Literature Review

TEXTO & CONTEXTO ENFERMAGEM
TEXT & CONTEXT NURSING TEXTO & CONTEXTO ENFERMERÍA

BENCHMARKING OF APPS FOR MOBILE DEVICES TARGETED AT CHILDREN'S HEALTH

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ABSTRACT

Objective: to identify which of the apps available for children include information on monitoring growth and development, in a way similar to the Brazilian Children's Handbook.
Method: this is an exploratory research study to survey apps designed to monitor children's growth and development. The "Benchmarking" technique was used to assist in the process. The search for apps was carried out in January 2023 in the *Google Play* and *App Store* stores. The data were tabulated in *Microsoft Excel*. After classifying the variables, absolute and relative frequencies were calculated.
Results: a total of 624 apps were identified. Of these, 491 were found in *Google Play* and 133 in the *App Store*. After analyzing the app descriptions and excluding duplicates, 48 software options were selected for the final sample. 41% (19) of the apps are in Portuguese, 36% (17) of those selected intend to record children's development, and only 2% (1) store children's growth, development and vaccination data.
Conclusion: the absence of an app similar to Children's Handbook for monitoring and recording children's health within the Unified Health System scope was evidenced.

DESCRIPTORS: Benchmarking. Children's health. Mobile apps. Children's growth and development. Primary Health Care.

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BENCHMARKING DE APLICAÇÕES PARA DISPOSITIVOS MÓVEIS DIRECIONADOS À SAÚDE DA CRIANÇA

RESUMO

Objetivo: Identificar quais dos aplicativos disponíveis para o público infantil contemplam informações sobre o acompanhamento do crescimento e desenvolvimento, análogos à Caderneta da Criança brasileira.
Método: Trata-se de uma pesquisa exploratória de levantamento de aplicativos destinados ao acompanhamento do crescimento e desenvolvimento infantil. Para auxiliar no processo, foi utilizada a técnica de *benchmarking.* A busca pelos aplicativos foi realizada nas lojas de aplicativos *Google Play* e *App Store*, em janeiro de 2023. Os dados foram tabulados no *Microsoft Excel*. Após a classificação de variável, calculou-se a frequência absoluta e relativa.
Resultados: Foram identificados 624 aplicativos. Desses, 491 foram encontrados no *Google play* e 133 no *App Store*. Após análise da descrição da aplicação e exclusão de duplicatas, foram selecionados 48 *softwares* para a amostra final. 41% (19) dos aplicativos apresentam-se na língua portuguesa, 36% (17) dos selecionados propõem-se a registrar o desenvolvimento da criança, e apenas 2% (1) faz o armazenamento do crescimento, desenvolvimento e vacinação infantil.
Conclusão: Evidenciou-se a ausência de um aplicativo análogo à Caderneta da Criança para o acompanhamento e registro da saúde infantil para o âmbito do Sistema Único de Saúde.

DESCRITORES: Benchmarking. Saúde da criança. Aplicativos móveis. Crescimento e desenvolvimento infantil. Atenção Primária à Saúde.

BENCHMARKING DE APLICACIONES PARA DISPOSITIVOS MÓVILES DIRIGIDAS A LA SALUD INFANTIL

RESUMEN

Objetivo: identificar cuáles de las aplicaciones disponibles para el público infantil incluyen información sobre el control del crecimiento, en forma análoga a la Libreta de Salud Infantil brasileña.
Método: investigación exploratoria para sondear aplicaciones destinadas a controlar el crecimiento y desarrollo infantil. Para facilitar el proceso se utilizó la técnica de *Benchmarking.* Se buscaron aplicaciones en las tiendas *Google Play* y *App Store*, en enero de 2023. Los datos se tabularon en *Microsoft Excel*. Luego de clasificar las variables se calcularon frecuencias absolutas y relativas.
Resultados: se identificaron 624 aplicaciones. De ellas, se encontraron 491 en *Google Play* y 133 en *App Store*. Después de analizar la descripción de cada aplicación y de excluir duplicados se seleccionaron 48 opciones de *software* para la muestra final. El 41% (19) de las aplicaciones estaba en portugués, el 36% (17) de las seleccionadas están destinadas a registrar el desarrollo infantil, y solamente el 2% (1) almacena datos de crecimiento, desarrollo y vacunación infantil.
Conclusión: se hizo evidente que no existe ninguna aplicación similar a la Libreta de Salud Infantil para controlar y registrar la salud en este grupo etario para el ámbito del Sistema Único de Salud.

