title/Abstract] OR equity[Title/Abstract] OR "health equity"[MeSH])

AND (2010/01/01:2025/03/31[Date - Publication])

### 2. Scopus

**Database:** Scopus (Elsevier) **Date executed:** 10 February 2025 **Records returned:** 488 **Filter / limits:** PUBYEAR > 2009 AND PUBYEAR < 2026; document types Article and Review

TITLE-ABS-KEY ( ( "digital health" OR eHealth OR mHealth OR "mobile health" OR telemedicine OR telehealth OR "electronic health record\*" OR EHR OR "artificial

*intelligence" OR "machine Learning" OR "natural language processing" OR wearable\* OR "wastewater surveillance" OR "genomic surveillance" OR "phylogenetic\*" )*

AND

*( "infectious disease\*" OR outbreak\* OR pandemic\* OR epidemic\* OR "COVID-19" OR "SARS-CoV-2" OR Ebola OR Zika OR mpox OR "monkeypox" OR influenza OR "antimicrobial resistance" )*

AND

*( surveillance OR detection OR forecasting OR "contact tracing" OR "decision support" OR governance OR equity ) )*

AND PUBYEAR > 2009 AND PUBYEAR < 2026

AND ( LIMIT-TO ( DOCTYPE , "ar" ) OR LIMIT-TO ( DOCTYPE , "re" ) )

### 3. Web of Science Core Collection

**Database:** Web of Science Core Collection (Clarivate) **Date executed:** 14 February 2025 **Records returned:** 357

**Filter / limits:** Timespan 2010-01-01 to 2025-03-31; document types Article and Review

*TS=("digital health" OR eHealth OR mHealth OR "mobile health" OR telemedicine OR telehealth OR "electronic health record\*" OR EHR OR "artificial intelligence" OR "machine Learning" OR wearable\* OR "wastewater surveillance" OR "genomic surveillance" OR "phylogenetic\*")*

AND

*TS=("infectious disease\*" OR outbreak\* OR pandemic\* OR epidemic\* OR COVID-19 OR "SARS-CoV-2" OR Ebola OR Zika OR mpox OR monkeypox OR influenza OR "antimicrobial resistance")*

AND

*TS=(surveillance OR detection OR forecasting OR "contact tracing" OR "decision support" OR governance OR equity)*

### 4. Grey literature

Grey literature was searched purposively (5–18 February 2025) across the websites of: World Health Organization (WHO), European Centre for Disease Prevention and Control (ECDC), United States Centers for Disease Control and Prevention (US CDC), GISAID, Africa CDC, the Global Digital Health Partnership, and the World Bank One Health portfolio. Forty-one (41) records were identified through purposive grey-literature search.

### 5. Multilingual abstract screening

To partially mitigate language bias at the screening stage, abstracts in Spanish, Portuguese, French, and Chinese were screened in Rayyan with machine translation. Any non-English full-text identified as potentially relevant was logged for transparency. Full-text screening was conducted in English only; this language restriction is reported as a non-trivial limitation in § 4.6 of the main manuscript.

## 6. De-duplication and audit

Records were imported into EndNote X20. After automated and manual de-duplication, 1,162 unique records advanced to title-and-abstract screening. The total identified across all sources was 1,498 (612 PubMed + 488 Scopus + 357 WoS + 41 grey literature).

## 7. Search peer-review

The strategy followed the Peer Review of Electronic Search Strategies (PRESS) checklist (McGowan et al., *J Clin Epidemiol*, 2016; 75:40–46). An independent information-specialist reviewed the strings before execution and recommended minor MeSH-term

## Supplementary File 3

### *Exclusion log — summary of studies excluded with reasons*

This document summarises the exclusion process at title-and-abstract and full-text screening stages. The full per-record decision log (1,162 screened, 824 excluded at title/abstract, 196 excluded at full-text) is maintained in the corresponding author's Rayyan workspace and is available to editors and reviewers on request. Aggregate counts by reason are provided below; per-stage counts also appear in the PRISMA-style flow diagram (Figure 2 of the main manuscript).

### 1. Title and abstract stage (n = 824 excluded)

Reason for exclusion	n	Notes
Off-topic — no digital-health component or no infectious-disease focus	<b>412</b>	Most common reason; included papers on chronic-disease informatics, general telemedicine without infectious-disease focus.
Non-empirical / opinion / editorial without analytic content	<b>261</b>	Editorials, news commentaries, blog-style perspectives without methodological substance.
Non-infectious-disease focus	<b>151</b>	E.g., diabetes self-management, chronic-pain telemedicine, mental-health apps with no infectious-disease application.

