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Digital-Based and Direct Education to Enhance Complementary Feeding Knowledge and Practices: A Systematic Review

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Abstract

Background: The practice of infant and young children still does not meet the WHO guidelines, although different types of education have been carried out to increase mothers' knowledge of infant and young children's feeding practices.
Objective: Tosynthesise the effectiveness of digital education and direct education in increasing the knowledge and practice of infants and children aged 6-23 months from available literatures.
Method: The research design is a systematic review which is reported following thePRISMA guideline.. The databases used to search for articles in English published in the period 2013 to 2023 are Pubmed, ScienceDirect, Scopus, and MEDLINE using the search keywords 'Mother OR maternal', 'Children OR infants', 'Digital based AND health education method', and 'Complementary feeding'. A total of 461 articles were obtained using RCT, quasi-experiment, and combined RCT-cohort research designs. Researchers use the Covidence tool for the data selection process through the extraction. Risk of bias assessment uses the JBI instrument to evaluate articles.
Results: Four articles detail the efficacy of digital-based education (utilizing smartphone applications, WeChat, WhatsApp, and digital job aid education), while five articles delve into the effectiveness of direct education approaches (peer counseling, personalized counseling, and home visits). Another article examines the effectiveness of both home visits and interactive voice calls. The research spanned multiple countries, including Indonesia, Bangladesh, India, China, Cambodia, Iran, and Brazil, encompassing a participant pool ranging from 110 to 1885 research subjects. Findings indicate that digital education enhances mothers' understanding of nutrition, essential knowledge, practices in providing complementary feeding in line with IYCF guidelines, and mother's confidence in preparing complementary foods. Moreover, direct education increased compliance with suggested feeding practices, encompassing dietary variety, intake of animal protein, and the consumption of iron-rich foods.
Conclusion: Nurses can enhance knowledge and practice of complementary feeding by embracing digital education as a potential solution and concurrently promoting cultural sensitivity and tailored education.

Keywords: children; complementary feeding; digital education; direct education; infant

INTRODUCTION

The United Nations Children's Fund (UNICEF) reported that at least 30 percent of children in 28 countries worldwide were affected by stunting in 2022 (UNICEF, 2023). Stunting due to chronic malnutrition occurs in 25% of toddlers (Saleh et al., 2021). Stunting in children under two years old has a high potential impact on cognitive development for children (Ekholuenetale et al., 2020). One of the WHO policies in addressing stunting issues is implementing interventions to improve exclusive breastfeeding practices and the introduction of complementary feeding (WHO, 2023). Appropriate practices in introducing complementary feeding have demonstrated positive effects in lowering the rates of stunting, wasting, and underweight, as well as preventing issues such as iron deficiency, micronutrient deficiencies, overweight, obesity, and non-communicable diseases related to food (Miniello et al., 2021; Twabi et al., 2021).

Feeding practices for infants and children still do not align with WHO/ UNICEF indicators and recommendations that complementary feeding

should be timely, sufficient, safe, and appropriately administered to meet nutritional needs (WHO, 2022). In Tanzania, 51.1% of mothers introduce solid, semi-solid, and soft foods before six months, 75.2% of children do not receive the minimum acceptable diet, 66.1% of children do not receive the appropriate daily food quantity, and 57.3% of children lack dietary diversity as per recommendations (Binamungu et al., 2023).

Key factors related to infant and child feeding include maternal factors (knowledge, perceptions, attitudes, beliefs, and skills), healthcare service factors, and home environmental factors (Herman et al., 2023). Maternal knowledge regarding infant and child feeding can be enhanced through nutritional education received during monthly visits to child clinics (Bimpong et al., 2020). Several studies have indicated that maternal knowledge, attitudes, and child growth are associated with feeding practices in infants and children (Bimpong et al., 2020; Binamungu et al., 2023; Thompson et al., 2023; Twabi et al., 2021).