DESCRIPTORES: *Benchmarking*. Salud infantil. Aplicaciones para dispositivos móviles. Crecimiento y desarrollo infantil. Atención Primaria de la Salud.

INTRODUCTION

The development of good practices that encourage healthy habits is essential for health care and should begin in childhood, with periodic monitoring of children's growth and development milestones by trained professionals, in order to reduce infant morbidity and mortality.

In this context, despite the reduction in child mortality worldwide, from 12.5 million in the 1990s to 5.3 million in 2018, it is fundamental to promote the prevention of child deaths, mainly given the forecast of 52 million deaths of children before the age of five between 2019 and 2030[1].

To this end, one of the proven effective actions for health promotion and prevention and reduction of child deaths is childcare, which nationally consists of following-up children by monitoring their development and growth in its entirety. In addition to that, it enables early detection of health problems and promotes better living conditions in early childhood[2–3].

The Brazilian Ministry of Health (*Ministério da Saúde*, MS) recommends carrying out at least nine routine consultations for children from zero to two years of age, to monitor their health, as well as to identify and intervene in factors that may cause harms to children's growth and development. These consultations must be carried out in Basic Health Units (BHUs), and the tool for this purpose is the Children's Handbook (*Caderneta da Criança*, CC)[4].

The CC is indicated by the National Policy for Comprehensive Children's Health Care (*Política Nacional de Atenção Integral à Saúde da Criança*, PNAISC) as one of the strategic components for promoting children's health care[2], and is also a dialogical instrument between health professionals and the family. Distributed by the Ministry of Health and sent to maternity wards and Basic Health Units (BHUs), this tool is organized into two parts: one aimed at the family, with guidelines for health and child care; and the other targeted at professionals, with space for recording information, growth charts and development surveillance instrument[4].

Although using handbooks to monitor children's health has been established since the 2000s, there is still certain deficit in recording this diverse information. Countless studies were carried out in Brazil to investigate issues related to filling out the CC. Some of them highlighted flaws in Handbook recording, suggesting that the tool has not achieved its objectives[5–6]. Results from a study with 420 handbooks showed that completion of these instruments was not satisfactory (25.5%), reaching 65% of records on head circumference at birth, 21.9% completion of age/head circumference graphs and only 18.1% in the assessment of children's developmental milestones[7].

In the state of Paraíba, several incorrectly filled-out items were identified in 402 (100%) of the children's handbooks evaluated. Among them is the low percentage of correct filling-out of the "head circumference at birth" chart (13.7%) and the neuropsychomotor development assessment (2%)[8]. This corroborates the results of another study, in which 54.5% of the CCs analyzed did not contain the neurodevelopment surveillance item for children under one year old, and 90% of the CCs for children aged one to three years also did not have the surveillance item[5].

Furthermore, in 2019 there was discontinuation in the delivery of CCs by the MS, which has not yet been fully normalized, influencing the quantity and quality of children's health information. This situation made it impossible to fill out the information in that instrument.

With the objective of reducing information loss, maternity hospitals and some Brazilian municipalities created a type of card with information about each child, such as name, date and time of birth, name of the maternity hospital, height and weight at birth and space for vaccine registration. Although this was an alternative to reduce children's health monitoring discontinuity, this instrument does not include all the information present in the CC, which may weaken the assistance in monitoring children's growth and development.

Given this context, it is essential to think of other ways to monitor and record children's health. Therefore, it is necessary to devise strategies to ensure the use of CCs and greater adherence by professionals and users to them, such as a digital app using Information and Communication Technology (ICT) for CCs.

ICTs are strongly present in people's lives, as they contribute to meeting the countless demands for information, as well as serving as interactive tools for the users, which are essential in the learning and decision-making processes[9]. These changes consolidate a new sociocultural and educational era through the rapid spread of information, and several knowledge areas are being modified through technologies, including the health field, incorporating new strategies on information use in the face of epidemiological problems.

The advent and popularization of ICTs have exerted impacts on the health sector through the use of smartphones, software programs and apps that promote several benefits, including use accessibility and portability, in addition to providing more agility in the development of activities[10].

Apps are technological devices developed for use on mobile devices (tablets or smartphones) and are capable of capturing, storing, receiving and sharing data and information, in addition to enabling customization of the tools according to the clients' needs and preferences[11].