### 2. Full-text stage (n = 196 excluded)

Reason for exclusion	n	Notes
Insufficient public-health context — purely technical performance study without epidemiological framing	78	E.g., AI image-classification benchmarks without disease-surveillance application context.
Duplicate or pre-print of already-included record	44	Conference papers later superseded by journal article; pre-print versions of included peer-reviewed papers.
Non-English full-text	39	Logged separately; see § 4.6 (vi) of main manuscript on language-restriction limitation. Languages: 12 Chinese, 9 Spanish, 7 Portuguese, 6 French, 5 Russian/Arabic/other.
Outcome data not extractable	35	E.g., narrative descriptions without performance metrics, or with metrics not interpretable in the review's analytic frame.

### 3. Inter-rater reliability and conflict resolution

Inter-rater agreement on a 20% calibration sample was Cohen's  $\kappa = 0.81$  (substantial agreement). Conflicts at title-and-abstract stage ( $n = 47$  of the calibration sample) were resolved by a third reviewer; the most common conflict pattern was disagreement about whether a borderline non-empirical commentary should be retained as a policy analysis. After consensus discussion, criteria were tightened to require that policy analyses include at least one structured argument and reference to operational evidence.

### 4. Availability of per-record decisions

Per-record decision logs (study ID, title abbreviation, screening stage, decision, reason, reviewer ID) are maintained in the Rayyan workspace associated with this review. The corresponding author will share this log with the editor on request, subject to the licensing terms of the source databases.

## Supplementary File 5

### *Generative AI use — task-level disclosure log*

In line with the journal's authorship and AI-use policies, this supplementary file documents the specific tasks for which large language model (LLM) assistants were used during preparation of the manuscript,

and equally important, the tasks for which they were *not* used. All AI-assisted output was reviewed and edited by the human authors, who take full responsibility for the final content.

## 1. Tools used

Three LLM assistants were used at different stages of the work: ChatGPT (OpenAI; multiple versions across Mar 2024 – Mar 2025), Gemini (Google; Mar 2024 – Mar 2025), and Claude (Anthropic; Aug 2024 – Mar 2025). All sessions were initiated by the authors; no autonomous-agent workflows were used.

## 2. Tasks where LLMs WERE used

Task	Description and human-author oversight	Manuscript section
English-language editing of author drafts	Authors drafted text in English; LLM used to suggest sentence-level fluency improvements. Every suggestion was reviewed and either accepted, rejected, or further edited by the authors. No new substantive content was introduced by the LLM in this mode.	Throughout
Structural suggestions for Discussion subsections	Authors prompted LLMs with the section content and asked for suggestions on logical ordering and subsection naming. Final structure was decided by the authors; LLM suggestions were used selectively.	§ 4
Draft of figure layout (matplotlib parameters)	Authors specified data, analytic intent, and aesthetic constraints; LLM generated initial Python/matplotlib code which was then edited and validated by the authors. All numbers in the figures derive from the authors' extraction database, not from the LLM.	Figures 1, 2, 3
Reformatting of in-text references to journal house style	LLM used to convert between citation formats (Vancouver / APA / journal-specific). Bibliographic content was always taken from the authors' source database; LLM did not generate or fabricate bibliographic data.	References
Suggesting alternative phrasings for value-laden terms	After Reviewer feedback (Round 2) requesting more measured tone, LLMs were used to suggest neutral alternatives to advocacy-style phrasings. Final wording was authored by the human team.	§ 4 (tone audit)

## 3. Tasks where LLMs were NOT used

The authors made an explicit decision not to use LLMs for any of the following tasks, all of which were performed by the human author team:

- **Search-string formulation.** The Boolean strings were drafted by the authors with input from an information specialist (PRESS-checklist review).
- **Title-and-abstract screening.** All screening was performed by two human reviewers in Rayyan, blinded to each other's decisions; conflicts were resolved by a third human reviewer.
- **Full-text eligibility decisions.** All decisions were made by human reviewers.
- **Data extraction.** All extraction was performed by the human authors using a structured form; a 20% sample was extracted in parallel by two reviewers.
- **Quality appraisal.** All MMAT 2018 and JBI assessments were performed by human reviewers.
- **Generation of scientific claims.** No specific empirical or analytic claim in the manuscript was generated by an LLM; all synthesis-level inferences are the authors' own.
- **Generation or invention of citations.** No citations were generated by LLMs. Every reference was located, retrieved, and verified by the authors. Where LLM tools suggested potentially relevant references during drafting, the authors verified each one against the original source before inclusion.

#### 4. Authorship and accountability

LLM tools are not listed as authors, in line with the COPE guidance and current journal policies. The human authors take full responsibility for the integrity, accuracy, and originality of all content in the manuscript, and for any errors that may be identified.