Various health education methods, such as YouTube videos, peer counseling, mobile phone-based nutritional education, and radio dramas in local dialects about child nutrition, are employed to improve maternal knowledge, particularly regarding the timing of introducing complementary foods, food diversity, feeding frequency, and exclusive breastfeeding. (Azak et al., 2023; Haque et al., 2023; Nurhayati et al., 2023; Saaka et al., 2021) it is expected that with the improvement of maternal knowledge, there will be better feeding practices for children, characterized by changes in providing nutritious food for children, thus enabling them to consume better-quality food (Saaka et al., 2021). To date, no systematic review has been conducted on the effectiveness of digital education compared to direct education in improving knowledge and practices related to complementary feeding. The objective of this systematic review is to analyze the effectiveness of digital education compared to direct education in enhancing complementary feeding practices. This comparison was chosen due to the need for evidence-based insight into the relative efficacy of these two widely used educational approaches and to provide a focused analysis.

METHOD

This study is a systematic review using The Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidelines and has been registered in Open Science Framework (OSF) with the registration DOI https://doi.org/10.17605/OSF.IO/TN3M5. The first action taken involved formulating the PICO question, which inquired about the effectiveness of digital education in contrast to traditional direct education. The focus was on enhancing mother's knowledge and practice in complementary feeding to infants and children aged 6-23 months. Thus, the PICO components are Population (P) – mothers of infants and children aged 6-23 months; intervention (I) - digital education on complementary feeding; Comparison (C) – direct education on complementary feeding; Outcome (O) – improvement in mother's knowledge and practice of complementary feeding.

The inclusion criteria for this study include mothers with children aged 6-23 months, mothers capable of using technology, education on complementary feeding practices, articles published between 2013-2023, English language, academic journals, and full text. The timeframe from 2013 was chosen to capture recent and pertinent studies, showcasing the most current developments and trends in digital education and complementary feeding practices. Furthermore, restricting the search to English-language articles guarantees the inclusion of research with a wide international perspective, as English is the main language used in scientific research and publication. This criterion also ensures that the studies are accessible and understandable, given the research team's proficiency in English. The exclusion criteria for this study are children with congenital disorders, literature reviews, systematic reviews, and meta-analyses.

A systematic review to address the research question, "Is education with digital media more effective than direct education in improving complementary feeding practices among mothers with children aged 6-23 months?". We search the four databases (PubMed, ScienceDirect, Scopus, and MEDLINE). We import all retrieved articles into the Covidence website to identify and eliminate duplicate articles. Two independent reviewers evaluated abstracts and titles based on predetermined eligibility criteria. According to the

eligible criteria, check the abstract and titles. Following this initial screening, full texts of pertinent studies were thoroughly examined, and ultimately, studies meeting the eligibility criteria were included. Any discrepancies between reviewers were documented and resolved through consultation with a third reviewer. The keywords used in the search included mother, maternal, children, digital-based, health education method, and complementary feeding.

Articles found in the database search were imported in RIS (Research Information System) format to ensure accurate and consistent transfer of citation information. These files are then imported into Covidence to filter titles, abstracts, and full texts. The screening process began by identifying and removing duplicates. The researcher screened the titles and abstracts of all articles according to the established inclusion criteria. The full texts of these articles were then uploaded to Covidence and reviewed by the researcher. PRISMA was prepared to provide an overview of the study flow throughout the selection process, as outlined in Figure 1.

