

# Measurement of Harms Associated with Technology use among Health Workers



## What are digital harms?

- Digital harms are the negative outcomes associated with the use of digital technologies.
- These can be direct or indirect, intentional or unintended, and can manifest across multiple technical, social, and organisational domains.
- In this review, we focused specifically on digital harms affecting healthcare workers (HCWs) in low- and middle-income countries (LMICs), recognising their unique contexts, constraints, and exposure to digital systems.

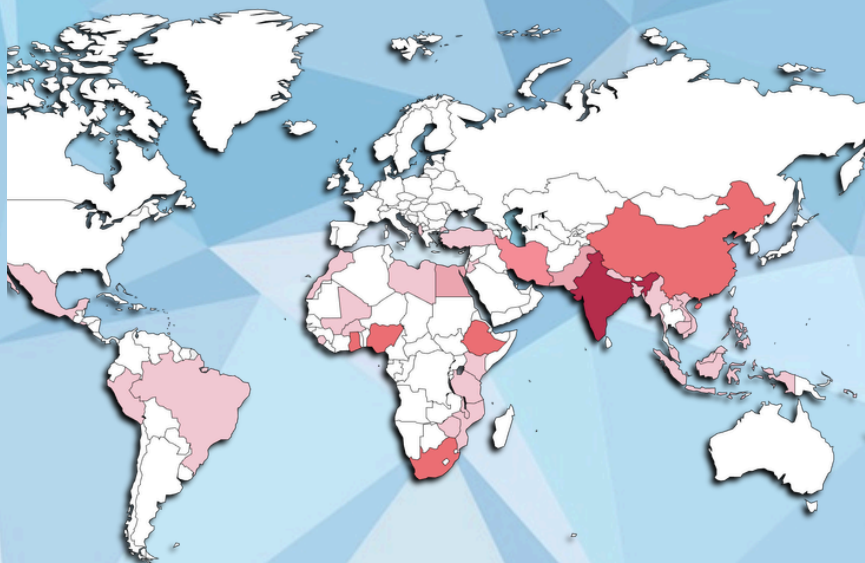
## Understanding digital harms among HCWs: a framework

AREA OF DIGITALISATION	POTENTIAL HARMS	OUTCOMES	IMPACTS
Digitisation of health records	Fragmented digitalisation	<b>PATIENT BASED</b>	<b>Poor service delivery</b> (quality of care & inequity)
Health worker decision support	False information	Patient misdiagnosis	
Activity planning & scheduling	Biases in AI & algorithms	Disease mismanagement	
Searching for health information	Technology over-dependence	Psychological & social	<b>Practitioner retention/loss</b>
Communication: provider-provider	Duplication of electronic/paper systems	Loss of income	
Communication: patient-provider	Excessive surveillance	<b>PROVIDER-BASED</b>	<b>Decline in mental health:</b> burnout, reduced job satisfaction
Telemedicine	Violations of privacy and data protection	Workload & burnout	
Training	Offline digital violence	Psychological strain	
Other: referral, laboratory, supply chain management	Loss of face-to-face interaction	Deskilling	<b>Decline in physical health</b>
	Dulling of clinical competencies	Workplace conflict	
	Financial harm due to OOP costs	Medicolegal risk	
		<b>HEALTH SYSTEM</b>	
		Inequitable service	<b>Economic loss</b>
		Efficiency & cost	
		Data & governance	
		Public trust & legitimacy	

Domains may generate multiple, interacting harms that contribute to diverse outcomes and longer-term system impacts

## Overview of methods & article geographical distribution

- 1,835 articles published between 2015 and 2025 were obtained from database search.
- 219 articles were eligible for full text screening, of which 99 were included.
- 34 studies were published in 2025 alone.
- The majority of the studies were from India, China, South Africa, and Ethiopia.
- Central Africa is underrepresented.



