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Bridging the Knowledge Gap: A Bibliometric Study of Digital Tools to Improve Parental Healths Literacy in Child Grow Monitoring

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Abstract. Parental health literacy plays a critical role in monitoring child growth and preventing nutritional problems such as stunting, wasting, and overweight. Low literacy often delays detection of growth disturbances and reduces the utilization of preventive health services. Digital technologies, including mHealth, interactive platforms, and IoT devices, offer new opportunities to address these gaps. This study aims to analyze scientific publications on digital tools for improving parental health literacy in child growth monitoring through a bibliometric approach. A quantitative descriptive design was applied using Scopus data from 2015–2024. Keywords included early childhood, nutritional status, digital health, and literacy. The analysis covered publication trends, core journals, productive authors, institutional and country affiliations, subject areas, funding sponsors, and keyword networks visualized with VOSviewer. A total of 1,151 publications were identified, peaking in 2023 (188, 16.28%). *Nutrients* ranked as the leading journal (60 articles), Dibley MJ as the most productive author (15), and the University of Sydney as the top institution (46). The United States contributed the most documents (378). Medicine was the dominant subject area (43.2%), with NIH as the main funder (94). Keyword mapping revealed strong links between health literacy, mHealth, parental involvement, and child growth monitoring. Research on digital tools for parental health literacy shows a growing trend, with significant contributions from international journals and scholars. Future studies should examine effectiveness, sustainability, and long-term impacts.
Keywords: Thoracolumbar MRI, ARC, SNR, Diagnostic information

1 Introduction

Monitoring a child's growth from an early age is an important way to improve nutritional status. The problems include stunting, wasting, and being overweight. If nutritional status monitoring is not handled seriously, then it can be influential globally in the development of cognitive, motor, economic, and social-emotional children, as well as increase the risk of disease that is not transmitted in adulthood [1]. Literacy among parents and caregivers health related monitoring growth child become factor crucial For ensure taking decision in a way appropriate about pattern care and provision food in children [2]. Some limitations parental understanding about nutrition child moment This Still become global challenges in various developing countries, including Indonesia.

The gap literacy health in the among parents and caregivers as determinant important especially in the beginning life to be achieved quality parenting and growth child optimally . Literacy poor health seen from taking poor decision or not optimal regarding practice giving eating and being late detection disturbance growth. Utilization service promotional inadequate preventive measures adequate Can impact on the results health suboptimal child development [3,4,5]. Digital transformation as one of the form literacy in the sector health give opportunity For bridge gap knowledge . Intervention other digital health, such as application mobile (mHealth), messaging short directed, educational platform interactive, and devices Internet of Things (IoT) includes digital scales have utilized by many user. Intervention This allows For increase knowledge, attitudes, and

practices parenting nutrition, strengthening monitoring growth as well as give bait return that can followed up by parents [6,7]. A number of review systematic and meta- analysis report potential mHealth Can increase knowledge nutrition, behavior breastfeeding, compliance monitoring grow flowers, and parental involvement, although its effectiveness is greatly influenced by design tools, context social, and quality implementation [8,9,10].

On the other hand, the evidence about effectiveness term long and sustainability family with literacy, issues digital equality, as well as interoperability device with system information health Still limited [11,12]. But data from a number of results publication related mHealth, literacy parental health, and monitoring growth increase rapidly with corpus knowledge spread across various discipline, such as health community, pediatrics, nutrition, informatics health and engineering. Although publication spread fast on the road various discipline science, but Not yet available in a way systematic as map comprehensive that describes temporal trends and distribution geographical publication; networking collaboration authors and institutions; journal outlets and clusters most influential themes; current topics appear for example personalization bait come back nutrition, experience users for parents literacy low, and device data privacy house ladder connected; and gap research that requires proof more strong, like real world effectiveness, sustainability and scalability, as well as integration with primary care and nutrition programs national level [9,6].

This study serve analysis bibliometrics as something the right approach For mapping and synthesizing literature about designed digital tools For increase literacy among parents and caregivers health in monitoring growth children. In a way special, analysis This aim map trend publications and citations; identifying most influential authors, institutions , and countries; mapping keyword co-currencies to uncover structure intellectual and research areas that are currently underway appear; and highlight gap knowledge and research agenda to front [9]. Bibliometrics as method for analyze publication scientific through pattern authorship, citation, keywords, as well as distribution journals and countries [13]. Through bibliometrics, researchers can see trend research, writer productive, core journals, and map thematic depicting direction development something field study.

