

WHO GUIDELINE

RECOMMENDATIONS ON DIGITAL INTERVENTIONS FOR HEALTH SYSTEM STRENGTHENING

RESEARCH CONSIDERATIONS



World Health
Organization



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FUTURE RESEARCH

This chapter on future research highlights crosscutting evidence gaps observed across a range of interventions in relation to effectiveness, resource use and cost-effectiveness, and gender, equity and rights. In addition, specific research questions are provided for each of the interventions, based on the gaps identified through the evidence-to-decision framework and GDG.

1.1 Overarching research gaps

The following sections describe the overarching research priorities identified through this guideline process. These reflect the general areas in which the available evidence was found to be of low or very low certainty or confidence, or where no direct evidence was identified. Where studies were available, in some cases the certainty or confidence of the evidence was affected by poor reporting of outcomes, studies with small numbers of participants, and limited representation across different settings.

Annex 6 maps the state of evidence and its gaps based on the findings from the effectiveness reviews for the included digital health interventions.

EFFECTIVENESS

For many of the interventions, the available evidence on effectiveness was sparse. Future research should measure health system process improvements that may immediately result from the digital intervention, such as health workers' adherence to recommended practice, as well as related distal health outcomes. Researchers should be realistic about the extent to which digital health interventions can impact on distal health outcomes, which are often affected by a variety of factors beyond the interaction with the digital intervention. Additionally, effectiveness studies need to include ways of concurrently monitoring technological performance (for example, do messages reach intended individuals?) and behavioural performance or user engagement (e.g. do individuals who get messages listen to or read them, and subsequently act on them?).

RESOURCE USE AND COST-EFFECTIVENESS

The studies included in the systematic reviews of the effectiveness of the digital interventions considered by the guideline identified limited evidence on the resources used to implement these interventions. Costing studies should assess costs over a longer period, with appropriate accounting of amortization and maintenance of equipment and the continuous user support required. Future research should explore the cost-effectiveness, and potential for cost savings of the identified intervention and additional savings achieved through combining interventions.

GENDER, EQUITY AND RIGHTS

Further research needs to encompass a wider range of contexts and populations, including populations with poor access to digital or conventional health services, in order to better understand and mitigate any potential negative impacts on gender, equity and rights. Key research questions include how digital health interventions can help to reduce disparities in linking to the wider health system and whether these interventions may create further inequities in some settings as a consequence of poor network coverage, limited control of mobile devices, or a lack of other resources. Research should also explore unintentional exacerbation of inequities based on who has access to digital devices, and who has access to network connectivity.

IMPLEMENTATION RESEARCH

Due to the strong focus on integrated health systems and interoperability, future research should also examine the synergies across different combinations of digital health interventions to determine which packages of interventions are most effective and cost-effective. Addressing this question is important given the potential complexity of implementing packages of digital interventions and the costs of establishing and maintaining these systems. Specific questions include the following.

- ▶ What is the feasibility and effectiveness of different combinations of digital health interventions?
- ▶ What are the non-digital health and supporting interventions (for example, enhanced transportation, supervision) that should be packaged together with digital health interventions to ensure their effectiveness, acceptability and feasibility?
- ▶ What are the minimum requirements of a country's enabling environment (infrastructure, governance, workforce, interoperability and standards) to support the different recommended digital health interventions?
- ▶ How can the fidelity (i.e. the roll out of all the critical components of the intervention as intended) of implementation at scale be facilitated?

Frameworks such as RE-AIM (Reach, Effectiveness, Adoption, Implementation, and Maintenance) may be useful in structuring the implementation research (87).

1.2 Considerations for the design of future evaluations

The GDG also identified several issues related to the design of future evaluations of digital health interventions, including the following:

- ▶ Health system focused digital interventions, such as stock management and birth and death notification, are often complex in the number of components, behaviours targeted, and organizational levels involved (89). These factors may make designs such as randomized controlled trials for evaluating the effectiveness of these interventions difficult to apply. Other designs may therefore need to be considered, such as controlled before-and-after studies, stepped-wedge randomized controlled trials and interrupted time series studies.
- ▶ While there is value in evaluating changes in client/patient health outcomes, intermediate outcomes are also critical for the evaluation of digital health interventions. For example, the effect of decision support on client/patient health outcomes are influenced not only by the information delivered through the digital system, but also by a host of other factors, including access to medicines, their cost, family support, and biomedical factors such as whether the individual responds appropriately to recommended treatments or has comorbidities. A logical framework of how the digital intervention functions may be helpful in understanding the pathways through which the intervention influences a targeted behaviour or health system challenge and in selecting appropriate outcomes along these pathways.
- ▶ Digital technologies provide new opportunities to capture research data for measuring the effectiveness of implementations in real time, thus facilitating the ability to conduct evaluations more rapidly. Incorporating the research data collection needs for primary and secondary outcomes of interest at the design stage can ensure that the data needed to measure these outcomes is captured alongside the implementation.
- ▶ Rapid changes in digital technologies and the iterative approaches often used for software development may force digital health interventions to evolve during evaluation periods, which may pose challenges for the evaluation process. Detailed process evaluations running alongside impact evaluations may be helpful in understanding the effects of incremental changes in the digital interventions over time.
- ▶ Future research efforts should establish common metrics and tools for assessing the effectiveness and cost-effectiveness of digital health interventions

EVIDENCE MAPS AND ILLUSTRATIVE RESEARCH QUESTIONS

The tables below illustrates the general trends in the evidence found in the effectiveness reviews, demonstrating low and very low certainty evidence across most interventions. For more details on the specific interventions and outcomes, please review the summary of findings in Web Supplement 1.