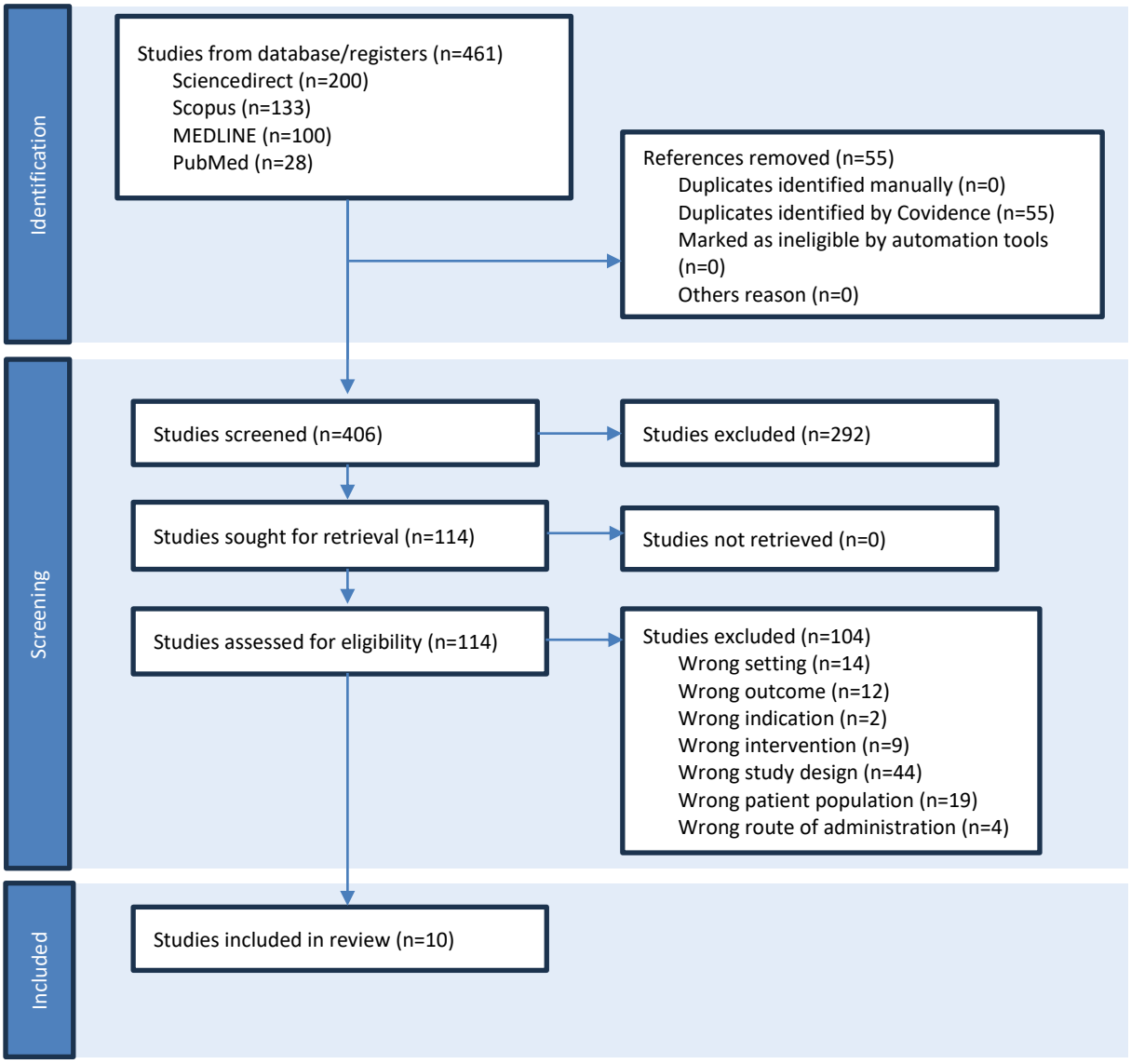

Figure 1. The PRISMA

Table 1. Joanna Briggs Institute's critical appraisal checklist for randomized controlled trials

	Selected RCT studies strengths and limitations (n=7)												
Studies	Was true randomization used for the assignment of participants to treatment groups?	Was allocation to treatment groups concealed	Were treatment groups similar at the baseline	Were participants blind to treatment assignment	Were those delivering treatment blind to treatment assignment	Were outcomes assessors blind to treatment assignment	Were treatment groups treated identically other than the intervention of interest	Was follow-up complete, and if not, were differences between groups in terms of their follow-up adequately described and analyzed	Were participants analyzed in the groups to which they were randomized	Were outcomes measured in the same way for treatment groups	Were outcomes measured in a reliable way	Was appropriate statistical analysis used	Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial
(Wu et al., 2023) , China	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Not clear	Yes	Yes	Yes	Yes
(Young et al., 2021) Cambodia	Yes	Yes	Yes	Not clear	Not clear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(Seyyedi et al., 2020) Iran	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(Billah et al., 2022) Bangladesh	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(Ara et al., 2019) Bangladesh	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes (except cognitive testing)	Yes	Yes
(Owais et al., 2017) Bangladesh	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(Yao et al., 2022) China	Yes	Yes	Yes	Not clear	Not clear	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 2. Joanna Briggs Institute's critical appraisal checklist of quasi-experimental studies