Therefore that, research this serve analysis bibliometrics for mapping and synthesizing literature about digital tools designed to improve literacy among parents and caregivers health in monitoring growth children. This research expected can contribute to efforts bridge gap knowledge between innovation technology and practice parenting based evidence, at the same time provide guide for researchers, developers , and makers policy in designing effective, ethical , inclusive, and sustainable digital interventions [14,6].

2 Methods

This study uses approaches bibliometrics, the unit of analysis used in study this is article scientific. Research data sources is publication scientific about digital tools for increase literacy among parents and caregivers health in monitoring growth Children . Reasons for choosing the Scopus database set purposively with consideration quality and reputation that has been recognized in a way international, both by universities tall and institution research. In addition, Scopus also provides data for show level influence something journal (journal impact) and institution impact in the world of publication scientific . This is based on relationships citation between published articles in A journal or published by researchers from something institutions.

Population study This is all over publication scientific about digital tools for increase literacy among parents and caregivers health in monitoring growth children who have Scopus indexed. Research sample in the form of publication scientific about topic published digital tools during ten year lastly, namely period 2015—2024. Based on results search, obtained as many as 1,151 documents .

Data collection techniques used researchers is through secondary data . Researchers do search with open the Scopus database at the link www.scopus.com using account subscribe (paid) from agency college high so that you can access all over its features . Search done with use term or keywords: (((child* OR "preschool*" OR pediatric*) AND ("growth" OR "nutrition" OR anthropometr * OR stunting OR wasting) AND (mhealth OR ehealth OR smartphone OR app OR

"mobile" OR digital* OR sensor*) AND (information OR knowledge OR literacy OR education OR "decision support" OR awareness OR counseling))).

Search focused on title , abstract , and keywords article . The data obtained in the form of publication field digital tools for increase literacy among parents and caregivers health in monitoring growth child during period 2015—2024 . After get results search , researcher do data exploration in the Scopus database For see growth publication scientific , core journal , productivity author , collaboration writer , growth publication based on institution or affiliates , as well as distribution publication by country.

Next , the researcher do visualization development study use device soft VOSviewer with method export results search from Scopus to in CSV format, then the CSV data is input to in VOSviewer For make keyword co-occurrence , network collaboration co-authorship, and network citation (citation network). Data analysis techniques in study This in a way descriptive quantitative use data processing with analyze search results feature on Scopus so that obtained external in the form of statistics in form graphic (JPEG). Next mapping trend research , theme main , and network collaboration in interpretation from results visualization from scopus and VOSviewer.

3 Results And Discussion

Publication Trends Scientific about Digital Tools For Increase Parental Health Literacy in Monitoring Child Growth has amount publication from results research indexed in the Scopus database from 2015—2024 is a total of 1,151 documents (taken last on September 10, 2025). Table 1 presents trend publication scientific according to distribution 2015 to 2024 on Digital Tools for Increase Parental Health Literacy in Monitoring Child Growth. Growth Scopus indexed publications show improvement significant in a number of year lastly ,in 2023 it will become most productive years in study This with a total of 188 publications (16.28%). The surge interest study This in line with more global trends wide in adoption intervention digital health for support parents , who have experience acceleration rapidly post-pandemic COVID-19 [15]. Rating second in 2024 with 180 publications (15.58%), followed by 2022 with 175 publications (15.15 %). furthermore in a way consecutive originate from In 2021 , there were 160 publications (13.85%) and in 2020 , there were 125 publications (10.82%). Publication trends show significant improvement since in 2020, after period more growth slow from 2015 to 2019. The smallest contribution in range time This originate from In 2015 and 2016, there were 43 (3.72%) and 47 (4.07%) publications respectively.

Table 1. Publication Trends Scientific according to distribution 2015 to 2024 on Digital Tools for Increase Parental Health Literacy in Monitoring Child Growth

No	Publication Year	Amount Publication	Percentage (%)
1.	2015	43	3.72%
2.	2016	46	4.07%
3.	2017	77	6.67%
4.	2018	81	7.01%
5.	2019	79	6.84%
6.	2020	124	10.82%
7.	2021	160	13.85%
8.	2022	174	15.15%
9.	2023	187	16.28%
10.	2024	180	15.58%
11.	Total	1,151	100.00%

Source: Results Exercise Data Personal , 2025.