In addition, specific research gaps and accompanying illustrative research questions are listed Table A5.4. These questions should be addressed using rigorous methods.

TABLE A5.1 EFFECTIVENESS EVIDENCE FOR CLIENT INTERVENTIONS

DIGITAL INTERVENTION	Unintended consequences	Resource use	Satisfaction and acceptability	Utilization of health services	Health behaviour, status and well-being
TCC – ADOLESCENTS	●	●	●	●	● ●
TCC – ADULTS	● ●	●	●	● ● ●	● ● ● ●
TCC – PREGNANT + POSTPARTUM	●	●	●	● ● ●	● ● ● ●
TCC – PREGNANT + POSTPARTUM WITH HIV	●	●	●	● ●	● ● ●
TCC – CHILDREN <5	●	●	●	● ● ●	●
CLIENT-TO-PROVIDER TELEMEDICINE	● ●	●	● ●	● ● ●	● ● ● ●

TCC stands for targeted client communication. This intervention was reviewed across five population groups.

This table does not reflect information on satisfaction and acceptability obtained from qualitative reviews.

The comparison for all interventions reflected on these tables is standard care. Please see Web Supplement 1 for other comparison groups for TCC.

TABLE A5.2 EFFECTIVENESS EVIDENCE FOR HEALTH WORKER (HW) INTERVENTIONS

DIGITAL INTERVENTION	Unintended consequences	Resource use	Satisfaction/acceptability	HW performance	HW skills/attitudes	HW knowledge	Clients' utilization of health services	Clients' health behaviour, health status/well-being
PROVIDER-TO-PROVIDER TELEMEDICINE	●	●	● ●	●			● ● ●	● ●
DECISION SUPPORT	●	●	● ●	●			●	● ● ● ●
DECISION SUPPORT + DIGITAL TRACKING	●	●	●	●			● ● ● ●	● ● ● ●
DECISION SUPPORT + DIGITAL TRACKING + TCC	●	●	●	●			●	●
MLEARNING	●	●	●	●	●	●	●	●

TABLE A5.3 EFFECTIVENESS EVIDENCE FOR HEALTH SYSTEM INTERVENTIONS

DIGITAL INTERVENTION	Unintended consequences	Resource use	Satisfaction/acceptability	Coverage of birth/death notification	Timeliness of birth/death notification	Coverage of newborn or child health services	Timeliness of newborn or child health services	Availability of commodities	Quality and timeliness of stock management
BIRTH NOTIFICATION	●	●		●	●	●	●		
DEATH NOTIFICATION	●	●		●	●	●	●		
STOCK NOTIFICATION	●	●						●	●

KEY





UNKNOWN	LITTLE OR NO DIFFERENCE	POSITIVE EFFECT	NEGATIVE EFFECT
Not applicable/Not measured	May make little or no difference (low certainty evidence)	May have benefits (low certainty evidence)	May lead to harm (low certainty evidence)
Uncertain effect because of very low certainty evidence	Probably makes little or no difference (moderate certainty evidence)	Probably has benefits (moderate certainty evidence)	Probably leads to harm (moderate certainty evidence) <i>no incidence</i>
No evidence identified	Makes little or no difference (high certainty evidence) <i>no incidence</i>	Has benefits (high certainty evidence) <i>no incidence</i>	Leads to harm (high certainty evidence) <i>no incidence</i>

7-10 4-6 1-3 Size of bubbles reflects the number of studies contributing to the outcome

Intervention-specific research gaps

Table A5.4 outlines the specific research gaps, with illustrative research questions, identified for each of the interventions included in the guideline. These research questions should be addressed using rigorous methods.

TABLE A5.4 RESEARCH GAPS

INTERVENTION	EVIDENCE-TO-DECISION DOMAIN	RESEARCH GAPS AND ILLUSTRATIVE RESEARCH QUESTIONS
BIRTH AND DEATH NOTIFICATION	 Effectiveness	<ul style="list-style-type: none"> ▶ What is the effect of birth and death notification on the quality and timeliness of birth and death reporting or on the accountability for responding to the data? ▶ Does notification by mobile devices lead to more timely and complete legal registration, in the case of births, increased coverage and timeliness of health and other social services (e.g. vaccination), or in the case of deaths, increased recording of the causes?
	 Acceptability	<ul style="list-style-type: none"> ▶ What is the acceptability of birth and death notification via mobile devices, rather than through standard practices of notification? Research should include how these interventions interact with the sociocultural norms and needs of different communities regarding births and deaths and their notification.
	 Feasibility	<ul style="list-style-type: none"> ▶ What are the legal, ethical, data security and policy requirements for allowing new groups of people or cadres of health worker to notify births and deaths? What types of modification to existing legal frameworks would be needed to implement birth and death notification by mobile devices at national scale? ▶ What are the most appropriate ways to train health workers and other people designated to use birth and death notification? ▶ In what ways do birth (and infant death) notification provide opportunities to link maternal health records with child health outcomes?
		<ul style="list-style-type: none"> ▶ See overarching research gaps in section 5.1

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