Selected quasi-experimental studies strengths and limitations (n=7)									
Studies	Is it clear in the study what cause and effect are (i.e., there is no confusion about which variable comes first)?	Were the participants included in any comparisons similar?	Were the participants included in any comparisons receiving similar treatment/ care other than the exposure or intervention of interest?	Was there a control group?	Were there multiple measurements of the outcome, both pre- and post-intervention/ exposure?	Was follow-up complete, and if not, were differences between groups in terms of their follow-up adequately described and analyzed?	Were the outcomes of participants included in any comparisons measured in the same way?	Were outcomes measured reliably?	Was appropriate statistical analysis used?
(Rachmah et al., 2023), Indonesia	Yes	Yes	Yes	No	Yes	Not clear	Yes	Yes	Yes
(Cândido et al., 2018), Brazil	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(Sharma et al., 2020), India	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

The quality of the research articles was assessed using the Joanna Briggs Institute's critical appraisal checklist for randomized controlled trials for RCT study design. In contrast, the Joanna Briggs Institute's critical appraisal checklists for quasi-experimental studies were used for quasi-experimental study designs. The strengths and limitations of the articles are presented in Tables 1 and 2.

Information from studies that meet the criteria will be extracted using a data extraction tool specifically developed for this review, considering common aspects found in systematic reviews. The data to be extracted will include information such as author names, year of article publication, study location, research objectives, study design, sample size, instruments used, and findings relevant to the research objectives set by the researcher. The data extraction process will be conducted using the Covidence tool. The researcher will then organize the data using a narrative synthesis method that will summarize the research results narratively to address the research questions due to limitations in data, time, and available resources, as well as the variations in research methodologies encountered.

Table 3. Summary of selected studies complementary feeding practices

Author, publication year, country	Intervention	Type of education	Sample Size	Instrument	Study Design	Key Findings
(Wu et al., 2023) China	Counseling through a personalized WeChat-based digital education called "Sojump"	Digital Education	1610 mothers	The WHO Maternal, Newborn, and Child Health Household Survey (MNCHHS) questionnaire	RCT	The intervention group exhibited a greater value across six feeding practice indicators compared to the control group. Minimum dietary diversity (OR 1.62; CI 95%: 1.16-2.28; p-value = 0,005), minimum meal frequency (OR 1.45; CI 95%: 1.03-2.04; p value=0,032), minimum acceptable diet (OR 1.51; CI 95%: 1.12 – 2.05; p-value 0.0081), consumption of iron-rich or iron-fortified foods (OR: 1.61; 95% CI, 1.06–2.43), consumption of iron-rich foods (OR: 1.43; 95% CI, 1.02–2.01), continued breastfeeding at 12-23 months (OR: 1.64; 95% CI, 1.06–2.53), consumption of flesh food (OR: 1.42; 95% CI, 1.03–1.95), eggs (OR: 1.40; 95% CI, 1.01–1.92) and consumption of pulses (OR: 1.59; 95% CI, 1.15–1.92)
(Rachmah et al., 2023) Indonesia	10-session online nutrition education program on WhatsApp based on the theory of planned behavior construct	Digital Education	155 mothers	- Complementary feeding behavior questionnaire - Complementary feeding administration questionnaire based on calorie needs - questionnaire for providing complementary feeding packages - maternal self-efficacy questionnaire	Quasi-experimental	Enhancement in mothers' perception of the ease of preparing homemade complementary feeding showed a significant improvement (p<0.002). There was a significant rise in mothers' confidence in delivering nutritious homemade complementary feeding (p<0.005).
(Young et al., 2021)	A 10 – 12 days educational program focused on the infant	Direct education	361 children and	- IYCF indicators - Digital scales	longitudinal cluster-	The second assessment results at the 3-month mark for the home visit intervention