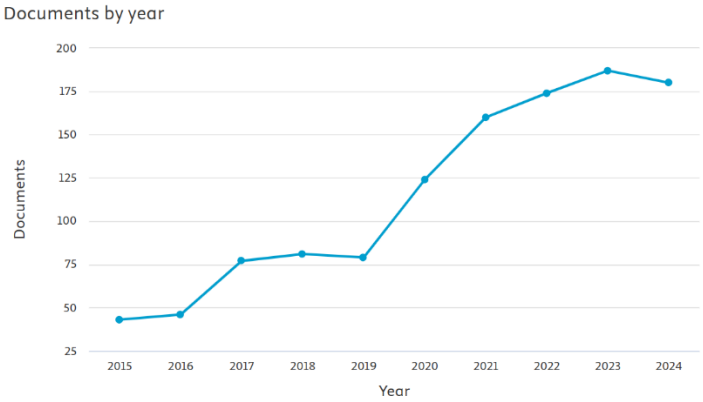

Fig. 1. Trends Publication Scientific about Digital Tools to Improve Parental Health Literacy in Monitoring Child Growth.
Source: Scopus.com , 2025

Search results show that based on publication as much as 1.151 regarding digital tools for increase literacy among parents and caregivers health in monitoring growth children indexed in the Scopus database are published in a number of journal international. There are five journals the most important publish research on the topic This as shown in Table 2 serve about trend publication scientific based on Distribution Publication Sourced Core Journal on Digital Tools for Increase Parental Health Literacy in Monitoring Child Growth.

Table 2. Distribution Publication Based on Source Core Journal

NO	Journal Name	Number of Documents
1.	Nutrients	60
2.	International Journal of Environmental Research and Public Health	43
3.	Plos One	40
4.	BMJ Open	33
5.	Jmir Mhealth and Uhealth	26
	Total	202

Source: Results Exercise Data Personal (2025)

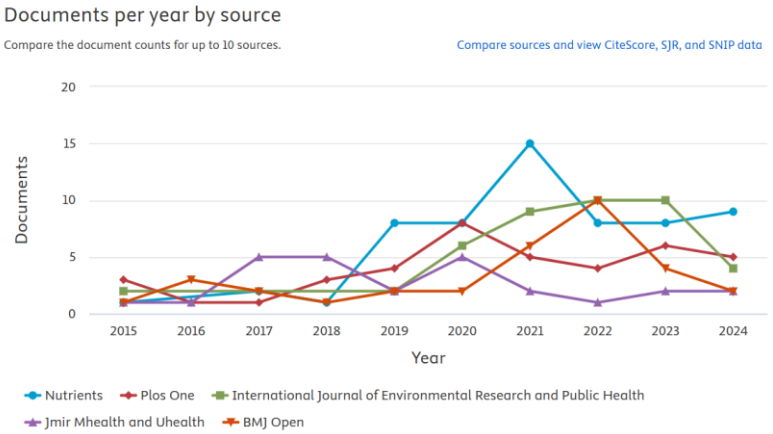

Fig. 2. Journal Core Publication Scientific
Source: Scopus.com , 2025.

Of the top five journals, Nutrients ranked first as the journal that published the most research on this topic with 60 publications, peaking at 15 documents in 2021. Second place was taken by the International Journal of Environmental Research and Public Health with 43 publications, reaching a peak of 10 publications in 2022. Furthermore, *Plos One* was ranked third with 40 publications,

with the highest peak in 2020 of 8 documents. Next came BMJ Open with 33 publications with a peak of 10 documents in 2022, and JMIR Mhealth and Uhealth ranked fifth with 26 documents, with a peak of 5 documents in 2020. Furthermore, in Peng et al's research on mobile health applications published from 2000 to 2019, it was stated that *JMIR mHealth and uHealth* were ranked first in publications [16]. This data shows that research related to this topic is published in various highly reputable journals covering the fields of nutrition, public health, general medicine, and digital health.

Amount researchers productive who do publication scientific about Digital Tools for Increase Parental Health Literacy in Monitoring Child Growth by 10 authors most productive in publish results study related topic This Dibley, MJ is the author with the most publications, namely 15 articles. Alam, A. is in the next position with 11 publications. Next, Koledova, E. and Wolfenden, L. each have 9 publications. Three researchers, namely Campbell, KJ, Love, P., and Øverby, NC, each have 8 publications. Then, Helle, C. and Hillesund, ER each contributed 7 publications, and in the last place on this list is Bärnighausen, T. with 6 publications such as seen in table 3 regarding amount researchers productive Which do publication scientific. This result show that study about utilization digital tools for increase literacy among parents and caregivers health in monitoring growth child Lots done in a way collaborative by researchers across countries, with relative contribution evenly distributed among writer productive.

