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 harms can be direct or indirect, intentional or unintended, and can manifest across multiple technical, social, and organisational domains.

- In this review, we focus specifically on digital harms affecting health workers in low- and middle-income countries (LMICs), recognising their unique contexts, constraints, and exposure to digital systems.

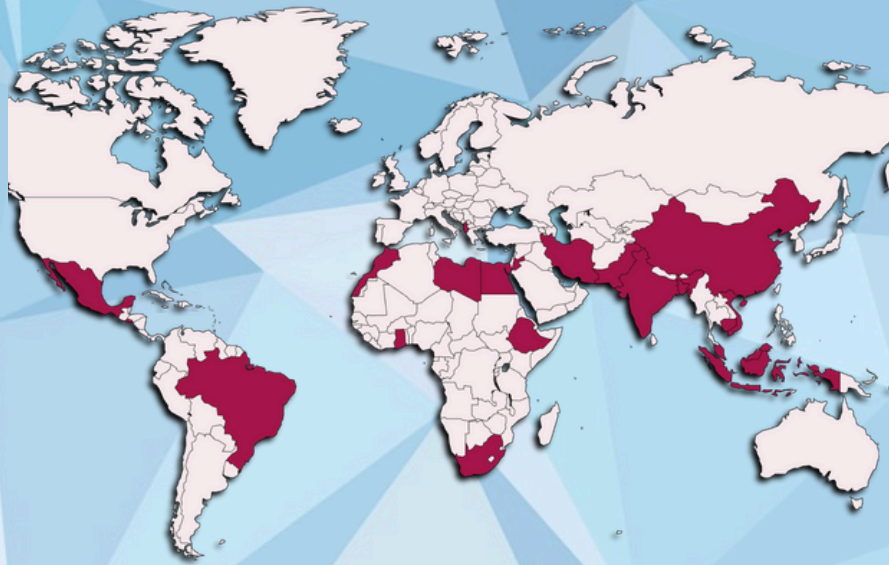## Understanding digital harms among health workers: a framework

DIGITALISATION OF HEALTHCARE WORKERS	POTENTIAL HARMS	OUTCOMES	IMPACTS
Digitalisation of health records	Fragmented digitalisation	**PATIENT BASED**	**Poor service delivery** (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	**Practitioner retention/loss**
Communication: provider-provider	Duplication of electronic/paper systems	Loss of income	
Communication: patient-provider	Excessive surveillance	**PROVIDER-BASED**	**Decline in mental health:** burnout, reduced job satisfaction
Telemedicine	Violations of privacy and data protection	Workload & burnout	
	Offline digital violence	Psychological strain	
Training	Loss of face-face interaction	Deskilling	**Decline in physical health**
	Dulling of clinical competencies	Workplace conflict	
Other: referral, laboratory, supply chain management	Financial harm due to OOP costs	Medicolegal risk	
		HEALTH SYSTEM	**Economic loss**
		Inequitable service	
		Efficiency & cost	
		Data & governance	
		Public trust & legitimacy	

www.evidence-digital.org

- From 2015 to 2025 a total of 1,839 articles were screened and 223 met the inclusion criteria.

- For Jan to Oct 2025 alone, 34 met the inclusion criteria for extraction. The location of these studies are depicted in the map.

- The majority of the studies were published in India, China, Ethiopia, and Egypt.

Key findings on digital harms among health workers

Key Finding

1

Most studies centred on provider experiences and emphasised positive outcomes; harms and challenges often not explicitly explored

- <u>Potential bias in the literature</u>: 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.

- <u>Limited self-identification of harms</u>: 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.

- <u>Framing of studies could drive under-reporting of harms</u>: Because many studies did not actively explore harms using a framework, the full range of harms experienced is likely underreported.

www.evidence-digital.org

EDiT
EVIDENCE
FOR DIGITAL
TRANSFORMATION
Consortium

School of Public Health
Departement Openbare Gesondheid
Isikolo Sempilo Yoluntu
UNIVERSITY OF CAPE TOWN

JOHNS HOPKINS
BLOOMBERG SCHOOL
of PUBLIC HEALTH

YORK
UNIVERSITÉ
UNIVERSITY

2

Pathways to harms under-examined

- Studies examining the negative effects of digitisation tended to focus on the overarching outcomes defined in our framework, rather than on the specific harms that may have caused them.