Given this context and the growing number of new apps in the children's health area, it becomes necessary to identify new products/software programs that are made available to professionals and to the general population. This analysis can be carried out using the "Benchmarking" technique.

Derived from the word "benchmark" meaning "reference", "Benchmarking" is an efficient search technique that evaluates and analyzes products, services and apps available on the market. Through a comparative assessment, it is possible to obtain relevant information with the purpose of promoting innovative ideas and improvements on the study object[10–11].

In this context, with the aims of expanding discussions for the creation and development of new apps in the children's health area and of contributing to monitoring children's growth and development in a systematic and longitudinal way, the objective was to identify which of the available apps for children include information on monitoring growth and development in a way similar to the Brazilian Children's Handbook.

METHOD

This is an exploratory research study to survey apps designed to monitor children's growth and development. To assist in the process, the "Benchmarking" technique was used, which acts as a search instrument, allowing comparisons to be made to support decision-making[10]. The first research phase was searching apps in the *Google Play* and *App Store* virtual stores and was guided by the following question: "Which apps present children's health data records (anthropometry, children's growth and development milestones and vaccination records) in a way similar to the Children's Handbook?" The following inclusion criteria were adopted: software program that would enable at least one of the health records proposed by the Children's Handbook, such as anthropometric data or children's development and vaccination milestones. Apps not aimed at monitoring children's health were excluded, such as games and those to help children sleep.

The research took place in January 2023, carried out by a single reviewer in the *Google Play* store aimed at *Android* operating system devices and in the *Apple App Store*, for the *iOS* operating system. Three devices were used for this purpose, namely: an *iOS*-compatible *iPhone* 11; a notebook with *Windows* operating system; and an *Android*-compatible *Xiomi* i9. The reviewer underwent training before starting the research and delved into the literature available to support his investigation.

The following keywords, in Portuguese, were used separately in each virtual store: "children's health" ("*saúde da criança*") and "child development" ("*desenvolvimento infantil*"). Apps targeted both at health professionals and at parents/caregivers of children were sought.

After the search, the second research phase was initiated: Cataloging the apps. At this stage, all apps resulting from the search were part of the study population and were organized in an information matrix in *Microsoft Excel*®.

The following variables were defined: name of the app; developer -author or company responsible-, to identify whether the initiative to produce the app was from a public or private institution; and the app objective – its intended purpose. There was no restriction regarding year of development, free of charge nature and language in which the apps were presented, as the aim was to verify whether the software made it possible to monitor children's anthropometry, as well as developmental milestones and record childhood vaccinations.

After tabulating the apps, the third research phase was initiated: Data processing and analysis. A critical reading of the description/objective of each app was carried out. The software options were classified as "Yes" for apps that had at least one of the characteristics of recording information from the Children's Handbook, and as "No" for those that did not have any type of recording of information on children's health.

The apps selected went through a duplicate removal filter in order to avoid repetitions. With the final sample established, a new analysis was carried out in which the "characteristic of the records" variable was assigned, with the aim of identifying the type of children's health record that the app proposed to offer.

At this moment, in addition to seeing the description of the apps again, their explanatory screens were analyzed, which are made available in online stores. Concerning the final sample, only one app presented in its description and explanatory screens an area intended for monitoring growth (anthropometry) and milestones in child development and vaccination records. The software was downloaded and registered to access the system, in order to learn about its usability.

After classifying the study variables, the absolute and relative frequencies were calculated for subsequent discussion in light of the literature relevant to the topic. As this is a research study which uses information in the public domain in virtual stores, it was not necessary to request the opinion from any Research Ethics Committee or informed consents.

RESULTS

The search data in the app stores compatible for use on mobile devices (smartphone, tablet, etc.), as shown in Figure 1 with *Android* or *IOS* systems, resulted in a total of 624 (100%) apps for the terms "*saúde da criança*" and "*desenvolvimento infantil*". 491 (79%) of them were found in *Google Play* and 133 (21%) in the *App Store*.

After analyzing the app titles and reading their characteristics and objectives, 569 (91%) were excluded because they were programs whose purpose was not intended for the proposed objective of the study, such as regulating children's sleep, calculating BMI in adults and children's games. 55 software options were pre-selected and subjected to the duplicate identification filter. Then, 07 duplications were identified by the filter and excluded, totaling 48 apps in the final sample (Figure 1).