Table 3. Amount Researchers Productive Which Do Publication Scientific

No	Researchers	Number of Publications
1.	Dibley, MJ	15
2.	Nature, A.	11
3.	Koledova, E.	9
4.	Wolfenden, L.	9
5.	Campbell, K.J.	8
6.	Love, P.	8
7.	Øverby, NC	8
8.	Helle, C.	7
9.	Hillesund, ER	7
10.	Bärnighausen, T.	6
	Total	88

Source: Results Exercise Data Personal, 2025.

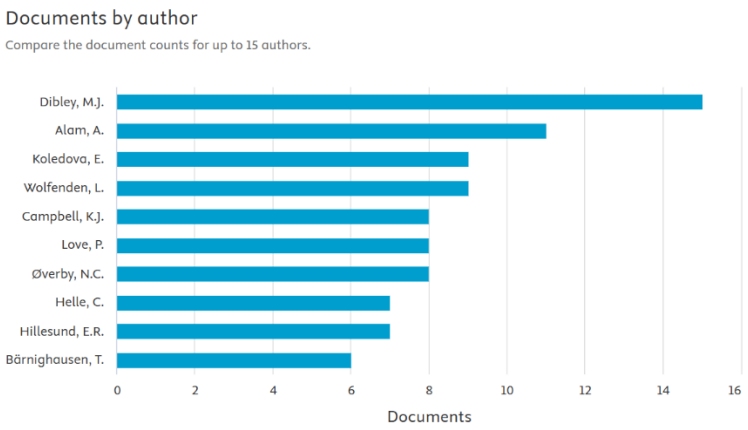

Fig. 3 . Amount Researchers Productive Which Do Publication Scientific
Source: Scopus.com , 2025 .

Number of Scientific Publications on Digital Tools for Increase Parental Health Literacy in Monitoring Child Growth by affiliation or institutional institution is shown in Table 4, showing that

The University of Sydney is the affiliate with the most publications, with 46 documents. Deakin University is in second place with 31 publications, followed by The University of Sydney School of Public Health with 29 publications. The Institute for Physical Activity and Nutrition is next with 23 publications.

Next, the Johns Hopkins Bloomberg School of Public Health had 22 publications, and the Faculty of Medicine and Health had 21. Similarly, The University of Newcastle, Australia, and Karolinska Institutet each had 20 publications. University College London contributed 18 publications, and The University of North Carolina at Chapel Hill was last on the list with 16 publications. The approach of reporting the most productive institutions based on document counts and affiliations is standard practice in bibliometric analysis and science mapping [17].

Table 4. Number of Institutional Affiliations with the Highest Productivity

No	Affiliate Name	Number of Publications
1.	The University of Sydney	46
2.	Deakin University	31
3.	The University of Sydney School of Public Health	29
4.	The Institute for Physical Activity and Nutrition	23
5.	Johns Hopkins Bloomberg School of Public Health	22
6.	Faculty of Medicine and Health	21
7.	The University of Newcastle, Australia	20
8.	Karolinska Institutet	20
9.	University College London	18
10.	The University of North Carolina at Chapel Hill	16
	Total	246

Source: Results Exercise Data Personal , 2025.