3

66% of studies focused primarily on the experiences of medical doctors

Distribution of HCW Cadre
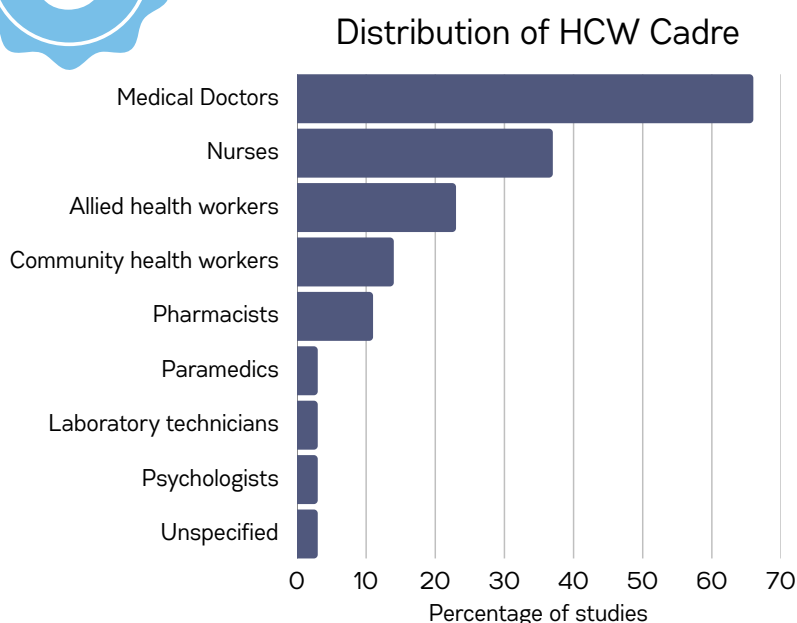
- Of the 34 studies included, two-thirds examined the experiences of medical doctors.

- Community health workers and other frontline cadres are largely absent from the literature.

- The cadres that support the majority of primary and rural care services in most LMICs remain understudied

Figure 1: Healthcare Worker Cadres by Percentage

4

Approaches to measuring harms relied in equal proportion on quantitative & qualitative methods

- Study designs were roughly evenly split between cross-sectional and qualitative approaches, with few mixed-methods studies, and most used one-off, non-validated tools to assess harms.

- This methodological mix reflects an emerging field lacking longitudinal evidence, cohesive frameworks, and standardised measurement tools.

www.evidence-digital.org

EDiT
EVIDENCE FOR DIGITAL TRANSFORMATION
Consortium

School of Public Health
Departement Openbare Gesondheid
Isikolo Sempilo Yoluntu
UNIVERSITY OF CAPE TOWN

JOHNS HOPKINS
BLOOMBERG SCHOOL
of PUBLIC HEALTH

YORK
UNIVERSITÉ
UNIVERSITY

Key Finding

5 — The majority of studies examined practitioner experiences of telemedicine interventions

- 17 studies captured experiences across multiple types of digital health interventions

- Other digital health interventions, including provider-patient communication and electronic health records (14% each), were also represented, with some studies spanning multiple domains.

ARTICLE DETAILS		AREA OF DIGITALISATION								
Author & Publication Year	Country	Health records	Decision Support	Planning & Scheduling	Provider-Patient	Provider-Provider	Telemedicine	Training	Search Health info	Other
Elmahgoub 2025	Libya						■			
Tawfik 2025	El Savador, Indonesia, Egypt					■	■			
Ambaye 2025	Ethiopia									■
Alhur, 2025	Palestine							■		
Kohlsdorf 2025	Brazil, Mexico						■			
Wasserman, 2025	India						■			
Labyad, 2025	Morocoo		■						■	
Ramdan, 2025	Egypt						■			
Fabens, 2024	South Africa						■			■
Atalla, 2025	Egypt	■					■			■
Goh, 2025	Combodia						■			
Guo, 2025	China	■		■			■			
He, 2025	China	■			■		■			
Jamison, 2025	India	■			■		■			
Ahmed, 2024	Ethiopia	■								
Aboye, 2024	Ethiopia	■								
Muhamed, 2025	Malaysia	■	■	■			■		■	■
Jat, 2025	India						■			
Kissi, 2025	Ghana					■	■			
Shpuza, 2025	Albania					■				
Samina, 2025	Pakistan						■			
Mostafavi, 2025	Iran		■		■					■
Khasawneh, 2025	Jordan	■								
Alobayli, 2025	Saudi Arabia									
Arora, 2025	India			■			■		■	
Mustafa, 2025	Tanzania		■		■					
Qureshi, 2025	Pakistan, India					■				
Thakur, 2025	India			■		■	■			
Burrola-Méndez, 2025	Mexico	■								■