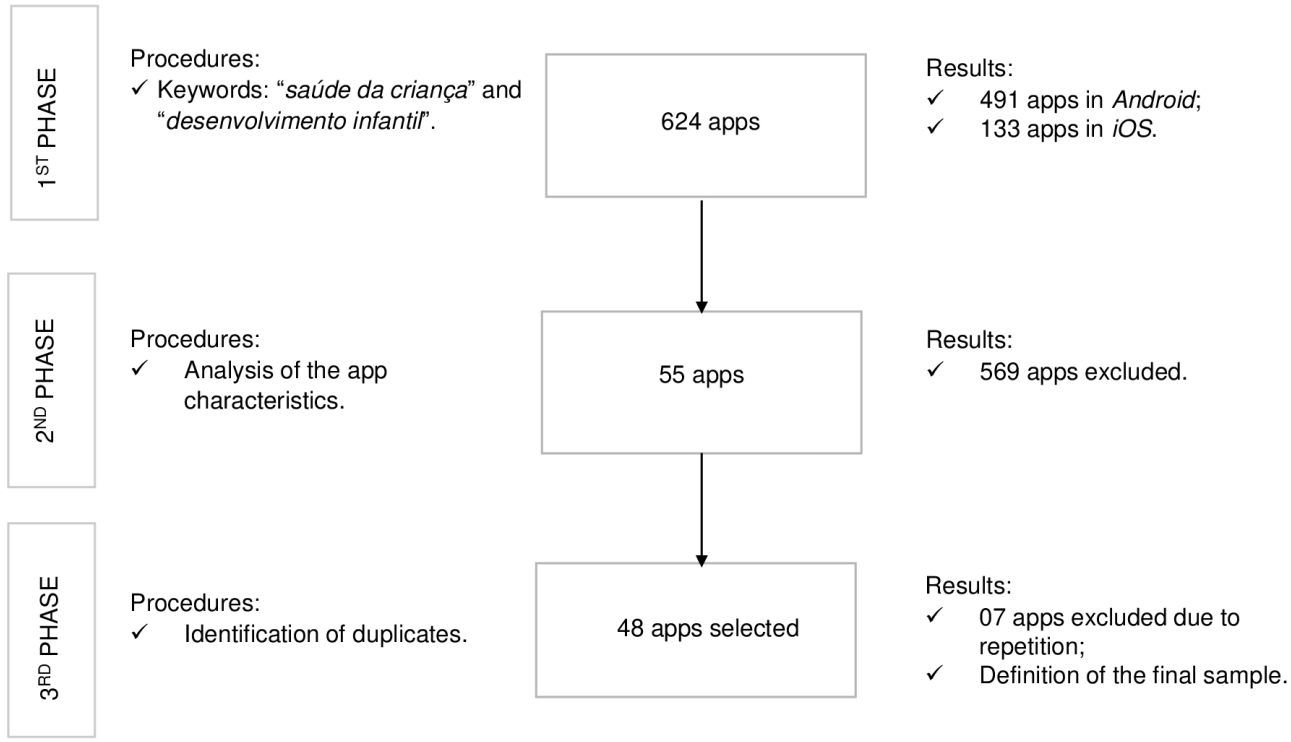

Figure 1 – Flowchart corresponding to the search for apps in *Google Play* and in the *App Store*. João Pessoa/PB, Brazil, 2023.

In Chart 1, of the software options selected (n=48), 42% (20) are available in Portuguese and another 58% (28) in other languages such as English, Japanese, Russian and Turkish. The apps were developed in other countries, such as the United States of America, Turkey, Russia and Japan and placed in app stores by companies or individuals independently.

Chart 1 – Distribution of the apps selected, João Pessoa, PB, Brazil, 2023. (n=48)

App	Developer	Language
Baby & Breastfeeding Tracker	Parentlove Baby Tracker by Coquisoft	English
Baby Daybook – Diário de Bebê	Baltapis	Portuguese
Baby Tracker – Newborn Feeding	Hokkabazsoft	English, Turkish
Babycare Tracker: Baby Journal	Maxwell Software	Portuguese, English
Babyfun – Desenvolva seu Bebê	Babyfun LLC	Portuguese
BabySparks- Development Activ	Baby Sparks	English
Babytime (Tracking & Analysis)	Simfler	English
Bebê + | Seu Registro do Bebê	Philips Digital UK Limited	Portuguese, English
Bebê conecta (Diário do Bebê)	Seacloud Software	English
Calculadora Antropométrica	Vönderful	English
Calculadora de Crescimento	Vitor Luiz Selva Pinto	English
Calendário Womanlog Baby Pro	Pro Active App Sia	Portuguese, English
Carteira de Vacinação	IT systems	Portuguese, Spanish
Cartilha Infantil	Lexen Informática S.A,	Portuguese
CDC Milestone Tracker	Centers for Disease Control and Prevention	English

Chart 1 – Cont.