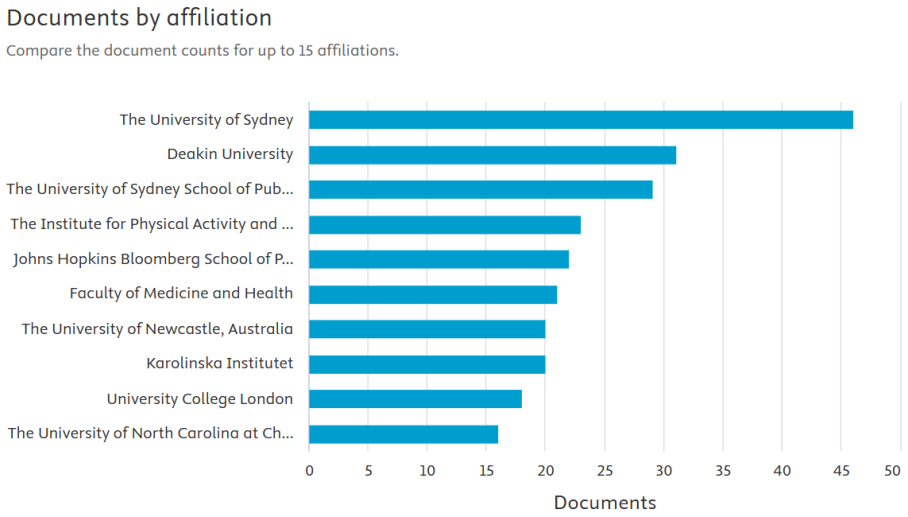

Fig. 4. Scientific Publication on Digital Tools to Improve Parents' Health Literacy in Child Growth Monitoring Based on Institutional Affiliation or Agency.
Source:Scopus.com, 2025.

The number of scientific publications on digital tools to improve parental health literacy in monitoring child growth by country or region is shown in Table 5, with the United States being the most productive country in this study with a total of 378 publications. The second rank is occupied by the United Kingdom with 148 publications, followed by Australia with 135 publications. The

next contribution comes from Canada with 71 publications, followed by India with 69 publications and Germany which contributed 68 publications. Several other countries such as Italy with 60 publications, China and Spain with 58 publications, and the Netherlands also contributed quite significantly with 53 publications each. This pattern of dominance of English-speaking countries is consistent with bibliometric findings in other digital health domains; for example, [18] showed that the United States and the United Kingdom are at the top of the publication contribution on the topic of wearable devices for health, with Australia also being a major contributor.

Table 5. Countries with the Highest Contributions

No	Country/Region Name	Number of Publications
1.	United States	378
2.	United Kingdom	148
3.	Australia	135
4.	Canada	71
5.	India	69
6.	Germany	68
7.	Italy	60
8.	China	58
9.	Spain	58
10.	Netherlands	53
	Total	1098

Source: Results Exercise Data Personal, 2025.

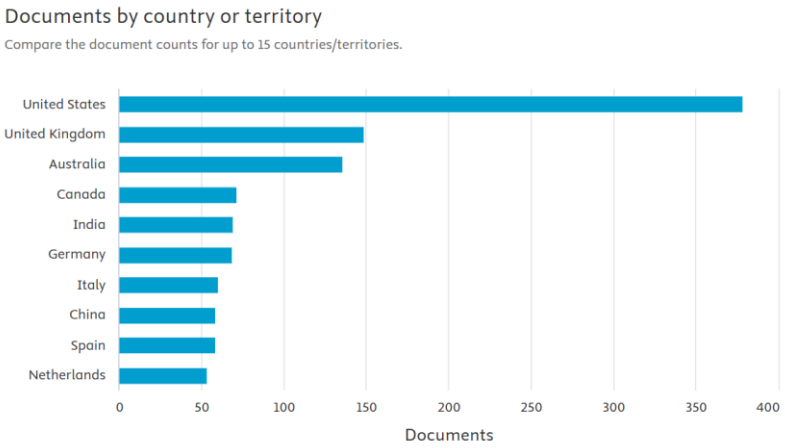

Fig. 5. Scientific Publications on Digital Tools to Improve Parental Health Literacy in Child Growth Monitoring by Country
Source: Scopus.com, 2025.

The number of scientific publications on digital tools to improve parental health literacy in monitoring child growth by subject area is presented in Table 6, with Medicine being the most dominant field, contributing 43.2% of the total publications. Evidence from systematic reviews and meta-analyses indicates that *mHealth studies* for maternal, newborn, and child health are substantially oriented towards medical contexts and clinical services, thus naturally being classified as Medicine in indexing [8]. Second place is taken by the other category with 12.8%, followed by Nursing with 10.5%. Further contributions come from Agricultural and Biological Sciences (6.8%), Social Sciences (5.8%), and Biochemistry, Genetics and Molecular Biology (5.3%). Other fields

that also contribute include Computer Science (3.5%), Environmental Science (3.1%), and Engineering and Neuroscience, each contributing 3.0%. Finally, the Multidisciplinary field contributes 2.9% of the total publications.