Author, publication year, country	Intervention	Type of education	Sample Size	Instrument	Study Design	Key Findings
Cambodia	and young children's feeding practices, water, sanitation, and hygiene (WASH), child caring, and health-seeking practices. Two approaches to counselling programs are the traditional method involving in-person visits and an interactive voice-calling		caregivers	- WHO growth standard	randomized control trial.	group indicated a 16.3% increase ($p<0.05$) in the variety of foods consumed by children and a 23.1% enhancement ($p<0.05$) in the acceptance of essential foods compared to the control group. However, there was no notable difference in feeding practices within the home visit intervention group when combined with interactive voice calling. In the final assessment (12 months), no sustained changes were observed in any of the groups, both in the intervention and control groups.
(Seyyedi et al., 2020) Iran	Education is delivered through a smartphone application based on the guidelines provided by the Ministry of Health in Iran, covering principles of age-appropriate child feeding, feeding methods for children, weaning time, introduction to complementary feeding, and maternal health.	Digital Education	110 mothers	- Mobile application and instructional material derived from maternal guidelines. - WHO Anthro software	RCT	Mothers in the smartphone group demonstrated more significant enhancements compared to those in the control group across critical dimension of nutritional literacy, including critical knowledge +6.50 (95% CI $\pm$ 0.98; $p<0.001$) feeding knowledge +9.38 (95% CI $\pm$ 1.70; $p<0.001$), nutrition practice +2.12 (95% CI $\pm$ 1.27; $p=0.001$) and nutritional literacy +18.0 (95% CI $\pm$ 2.53; $p<0.001$).
(Billah et al., 2022) Bangladesh	Individual health counseling provided by healthcare professionals using digital aids to mothers is categorized into four intervention groups and one control group.	Digital Education	1258 mothers	- IYCF indicators - Web-based project management information system	RCT	The intake of animal protein in the intervention group was 1.33 times higher than in the control group (OR 1.33, 95% CI: 1.11-1.60). The dietary diversity in the intervention group was 1.18 times higher than in the

Author, publication year, country	Intervention	Type of education	Sample Size	Instrument	Study Design	Key Findings
						control group (OR 1.18, 95% CI: 0.99-1.40).
(Ara et al., 2019) Bangladesh	peer counseling with psychosocial stimulation about complementary feeding practice	Direct education	378 mothers	- WHO Maternal, Newborn and Child Health Household Survey (MNCHHHS) - WHO growth standard - Infant feeding scale - Bayley Scale of Infant and Toddler Development- third edition (BSID-III)	RCT	The intervention group exhibited a minimum dietary diversity that was twice as high (aOR 1.98; 95% CI: 1.37, 2.87; p=0.000). The consumption of fleshy foods was significantly greater in the intervention group (aOR 1.38; 95% CI: 1.38, 2.77; p=0.000). Moreover, the frequency of egg consumption among infants in the intervention group was notably higher (aOR: 1.42; 95% CI: 1.00, 2.77; p=0.045). Additionally, the total frequency of protein consumption was more than two times higher for infants in the intervention group (aOR 2.08; 95% CI: 1.39, 13.11; p=0.000).
(Owais et al., 2017) Bangladesh	Information regarding maternal nutrition, breastfeeding initiation, and proper complementary feeding practices was conveyed through counseling sessions, both on an individual basis and in group settings.	Direct education	1885 mother-child dyads	- WHO growth standard - IYCF indicators	RCT dan Cohort	The percentage of infants who started complementary feeding at the appropriate time rose from 27.1% to 54.7% (p-value < 0.01). There was a 6.6 increase in the minimum acceptable diet within the intervention group (95% CI: 4.2, 10.4).
(Yao et al., 2022) China	Health education with a focus on breastfeeding up to 2 years, introducing complementary feeding at six months, food texture, food diversity, and meal frequency is provided through home visits by health professionals, accompanied by the provision of iron-rich supplements and soy-based supplementary foods.	Direct education	In 2018, 1218 mother-child pairs and 1293 child-caregiver pairs were involved in the study in 2020.	- IYCF indicators	RCT	Between 2018 and 2020, there was an increase in the rates of introducing solid, semisolid, or soft foods (from 83.1% to 84.1%), achieving Minimum Dietary Diversity (MDD) (from 49.5% to 51.4%), and consuming iron-rich or iron-fortified foods (from 55.0% to 84.5%)