App	Developer	Language
CEI Desenvolvimento Infantil	Kinedu	Spanish
Centers for Disease Control and Prevention	CDC	English
Child Journal – Childcare Mana	Childjournal	English
Chiquiplace Bebê Tudo Em Um	Cecilia Nunez del Prado	English
Controle de Crescimento – Perc	Edxr	English
Controle de Crescimento Infan	Edxr	Portuguese
Controle de Peso do Bebê	Mozo Yazilim	Portuguese, Turkish
Cubtale Baby Tracker	Cubtale	English
Curvas de Crescimento Criança	Abq App Source, LLC	Portuguese, French
Desarrollo Infantil	Desarrollo Infantil	Spanish
Desenvolvimento do Bebê	Steveloper	Portuguese
Desenvolvimento do Bebê- LOG	Stefan Roobol	English
Desenvolvimento Infantil	Tinybeans	English
Dr. Luke: Saúde Infantil	Luke Tecnologia em Saúde Ltda	English
Etapas do Desenvolvimento Infa	Alularest	English
Goodmama все о детях 0-3х лет	Goodmama	Russian
Graphi	Camile Alves Ancines	Portuguese, English
Growth Chart CDC WHO Percentil	Osama Orabi	English
Healow Kids	Eclinicalworks LLC. Healow	English
Kinderpass: Baby Development	Kinderpass- Child Health & Development	English
Kinedu Desenvolvimento do Bebê	Kinedu	Portuguese, Spanish
Meu Bebê – Crescimento Pediat	Sistemas Informáticos	Portuguese
Nara Baby for Moms & Dads	Nara Organics	English
Parent: Child Care App	Parent TM	English
Pimpos	Fábio Mendes	Portuguese, English
Piyolog: Newborn Baby Tracker	Piyolog Inc	Japanese, English
Pró-mamá	Osório City Hall	Portuguese
Rotina Mamã e Bebê	Bruno Munhoz	Portuguese
Saltos de Desenvolvimento	Saltos de Desenvolvimento	Portuguese
Sprout Bebê	Med Art Studios	Portuguese, English
Suivi Evolution Bébé Mois Par	Kids Mobile Games	French
Tabela de Crescimento	Koruskan SC	Portuguese, English
Tedi Pro	Butec Inovação Ilimitada Ltda	English

Table 1 presents the characteristics of the apps, of which 40% (19) are aimed at recording children's growth, such as weight, height and BMI; 35.4% (17) of the apps selected intend to record children's developmental milestone; 8.3% (4) are intended for storing data on children's growth and vaccinations; 8.3% (4) signal children's growth and development; 4% (2) record vaccination data; 2% (1) monitor children's development and vaccination; and only 2% (1) record children's growth, development and vaccinations, although not making any reference to availability in the Unified Health System (*Sistema Único de Saúde*, SUS) services.

Table 1 – Proportional distribution of the app attributes, João Pessoa, PB, Brazil, 2023. (n=48)

App Attributes	n	%
Children's growth	19	40%
Children's development	17	35,5%
Children's growth and vaccination	4	8,3%
Children's growth and development	4	8,3%
Vaccination	2	4%
Children's development and vaccination	1	2%
Children's growth, development and vaccination	1	2%
Total	**48**	**100%**

DISCUSSION

Technology is increasingly present in people's daily life. Technological advances and the use of mobile telephony allow various functionalities to be quickly incorporated into modern routines. ICT is a terminology that highlights the role of communication in information technology and corresponds to a group of integrated technological devices that allow the automation and communicability of training processes through software and telecommunications functions[12]. Integration of these technologies with different logics and language articulations supports data storage, development and exchange with agility[13].

In view of the above, ICTs directly influence the community, contributing new knowledge with sociocultural values at a high speed[14] and changing market trends. Various possibilities and proposals for technological innovation are constantly emerging, and the health area has been strongly impacted by the incorporation of ICTs into general service provision strategies and the development of apps for mobile devices, with the objective of assisting medical and health practices[15].