Table 6. Scientific Publications on Digital Tools to Improve Parental Health Literacy in Monitoring Child Growth by Subject Area

No	Subject Area	Percentage
1.	Medicine	43.2%
2.	Other	12.8%
3.	Nursing	10.5%
4.	Agricultural and...	6.8%
5.	Social Sciences...	5.8%
6.	Biochemistry, G...	5.3%
7.	Computer Science...	3.5%
8.	Environmental S...	3.1%
9.	Engineering	3.0%
10.	Neuroscience	3.0%
11.	Multidisciplinary...	2.9%
	Total	99.9%

Source: Results Exercise Data Personal, 2025.

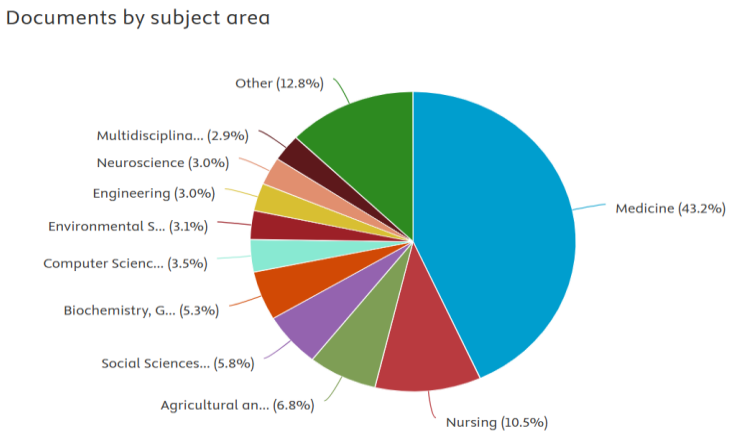

Fig. 6. Scientific Publications on Digital Tools to Improve Parental Health Literacy in Monitoring Child Growth by Subject Area
Source: Scopus.com (2025)

The Number of Scientific Publications on Digital Tools to Improve Parental Health Literacy in Child Growth Monitoring Based on Funding Sponsors can be seen in Table 7 that the National Institutes of Health is the most productive funding sponsor in this study with a total of 94 publications. The second rank is occupied by the National Health and Medical Research Council with 33 publications, followed by the European Commission with 26 publications. The next contribution came from the Eunice Kennedy Shriver National Institute of Child Health and Human Development and the Horizon 2020 Framework Programme with 22 publications, followed by the Bill and Melinda Gates Foundation which each contributed 21 publications. The National Institute of Child Health and Human Development contributed 20 publications, the Wellcome Trust with 19 publications, and the National Center for Advancing Translational Sciences and the National Science Foundation each contributed 17 publications.

Table 7. Scientific Publications on Digital Tools to Improve Parental Health Literacy in Child Growth Monitoring Based on Funding Sponsor

No	Funding Sponsor	Number of Documents
1.	National Institutes of Health	94
2.	National Health and Medical Research...	33
3.	European Commission	26
4.	Eunice Kennedy Shriver National Institute...	22
5.	Horizon 2020 Framework Programme	22
6.	Bill and Melinda Gates Foundation	21
7.	National Institute of Child Health and...	20
8.	Wellcome Trust	19
9.	National Center for Advancing Transl...	17
10.	National Science Foundation	17
	Total	291

Source: Results Exercise Data Personal, 2025 .

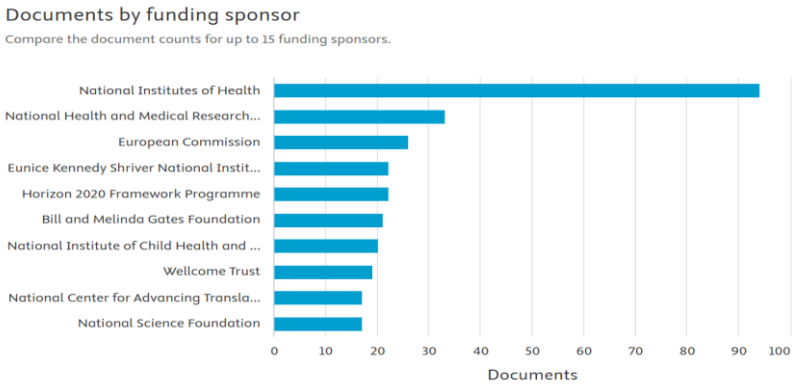

Fig. 7. Scientific Publications on Digital Tools to Improve Parental Health Literacy in Child Growth Monitoring Based on Funding Sponsorship
Source: Scopus.com, 2025.

