

E-health for monitoring children's growth and development: scoping review protocol

E-health para controle do crescimento e desenvolvimento de crianças: protocolo de revisão

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ABSTRACT

Objective: to find evidence that e-Health contributes to monitoring children's growth and development, especially during maternal death. **Method:** The procedures guided by the Joanna Briggs Institute for scoping review will be applied. The ten databases listed below will be queried: Medical Literature Analysis and Retrieval System Online, Excerpta Medica Database, Cumulative Index to Nursing and Allied Health Literature, Cochrane Library, Scopus, Web of Science, Literatura Latino-americana e do Caribe em Ciências da Saúde, Banco de Dados da Enfermagem, Scientific Electronic Library, and IEEE Xplore. Studies available in full, published in English, Portuguese, or Spanish, between 2000 and 2022 will be selected. There will be no restrictions on the types of designs for quantitative studies. Two reviewers will independently screen all citations using an electronic platform. The degree of agreement between researchers will be assessed with Cohen's Kappa Coefficient. The results will be presented through narrative descriptions, charts, and tables. Data analysis will involve descriptive statistics, frequency, and percentage. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews checklist will be used to review and write this review.

Descriptors: Technology; Maternal Mortality; Child; Nursing Care.

RESUMO

Objetivo: identificar evidências de que as *e-Health* contribuem para o controle do crescimento e desenvolvimento de crianças, especialmente quando da morte materna. **Método:** Serão aplicados os procedimentos orientados pelo *Joanna Briggs Institute* para a revisão de escopo. As buscas serão efetuadas em dez bases de dados a seguir registradas: *Medical Literature Analysis and Retrieval System Online*, *Excerpta Medica Database*, *Cumulative Index to Nursing and Allied Health Literature*, *Cochrane Library*, *Scopus*, *Web of Science*, *Literatura Latino-americana e do Caribe em Ciências da Saúde*, *Banco de Dados da Enfermagem*, *Scientific Electronic Library* e *IEEE Xplore*. Serão selecionados estudos disponíveis na íntegra, publicados nos idiomas inglês, português ou espanhol, publicados entre os anos 2000 e 2022. Não haverá restrições quanto aos tipos de delineamentos dos estudos quantitativos. Dois revisores farão uma triagem independente de todas as citações com auxílio de plataforma eletrônica. O grau de concordância entre os pesquisadores com o Coeficiente Kappa de Cohen. Por meio de descrição narrativa, quadros e tabelas, serão apresentados os resultados obtidos. A análise dos dados envolverá estatística descritiva, frequência e percentual. Utilizaremos o *checklist Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews* para revisão e redação desta revisão.

Descritores: Tecnologia; Mortalidade Materna; Criança; Cuidados de Enfermagem.

INTRODUCTION

Women face risks during pregnancy, childbirth, and puerperium, and middle and low-income countries are where most maternal deaths occur. It is known that impacts on maternal health directly affect neonatal

health. Perinatal death is related to problems, such as Intrauterine growth restriction, perinatal asphyxia (like fetal immaturity), severe congenital malformations, early-onset neonatal infection and neonatal risk, low birth weight, premature birth, and lethal congenital anomalies⁽¹⁻³⁾.

This disparity between neonatal mortality rates in developed and developing countries shows how important it is to consistently invest in maternal and child health and fight against social and economic inequalities⁽⁴⁾.

In Brazil, many childhood indicators have improved in the last decades, especially concerning survival. Therefore, children must be able to reach their total growth and development potential⁽⁵⁻⁷⁾.

The healthcare sector has seen a new set of systems, services and applications arise that use electronic communication. Known as e-Health, this network encompasses several health-related technologies, such as web-based informative programs, remote monitoring, teleconsultation, and care supported by mobile devices⁽⁸⁾.

E-Health contributes to universal health coverage. Its approach includes breaking barriers, especially for vulnerable groups, such as mothers and newborns. There are results that show that health care provided during the birth period is essential to save the lives of mothers and their newborns, prevent stillbirths, and avoid disabilities⁽⁹⁻¹²⁾.

Over the past few decades, best practices and strategies have been shown to expand the coverage of interventions for newborns, reducing mortality, morbidity, and disability. To achieve these results, innovations are needed that involve all stakeholders, including families, health managers, research and teaching institutions, among others, and seek to reach the poorest and most vulnerable populations. More research and development are also needed to optimize the application of knowledge about which interventions and strategies are the most effective⁽¹³⁾.