Mobile apps can be defined as software or programs developed for mobile devices (cell phones, tablets) that have the most diverse modalities[13,16]. This varied applicability modalities of mobile apps generate innovations that increase dissemination of information and transform the teaching and learning process in modern society[17].

Mobile apps have gained space in health, and specific software programs have been developed over the years, the use of which allows remote support and patient self-care, assistance in decision-making and the creation of public policies for health promotion and control of diseases, as well as in training and qualification of professionals[13,16].

In this context, health information systems have become indispensable for carrying out surveillance, monitoring health problems and following-up morbidity and mortality indicators[18]. The dissemination of mobile technology in health and the development of apps (*mHealth*) assist users and professionals in monitoring health remotely (support for diagnosis and decision-making) and in teaching and learning (care self-promotion), as well as in health monitoring[19].

In the children's health context, the use of apps by health professionals can be effective, as they are considered to induce positive effects and have good receptivity, by automating results and by integrating playful characteristics with specific themes[20].

However, despite their potential impact on active learning and the perspective of professionals' adherence, there is no identification in the national literature of a free digital app integrated with the SUS as an alternative to CCs, and which can be used by professionals who assist children, including

monitoring their growth, development and vaccination or other topics inherent to controlling their health, which are scored in the CC.

Similarly to the Brazilian reality, countries such as England, Germany and Australia have implemented health apps that provide tools in some children's health areas, such as recording vaccinations and scheduling medical appointments.

The National Health Service (NHS), the English health system, launched the *NHS App*, which became the most downloaded free app in the country. It allows children's parents or guardians to register, schedule medical appointments, record allergies and access vaccination records, in addition to having an area for health guidelines[21].

In Germany, the smartphone app called *KleineWeltentdecker App* seeks to assist caregivers of children in recording child development milestones such as cognition, language, motor skills and socio-emotional skills. However, the app lacks a general approach to children's health, although it can be considered as a first step in the process of using software to assist in the child care process[22].

In Australia, procedures were initiated in 2015 to implement the patient's Electronic Medical Record, called *My Health Record (MyHR)*. MyHR is used by approximately 6 million people and incorporated in 13,000 health organizations, including basic health units, laboratories and pharmacies. For greater adherence to MyHR, the country adopted the opt-out approach, that is, all citizens of the country are automatically registered and only those who are not interested in being enrolled should request to be unregistered from the system. When users are under 14 years old, their parents are responsible for accessing and recording all the information[23–24].

Regarding the MyHR applications, registered users have access to an online summary of key information about their health, such as medical and vaccination records[24–25]. In addition, the patients can include data about their health in MyHR or make personal notes about allergies and adverse reactions after taking medications and vitamins[23].

With the purpose of knowing the users' perception about the *MyHR App*, research studies were carried out which showed that the users approved and felt safe with the app, in addition to having added better health care quality, as data were shared between various services and self-management of information by the patients themselves[25–26].

However, despite the users' positive perception and growing adherence to the app, it is important to highlight that MyHR is not a system exclusively targeted at children and that it does not provide specific tools for monitoring their health.

In this context, it is clear that, although there are initiatives in the development and use of apps in the health area, there is still no identification, both in Brazil and in other countries, of software options that include all the data necessary for children's health care that are similar to the CC items, corroborating the findings of this study.

Furthermore, many challenges need to be overcome to develop an app to monitor children's health. A responsible and equitable approach is necessary to meet the specific demands required by the children's health area[27]. Therefore, creating a digital app, free and integrated with the SUS, to monitor this age group, is a reality that needs to be faced.

In this sense, there is a need to develop software in Brazil for monitoring children's health with the CC methodological scope used in PHC, allowing for the correction of operational weaknesses already mentioned in this study and which will ease using health information in a timely manner, focusing on epidemiological surveillance of child growth and development.

As study limitations, the presence of a single reviewer for sample selection and the predominance of international app are considered, thus hindering the comparison to the CC in a broader sense.

CONCLUSION

The results of the "Benchmarking" research evidenced the absence of a free app similar to the Brazilian Children's Handbook for monitoring and recording children's health within the Unified Health System scope. In addition to that, only one of the apps included recording anthropometry data, children's developmental milestones and vaccinations, but it is not available for use in the SUS health services.

In view of the above, there is a need to develop a digital app for the CC that presents itself as an alternative for monitoring children's health, in order to increase the professionals' adherence, minimize health data losses and ease information recording, thus enabling comprehensive assistance for children.