Figure 2: Heat-map of studies focusing on different areas of digitalisation

6

24% of studies reported privacy violation & blurred work-life balance as a harm

- **Digitalisation is reshaping professional boundaries in new ways.** Digital tools, especially on personal devices, encroached health workers private time, blurred work-home boundaries and enabled after-hours contact.
- Providers show **concern about the confidentiality of patient interactions and protection of both theirs & their patients data**
- **Duplication and workload** was another consistently reported harm which increased administrative burden and contributed to burnout
- **Limited exploration of AI related harms**- Only two studies examined AI, highlighting cognitive offloading, skills atrophy, loss of creativity, and motivational decline
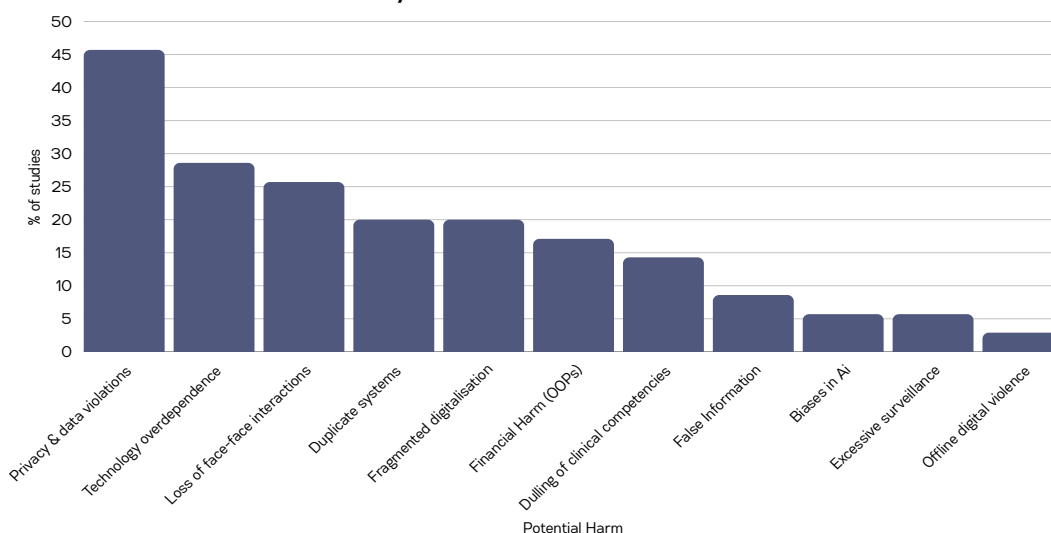

Figure 4: Potential harms within the literature (%)

7

Increased workload drives outcome measures, impacts remain largely underreported

- 55% of studies report increased workload and burnout.
- Poor connectivity, design flaws, and inadequate technological support only intensify this problem.
- Emotional strain and stress emerged as common outcomes across multiple studies.
- Harms also included medico-legal issues, patient mismanagement, data/governance challenges, and workplace conflict.
- Longer term impacts were largely underreported

www.evidence-digital.org/team

(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)

Current recommendations

- **Expand WHO we study**
  - Community Health Workers
  - Nurses
  - Allied health
- **Expand WHAT we study**
  - Increase awareness of the full typology of harms and impact pathway
  - Widen focus to all emerging digital domains, including AI
  - Use this to build research methods that adequately explore all components

For more information or permission to reproduce or adapt this resource, please contact:

Dr. Amnesty Lefevre
Director, EDiT Consortium
✉ aelefevre@gmail.com

Dr. Kerry Scott
Co-director, EDiT Consortium
✉ kerry.e.scot@gmail.com

Dr. Loveness Kimaro
Digital Health Fellow, UCT
✉ lovenessjk123@gmail.com

Dr. Angelica Panieri
Digital Health Fellow, UCT
✉ angelicapanieri@gmail.com

www.evidence-digital.org

EDiT
EVIDENCE FOR DIGITAL TRANSFORMATION
Consortium

JOHNS HOPKINS
BLOOMBERG SCHOOL of PUBLIC HEALTH

School of Public Health
Departement Openbare Gesondheid
Isikolo Sempilo Yoluntu
UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA · UNIVERSITEIT VAN KAAPSTAD

YORK
UNIVERSITÉ
UNIVERSITY