The creation of *e-health software* to monitor children under one year of age after maternal death will promote child health and support the family. Through this technology and the connectivity it enables, monitoring that would facilitate access to health care and provide continuous

support to families is possible. Thus, the child's growth and development would be contributed to, and a healthy and happy life would be promoted in these families.

This review aims to find evidence that *e-Health* contributes to the monitoring of growth and development of children under one year of age after maternal death.

METHOD

This Scoping Review protocol used the guidelines proposed by *Joanna Briggs Institute* (JBI)⁽¹⁴⁾. Additionally, the title of this scoping review was recorded in the *Open Science Framework* (OSF) (<https://osf.io/etzah/>). The following steps were described: (1) identification of the research question; (2) identification of relevant studies; (3) selection of studies; (4) data extraction; (5) interpretation, summary, and dissemination of results.

The scoping review process should ensure that the project meets global standards, providing consistency, transparency, and readability in the analysis and presentation of data⁽¹⁴⁻¹⁵⁾. So, the planning stage must be practical, and the research team must ensure complete adherence to the protocol. Other elements are also essential in the development of a *scoping review*, such as a team with expertise in the topic, method, and requirements for literature review, the pre-planning phase to confirm the methodology, use of mnemonics, such as PCC (population, concept, and context), following updated guidelines and reporting criteria. Therefore, the researcher must develop a protocol and register or make it publicly available. Subsequently, the researcher will reference it in the scoping review article submitted for publication. Planning in advance how data will be presented and using visual resources to increase impact are also essential steps⁽¹⁶⁾. This protocol was registered with the OSFHome platform: DOI 10.17605/OSF.IO/ETZAH.

Definition of the research question

The research question was defined using the following strategy: Population, Context, and Concept (PCC). Figure 1 presents the description of the PCC mnemonic⁽¹⁶⁻¹⁷⁾.

Figure 1 - Development of the research question based on the PCC mnemonic. Florianópolis, SC, Brazil, 2023

ACRONYM	DESCRIPTION	COMPONENTS OF THE QUESTION
P	Population	Children under one year of age who lost their mothers due to maternal death
C	Concept	<i>e-Health follow-up</i>
C	Context	Environments where health care takes place

This review seeks to answer the following research question: "What evidence is there that *e-Health* contributes to the monitoring of growth and development in children after maternal death?".

Identification of relevant studies

Inclusion criteria

Studies in English, Portuguese, or Spanish, published between 2000 and 2022 in scientific journals, available in total, with different types of quantitative methodology designs, whose central theme is e-Health for monitoring children younger than one year of age who lost their mothers due to maternal death. Literature review articles will have their references analyzed to check for new studies to be

included that were not extracted with the adopted search strategy.

Exclusion criteria

Books or book chapters, theses or dissertations, editorials and review articles, and studies that include a population other than children under one year of age who have lost their mother due to maternal death.

Strategies for searching for studies

To plan and organize the search strategies, a prior search was done in health thesauri (DeS-Cs/MeSH). With the help of a librarian, the necessary terms were listed, and the search keys presented in Figure 2 were assembled.

Figure 2 - Strategy for searching for studies. Florianópolis, SC, Brazil, 2023

Platforms and Database	Search keys
Pubmed/MEDLINE	("Telemedicine"[Mesh] OR "Telemedicine" OR "Mobile Health" OR "mHealth" OR "Telehealth" OR "eHealth" OR "Mobile Applications"[Mesh] OR "Mobile Applications" OR "Mobile Application" OR "App" OR "Apps" OR "Smartphone"[Mesh] OR "Smartphone" OR "Smartphones") AND ("Child Development"[Mesh] OR "Child Development" OR "Infant Development")
Embase (Elsevier)	("Telemedicine" OR "Mobile Health" OR "mHealth" OR "Telehealth" OR "eHealth" OR "Mobile Applications" OR "Mobile Application" OR "App" OR "Apps" OR "Smartphone" OR "Smartphones") AND ("Child Development" OR "Infant Development")
CINAHL (EBSCO)	("Telemedicine" OR "Mobile Health" OR "mHealth" OR "Telehealth" OR "eHealth" OR "Mobile Applications" OR "Mobile Application" OR "App" OR "Apps" OR "Smartphone" OR "Smartphones") AND ("Child Development" OR "Infant Development")
Cochrane Library	("Telemedicine" OR "Mobile Health" OR "mHealth" OR "Telehealth" OR "eHealth" OR "Mobile Applications" OR "Mobile Application" OR "App" OR "Apps" OR "Smartphone" OR "Smartphones") AND ("Child Development" OR "Infant Development")