REFERENCES

1. United Nations Inter-Agency for Child Mortality Estimation. Levels and trend in child mortality: Report 2019 [Internet]. 2019 [cited 2023 Jan 05]. Available from: https://www.unicef.org/reports/levels-and-trends-child-mortality-report-2019
2. Ministério da Saúde (BR). Política Nacional de Atenção Integral à Saúde da Criança: orientações para implementação [Internet]. Brasília: Ministério da Saúde; 2018 [cited 2023 Jun 22]. Available from: https://central3.to.gov.br/arquivo/494643/
3. Reichert APS, Rodrigues PF, Albuquerque TM, Collet N, Minayo MCS. Vínculo entre enfermeiros e mães de crianças menores de dois anos: percepção de enfermeiros. Ciênc Saúde Colet [Internet]. 2016 [cited 2023 Jan 05];21(8):2375-82. Available from: https://doi.org/10.1590/1413-81232015218.07662016
4. Ministério da Saúde (BR). Secretaria de Atenção à Saúde. Caderneta da Criança [Internet]. 5th ed. Brasília: Ministério da Saúde; 2022. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/caderneta_crianca_menina_5.ed.pdf
5. Coelho II, Silva LJ, Santos EP, Bustamante IO, Silva LCO, Maciel MJP. Mapping the use of the child health handbook by parents and professionals: A descriptive study. Rev Fun Care Online [Internet]. 2021 [cited 2023 Feb 5];13:768-73. Available from: https://doi.org/10.9789/2175-5361.rpcfo.v13.9199
6. Almeida AP, Ceballos LC, Barbosa ARC, Nogueira DA, Moreira DS. The record of children's growth and development in the health booklet. Rev Enferm UERJ [Internet]. 2017 [cited 2023 Mar 17];25:e16895. Available from: http://doi.org/10.12957/reuerj.2017.16895
7. Freitas JLG, Pereira PPS, Moreira KFA, Órfão NH, Cavalcante DF, Nascimento RC, et al. Preenchimento da caderneta de saúde da criança na primeira infância. Ver Bras Promoc Saúde [Internet]. 2019 [cited 2023 Mar 22];32:8407. Available from: https://doi.org/10.5020/18061230.2019.8407
8. Pedraza DF. Preenchimento da Caderneta de Saúde da Criança e antropometria de crianças. J Manag Prim Health Care [Internet]. 2019 [cited 2023 Mar 22];10:e10. Available from: https://www.jmphc.com.br/jmphc/article/view/957
9. Millão LF, Vieira TW, Santos ND, Silva APSS, Flores CD. Integração de tecnologias digitais no ensino de enfermagem: criação de um caso clínico sobre úlceras por pressão com o software SIACC. Rev Eletron Comun Inf Inov Saúde [Internet]. 2017 [cited 2023 Mar 10];11(1). Available from: http://doi.org/10.29397/reciis.v11i1.1189
10. Silva AR da, Silva Junior, GB da, Branco KMPC. Estudo comparativo de aplicativos móveis disponíveis para pacientes transplantados renais. Rev Saúde Digital Tec Educ [Internet]. 2020 [cited 2023 Sep 17];5(3):01-15. Available from: http://doi.org/10.36517/resdite.v5.n3.2020.a2

11. Oliveira AR, Alencar MSM. O uso de aplicativos de saúde para dispositivos móveis como fontes de informação e educação em saúde. Rev Digit Bibliotecon Cienc Inf [Internet]. 2017 [cited 2023 Apr 19];15(1):234-45. Available from: https://periodicos.sbu.unicamp.br/ojs/index.php/rdbci/article/view/8648137/15054

12. Oliveira C, Moura SP, Sousa ER. TIC´s na educação: a utilização das tecnologias da informação e comunicação na aprendizagem do aluno. Pedag Ação [Internet]. 2015 [cited 2023 May 15];7(1):75-95. Available from: http://periodicos.pucminas.br/index.php/pedagogiacao/article/view/11019/8864

13. Bezerra LB, Vilhena BJ, Freitas RN, Bastos ZRG, Teixeira E, Menezes EG, et al. Aplicativos móveis no cuidado em saúde: uma revisão integrativa. Rev Enferm Atual In Derme [Internet]. 2020 [cited 2023 Apr 19];93(31):e-020047. Available from: https://doi.org/10.31011/reaid-2020-v.93-n.31-art.760