## Key findings on digital harms among health workers

### Key Finding



### Most studies centred on provider experiences and positive outcomes; harms are often not explicitly explored

- **Evidence is skewed toward positive outcomes:** Research predominantly emphasises the positive aspects of technology use, such as feasibility, acceptability, or strategies for “making a system work,” with less attention to negative outcomes. Only 12 studies directly sought to measure harms defined in our framework.
- **Limited self-identification of harms:** Many providers reported experiences that met our framework’s criteria for harm, despite not labelling them as such themselves; for example, managing duplicate paper and electronic systems.
- **Framing of studies could drive under-reporting of harms:** Because many studies did not actively explore harms using a framework, the full range of harms experienced is likely underreported.

## Key Finding



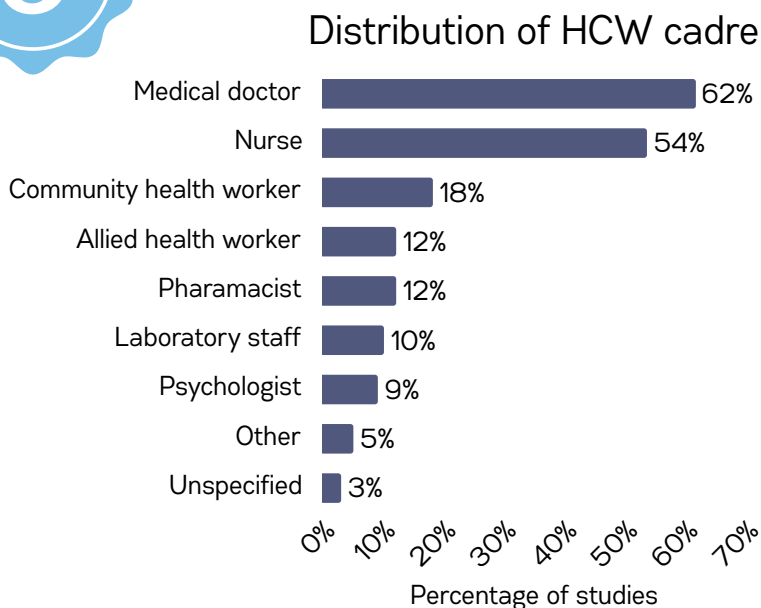
### Pathways to harms under-examined

- Studies examining the negative effects of digitalisation **tended to focus on the overarching outcomes**, such as burnout, rather than the underlying harms that caused them.
- This limits the understanding of causal pathways between digital systems, harms, and downstream impacts.

## Key Finding



### 62% of studies focused primarily on the experiences of medical doctors



- Of the 99 studies included, two-thirds examined the experiences of **medical doctors**.
- **Community health workers** and other frontline cadres are **underrepresented** in the literature.
- This reflects a **mismatch between who is studied and the primary users of digital systems** in LMICs, in many cases CHWs.

Figure 1: Healthcare Worker Cadres by Percentage

## Key Finding



### Methods for measuring digital harms lack consistency and rigour










- Study designs were split between quantitative and qualitative approaches, with a few mixed-methods studies.
- Amongst **quantitative** studies:
  - 60% of studies relied on once-off, unvalidated instruments.
  - Only 7 improved phrasing and/or translation of survey questions via cognitive testing.
- This methodological mix reflects an emerging field lacking longitudinal evidence, cohesive frameworks, and standardised measurement tools.

## Key Finding



### Digitisation of health records was the most commonly studied domain

- Health record digitisation was reported in 42 studies (41%).
- Telemedicine was also commonly studied (23% of the studies).
- Several studies examined HCW experiences across multiple domains.
- All domains were represented, although “Searching for Health Information” and “training” were the least studied (7% and 4%, respectively).

Rank	Digitalisation Domain	% of Studies
1	 Digitisation of health records	41%
2	 Telemedicine	23%
3	 Decision support tools	19%
4	 Patient-provider communication	16%
5	 Other	15%
6	 Activity planning & scheduling	10%
7	 Provider-provider communication	8%
8	 Searching for health information	7%
9	 Training	4%

**Table1:** Studies focusing on different areas of digitalisation

(1). “It has **increased our workload**. Every message needs a response. Even at night they message, It feels like work never ends now”

Nurse -India (Jamison; 2025)

(2) “Patients have my WeChat ID and see me **as always on-call**. It’s great for their comfort, but sometimes **I feel I’m a nurse 24/7, even at home**”.