Platforms and Database	Search keys
Scopus (Elsevier)	("Telemedicine" OR "Mobile Health" OR "mHealth" OR "Telehealth" OR "eHealth" OR "Mobile Applications" OR "Mobile Application" OR "App" OR "Apps" OR "Smartphone" OR "Smartphones") AND ("Child Development" OR "Infant Development")
Web of Science	("Telemedicine" OR "Mobile Health" OR "mHealth" OR "Telehealth" OR "eHealth" OR "Mobile Applications" OR "Mobile Application" OR "App" OR "Apps" OR "Smartphone" OR "Smartphones") AND ("Child Development" OR "Infant Development")
LILACS/BDENF	("Telemedicine" OR "Mobile Health" OR "mHealth" OR "Telehealth" OR "eHealth" OR "Mobile Applications" OR "Mobile Application" OR "App" OR "Apps" OR "Smartphone" OR "Smartphones" OR "Telemedicina" OR "Ciber Saúde" OR "Ciber-Saúde" OR "Cibersaúde" OR "Saúde Conectada" OR "Saúde Digital" OR "Saúde Eletrônica" OR "Saúde Móvel" OR "Tele-Serviços em Saúde" OR "Teleassistência" OR "Telecuidado" OR "Telessaúde" OR "e-Saúde" OR "eSaúde" OR "mSaúde" OR "uSaúde" OR "Aplicativos Móveis" OR "Ciber Salud" OR "Ciber-Salud" OR "Cibersalud" OR "Salud Conectada" OR "Salud Digital" OR "Salud Electrónica" OR "Salud Mueble" OR "Salud Móvil" OR "Teleasistencia" OR "Telesalud" OR "eSalud" OR "mSalud" OR "uSalud" OR "Aplicaciones Móviles") AND ("Child Development" OR "Infant Development" OR "Desenvolvimento Infantil" OR "Desenvolvimento Pré-Escolar" OR "Desenvolvimento da Criança" OR "Desenvolvimento das Crianças" OR "Desenvolvimento de Criança" OR "Desenvolvimento de Crianças" OR "Desenvolvimento de Lactentes" OR "Desenvolvimento de Pré-Escolares" OR "Desenvolvimento do Lactente" OR "Desenvolvimento do Pré-Escolar" OR "Desenvolvimento dos Lactentes" OR "Desenvolvimento dos Pré-Escolares" OR "Desarrollo Infantil" OR "desarrollo de lactantes" OR "desarrollo de los lactantes" OR "desarrollo de los niños" OR "desarrollo de los pré-escolares" OR "desarrollo de preescolares" OR "desarrollo del lactante" OR "desarrollo del niño en edad preescolar" OR "desarrollo del preescolar" OR "desarrollo infantil" OR "desarrollo preescolar")
SciELO	("Telemedicine" OR "Mobile Health" OR "mHealth" OR "Telehealth" OR "eHealth" OR "Mobile Applications" OR "Mobile Application" OR "App" OR "Apps" OR "Smartphone" OR "Smartphones" OR "Telemedicina" OR "Ciber Saúde" OR "Ciber-Saúde" OR "Cibersaúde" OR "Saúde Conectada" OR "Saúde Digital" OR "Saúde Eletrônica" OR "Saúde Móvel" OR "Tele-Serviços em Saúde" OR "Teleassistência" OR "Telecuidado" OR "Telessaúde" OR "e-Saúde" OR "eSaúde" OR "mSaúde" OR "uSaúde" OR "Aplicativos Móveis" OR "Ciber Salud" OR "Ciber-Salud" OR "Cibersalud" OR "Salud Conectada" OR "Salud Digital" OR "Salud Electrónica" OR "Salud Mueble" OR "Salud Móvil" OR "Teleasistencia" OR "Telesalud" OR "eSalud" OR "mSalud" OR "uSalud" OR "Aplicaciones Móviles") AND ("Child Development" OR "Infant Development" OR "Desenvolvimento Infantil" OR "Desenvolvimento Pré-Escolar" OR "Desenvolvimento da Criança" OR "Desenvolvimento das Crianças" OR "Desenvolvimento de Criança" OR "Desenvolvimento de Crianças" OR "Desenvolvimento de Lactentes" OR "Desenvolvimento de Pré-Escolares" OR "Desenvolvimento do Lactente" OR "Desenvolvimento do Pré-Escolar" OR "Desenvolvimento dos Lactentes" OR "Desenvolvimento dos Pré-Escolares" OR "Desarrollo Infantil" OR "desarrollo de lactantes" OR "desarrollo de los lactantes" OR "desarrollo de los niños" OR "desarrollo de los pré-escolares" OR "desarrollo de preescolares" OR "desarrollo del lactante" OR "desarrollo del niño en edad preescolar" OR "desarrollo del preescolar" OR "desarrollo infantil" OR "desarrollo preescolar")