The highest frequency of keyword occurrences in Scientific Publications on Digital Tools to Improve Parental Health Literacy in Child Growth Monitoring is shown in *the VOSviewer* visualization map as shown in Figure 9 below, which shows the relationship between the most frequently appearing keywords in the study, which are grouped into several thematic clusters based on color. The most prominent keywords, marked with the largest circle size, are "human", "male", "nutrition", "obesity", "pregnancy", and "clinical article".

The blue cluster in the upper left focuses on the themes of nutrition, obesity, and eating behavior, particularly in children. Key keywords in this cluster include "nutrition," "obesity," "feeding behavior," "diet," "children," and "pediatric obesity." This demonstrates the strong focus of child nutrition, reflecting the tradition of *eHealth/mHealth research* focused on obesity prevention and managing eating behavior in children with parental involvement [19]. The red cluster in the lower left highlights research on maternal and child health. This theme is evident from dominant keywords such as "pregnancy," "mother," "breast feeding," "pregnant woman," and "newborn." Furthermore, the emergence of the terms " *mHealth* " and " *Community Care* " indicates research on the use of technology and community health services in this context. This aligns with evidence that *mHealth interventions* are largely directed at maternal and neonatal care, including

education and support during pregnancy and breastfeeding [20]. The green cluster on the right encompasses the fields of clinical medicine, genetics, and pathology. Keywords such as "clinical article," "genetics," "phenotype," "case report," "complication," and "pathology" are central, indicating a focus on case reports, clinical features of disease, and genetic studies. The yellow cluster in the upper right relates to neurodevelopment and physiology. This is represented by keywords such as "brain," "development," "physiology," " *nervous system development* ," and "diagnostic imaging," indicating research on brain development and the use of diagnostic imaging.

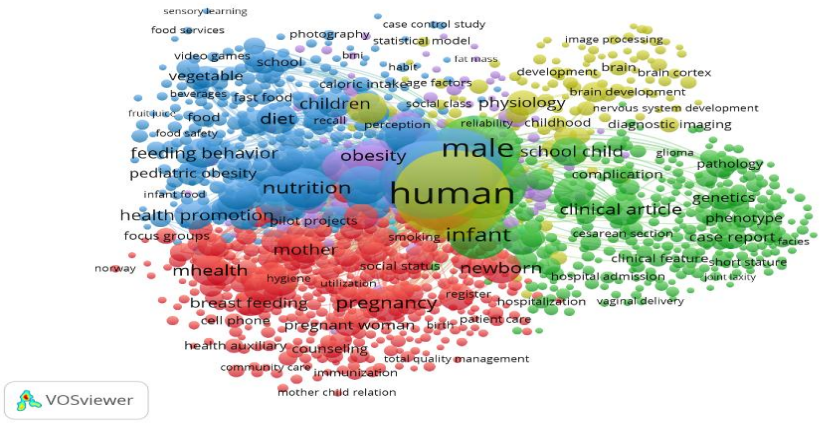

Fig. 8. Research Trends on Digital Tools to Improve Parental Health Literacy in Monitoring Child Growth Based on Keywords
Source: Personal Data Processing Results, 2025.

4 Conclusion

Based on results and discussion , can concluded that publication scientific about digital tools for increase literacy among parents and caregivers health in monitoring growth indexed children in the Scopus database shows trend consistent improvement during 2015–2024 period . Peak growth publication occurred in 2023, with 188 publications (16.28%). In terms of publication outlets, Nutrients became journal with contribution highest, namely 60 publications, followed by the International Journal of Environmental Research and Public Health with 43 publications. The most productive author is Dibley, MJ with 15 publications, followed by Alam, A. with 11 publications .

Findings This confirm that research related utilization digital technology in support literacy parental health and monitoring growth child has interesting attention widespread in the community academic international , especially in the field of health society , nutrition , and digital health. Analysis bibliometrics use VOSviewer show that publication distributed to in a number of keyword clusters, which describe focus research on the use of mHealth, parental engagement, and monitoring nutritional status and growth child .

In a way overall, publication scientific on the topic This experience growth positive and increasingly relevant in context global challenges of stunting prevention and improvement literacy health family. As recommendations, studies bibliometrics in the future can expanded with involving scientific databases other, expanding range time analysis, as well as integrate aspect citation and impact research, so that can give a clearer picture comprehensive about direction development research in the field.

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