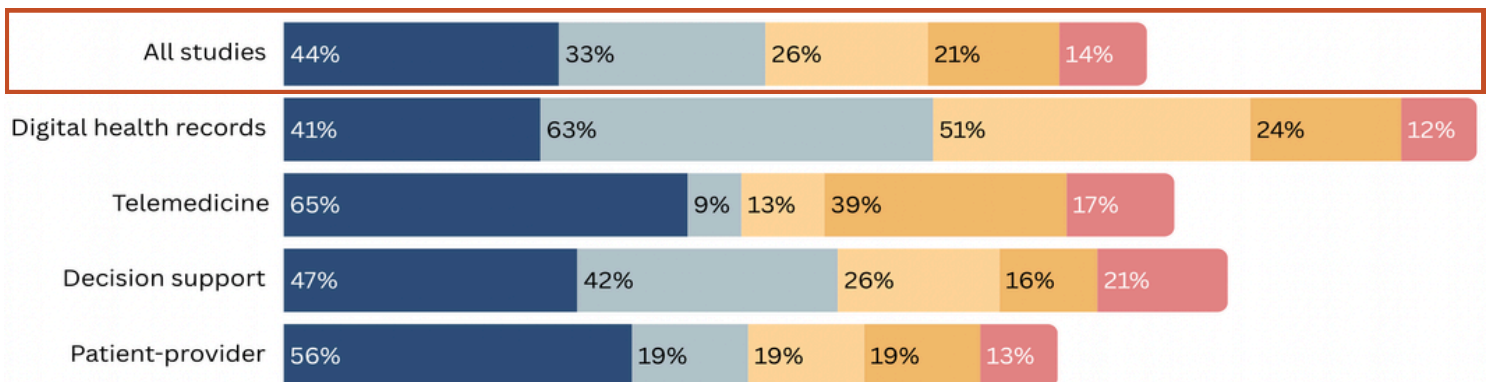
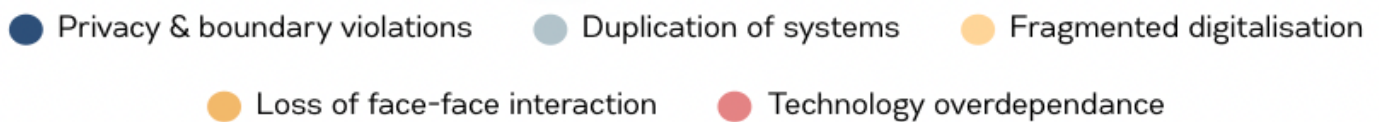
Nurse-China (He; 2025)

## Key Finding



### Privacy and boundary violations were the most commonly reported harms

- **Digitalisation is reshaping professional boundaries.**
  - Use of personal devices and messaging platforms extends work into private time and enables after-hours contact.
- Concerns around **patient confidentiality and data protection** were linked to the use of informal communication tools.
- **Duplication of paper & digital systems, along with fragmented digitalisation,** were also consistently reported, increasing administrative burden and contributing to burnout.
- **Limited exploration of AI-related harms.**
  - Only two studies identified concerns around cognitive offloading, reduced creativity, and declining motivation.
- **Patterns of harm varied by digital domain.**
  - Health record systems were more strongly associated with duplication and fragmentation, while telemedicine was more frequently linked to privacy concerns, reduced face-to-face interaction, and out-of-pocket costs.



**Figure 4:** Potential harms within the literature (%)

## Key Finding



### **Workload & burnout dominates outcomes while impacts remain largely under-studied.**

- Increased **workload and burnout** were the most commonly reported outcomes, identified in **78% of studies**.
- Poor connectivity and system design limitations intensify workload.
- Emotional strain and stress were also widely reported (31% of studies).
- Workload burden was mostly linked to fragmented digitalisation, while medico-legal concerns were proportionally more prominent in telemedicine.

## Current recommendations

- **Expand WHO we study**
  - Include CHWs, nurses, and frontline cadres
- **Expand WHAT is measured**
  - Capture full harm → outcome → impact pathway
  - Widen focus to include emerging domains such as AI
  - Increase awareness of the full typology of harms and impact pathway
- **Strengthen HOW harms are measured**
  - Standardised, context-appropriate, cognitively tested tools

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