Platforms and Database	Search keys
IEEE	("Telemedicine" OR "Mobile Health" OR "mHealth" OR "Telehealth" OR "eHealth" OR "Mobile Applications" OR "Mobile Application" OR "App" OR "Apps" OR "Smartphone" OR "Smartphones") AND ("Child Development" OR "Infant Development")

Study selection

A pilot test will be performed for article selection, with analysis and discussion of the inclusion criteria, seeking an agreement of at least 75% among the reviewers.¹⁸ The phases for study selection will be as follows:

Combine health descriptors (DeCs and MeSH) with related keywords by means of cross-referencing using Boolean operators *AND* and *OR* according to each database, as shown in figure 2. Export the references into the reference management software *EndNote Web* to find copies and delete them. Subsequent reading of titles will be done for the same purpose.

Screen materials. Titles and abstracts read by two researchers, independently, for selection and exclusion according to the eligibility criteria. In cases where the abstract is unavailable for reading, the articles may be included in the next phase if their titles suggest a subject aligned with the research objective. Two researchers will use the Rayyan system to select articles independently.

The reverse or cross-reference search (analysis of the references of the articles selected for complete reading) will be used to identify other studies that are not found with the previously defined search strategy.

The degree of agreement between researchers will be measured by applying the Cohen's Kappa Coefficient⁽¹⁸⁾. Disagreements between reviewers will be resolved through discussion and in collaboration with a third researcher to reach consensus.

Data extraction

Data collection and analysis

To extract and systematize data, a matrix will be used within a spreadsheet in *Excel* listing: Order number, year of publication, origin, language, identification of authors, country where the study was conducted, characteristics of participants, objectives, study design, outcomes and recommendations, processes and care

actions included in *e-Health*.

The extraction of data will descriptively map and obtain the frequency of concepts, populations, and characteristics, care actions and whether the *e-Health* was built with the participation of health professionals. To expand the analysis, data coding will be done to obtain a summary to build specific categories⁽¹⁴⁾.

Interpretation, summary and dissemination of results

We will use the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist to write this review⁽¹⁹⁾. The extracted data will be presented in tables and charts and/or images, according to the objective of this scoping review. The selected studies and the evidence they present will be organized and classified by categories arising from the subthemes that emerge from the search. Subsequent discussion of the results will be presented in a narrative form⁽²⁰⁾. The results of this review will be made available in publications such as scientific articles in indexed journals and relevant academic events aiming at broad dissemination.

Discussion

Research into the evidence supporting the contribution of *e-Health* to monitoring children's growth and development is essential due to the increasingly important role of these technologies in the field of child health. With the rapid development of technologies, *e-Health* interventions are becoming increasingly accessible and widely used in different pediatric care settings.

With the ability to monitor key health parameters, provide educational information to parents and healthcare professionals, and facilitate communication between them, *e-Health* tools can potentially improve the quality of growth and development care provided to children. However, for these innovations to be properly adopted and implemented, it is essential to

check for their efficacy, safety and effectiveness to support clinical and political decision making. Despite the growing number of studies in this area, assessing the impacts of this technology more comprehensively is crucial. The main barrier is the limited identification of measurable and reliable indicators. Furthermore, the evaluation of the results of these tools is hampered by the difficulty in establishing consistent methodologies and obtaining reliable indicators⁽¹⁷⁾.

Investigation of the evidence that *e-Health* contributes to monitoring children's growth and development is justified in view of the definitions of information management and continuous monitoring of children in the first year of life found in health systems. *E-Health* technologies can potentially fill important gaps in these systems with a more comprehensive health data collection, tracking of growth milestones, assessment of relevant indicators, and timely interventions.

The investigation of the contribution of *e-Health* to change the scenario of child health will

prompt the informed and well-founded adoption of these technologies and promote the healthy development and well-being of children in the event of maternal death.

Study limitations

The review should consider some important limitations. It is impossible to include all available studies due to the constant updating of scientific knowledge around the world and to the indexing of studies on platforms or databases from other fields of knowledge that were not initially covered in the review protocol.

Language is another limitation. Despite the worldwide recognition of the English language and the inclusion of two more languages (Spanish and Portuguese), it is possible that relevant studies published in other languages will not be incorporated.

CONFLICT OF INTERESTS

The authors have declared that there is no conflict of interests.

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Data analysis and interpretation: Leal TC, Jesus SC, Souza ML

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