14. Pereira FGF, Frota NM, Silva DV, Sousa LMO, Almeida JC, Cysne Filho FMS. Avaliação de aplicativo digital para o ensino de sinais vitais. Rev Min Enferm [Internet]. 2017 [cited 2023 Mar 23];21:e-1034. Available from: https://pesquisa.bvsalud.org/portal/resource/pt/biblio-907994

15. Silva AMA, Mascarenhas VHA, Araújo SNM, Machado RS, Santos AMR, Andrade EMLR. Mobile technologies in the Nursing area. Rev Bras Enferm [Internet]. 2018 [cited 2023 Apr 20];71(5):2570-8. Available from: http://doi.org/10.1590/0034-7167-2017-0513

16. Tibes CMS, Dias JD, Zem-mascarenhas SH. Mobile applications developed for the health sector in Brazil: An integrative literature review. Rev Min Enferm [Internet]. 2014 [cited 2023 Apr 22];18(2):479-86. Available from: https://pesquisa.bvsalud.org/portal/resource/pt/lil-727281

17. Castells M. A era da informação: economia, sociedade e cultura- A sociedade em rede. 1st ed. São Paulo: Paz e Terra;1999.

18. Cardoso JP, Rosa VA, Lopes CRS, Vilela ABA, Santana AS, Silva AT. Construção de uma práxis educativa em informática na saúde para ensino de graduação. Ciênc Saúde Colet [Internet]. 2008 [cited 2023 Mar 22];13(1):283-88. Available from: https://doi.org/10.1590/S1413-81232008000100031

19. Silva WI, Costa DR, Silva VS, Barros NB, Barros RR. Digital technology as a tool in pharmaceutical care of hypertensive diseases and diabetes mellitus. Braz J Dev [Internet]. 2022 [cited 2023 Sep 17];8(5):35630-5. Available from: https://doi.org/10.34117/bjdv8n5-192

20. Chiavone FBT, Bezerril MS, Paiva RM, Oliveira PTC, Andrade FB, Santos VCP. Serious games en la enseñanza de enfermería: Scoping review. Enf Global [Internet]. 2020 [cited 2023 Mar 22];19(4):573-602. Available from: https://doi.org/10.6018/eglobal.410841

21. NHS Digital. Around half of people in England now have access to digital healthcare [Internet]. 2022 [cited 2023 Apr 01]. Available from: https://digital.nhs.uk/news/2021/around-half-of-people-in-england-now-have-access-to-digital-healthcare

22. Daum MM, Bleiker M, Wermelinger S, Kurthen I, Maffongelli L, Antognini K. The kleineWeltentdecker App- A smartphone-based developmental diary. Behav Res Methods [Internet]. 2022 [cited 2023 Apr 01];54:2522-44. Available from: https://doi.org/10.3758/s13428-021-01755-7

23. Galvão MCB, Ricarte ILM. O prontuário eletrônico do paciente em escala nacional: o caso australiano. Rev Ci Inf Doc [Internet]. 2019 [cited 2023 Apr 10];10(1):244-64. Available from: https://doi.org/10.11606/issn.2178-2075.v10i1p244-264

24. Australian Digital Health Agency. My Health Record. What is My Health Record? [Internet]. 2023 [cited 2023 Apr 01]. Available from: https://www.digitalhealth.gov.au/initiatives-and-programs/my-health-record

25. Almond H, Cummings E, Turner P. An approach for enhancing adoption, use and utility of shared digital health records in rural Australian communities. Stud Health Technol and Inform [Internet].

2017 [cited 2023 Apr 01];235:378-82. Available from: https://doi.org/10.3233/978-1-61499-753-5-378

26. Hanna L, Gill SD, Osborne RH. Patient perspectives on a personally controlled electronic health record used in regional Australia: 'I can be like my own doctor'. Health Inf Manag [Internet]. 2017 [cited 2023 Apr 15];46(1):42-4. Available from: https://doi.org/10.1177/1833358316661063

27. Kickbusch I, Piselli D, Agrawal A, Balicer R, Banner O, Adelhardt M, et al. The Lancet and Financial Times Commission on governing health futures 2030: Growing up in a digital world. Lancet [Internet]. 2021 [cited 2023 Jun 20];398(10312):1727-1776. Available from: https://doi.org/10.1016/S0140-6736(21)01824-9

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