Author, publication year, country	Intervention	Type of education	Sample Size	Instrument	Study Design	Key Findings
(Cândido et al., 2018) Brazil	Face-to-face sessions between parents and health professionals are needed to discuss complementary feeding practices and assess parents' beliefs, attitudes, and behaviours when introducing complementary foods.	Direct education	202 individuals, with 102 in the control group and 100 in the intervention group.	- IYCF indicators	Quasi-experimental	The enhancement in parental confidence regarding the necessity for children to consume meat starting from the age of 6 months (p=0.008), the improved perception among parents that soups and broths lack nutritional value (p<0.001)
(Sharma et al., 2020) India	- Nutritional counseling program designed for healthcare providers, addressing topics such as complementary feeding, hand hygiene, and responsive feeding. - Nutritional counseling sessions for mothers were conducted in two classes, emphasizing age-appropriate complementary feeding, the continuation of breastfeeding for up to 2 years, and the selection of suitable complementary foods and snacks for infants.	Direct education	190 mothers in the intervention group and 191 mothers in the control group	- Questionnaire for mother-infant dyad	Quasi-experimental	The proportion of infants using bottle feeding was significantly lower in the intervention group (35% compared to 47.6%, p < 0.04). A higher percentage of infants received complementary feeding timely in the intervention group (92.6% compared to 79.1%, p < 0.01). The percentage of infants consuming a diverse range of foods was also higher in the intervention group (83% compared to 61.8%, p < 0.01).

RESULT

Four databases were utilized, yielding 461 articles. After removing 55 duplicates, a total of 406 articles met the inclusion criteria. Subsequently, 114 articles were screened based on their titles and abstracts. Among them, 10 articles met the inclusion criteria and underwent quality assessment. All 10 articles, encompassing various study designs, were included in the analysis. Of these, one article employed a quasi-experimental design, another used an RCT and cohort design, and the rest utilized an RCT design.

The strength of the reviewed study lies in its longitudinal randomized controlled trial (RCT) design, involving multiple data collection points over a 0-12-month period, enabling the examination of social changes over time. The study boasts a high retention rate among respondents, robust follow-up procedures, a large-scale respondent pool, and the incorporation of innovative digital intervention methods and counseling. These attributes position the research as a commendable recommendation for widespread education on complementary feeding practices for breastfeeding infants. The findings contribute valuable insights into the dynamics of social changes, demonstrating the effectiveness of digital and counseling interventions on a larger scale and offering implications for public health initiatives and interventions.

On the flip side, the limitations of the reviewed study include the presence of research utilizing pre-post-study designs without incorporating control groups. Additionally, some studies measuring complementary feeding practices employ a 24-hour recall method reported by respondents themselves rather than through direct observation, thus introducing the potential for recall bias.

The sample sizes in the reported studies ranged from 110 to 1885 subjects, conducted in diverse geographical regions, including Indonesia, Bangladesh, China, India, Cambodia, Iran, and Brazil. These studies were carried out in multiple countries and met the inclusion criteria by providing a broader understanding of the research topic within various cultural and environmental contexts. Such diversity improves the generalizability of the findings and ensures that the results are not confined to a particular location or population. Four articles addressed digital education interventions utilizing smartphone applications, WeChat, WhatsApp, and digital aids. Five studies implemented direct education through face-to-face counseling, peer counseling, and home visits. Meanwhile, one study employed a combination of education, follow-up through home visits, and interactive voice calls.

The findings in intervention research with digital education are improvement in nutritional literacy, critical knowledge, feeding practices, and children's nutritional literacy (Seyyedi et al., 2020). Increased complementary feeding practices following IYCF recommendations were observed in the study conducted by Wu et al. (2023), while Billah et al. (2022) reported enhanced consumption of animal protein and dietary diversity. Additionally, Rachmah et al. (2023) reported increased maternal confidence in preparing complementary feeding.

The impacts of direct education included parental confidence in introducing meat at 6 months and awareness of the low nutritional value of soups and broths (Cândido et al., 2018), increased dietary diversity (Sharma et al., 2020; Young et al., 2021), improved acceptance of essential foods by children (Young et al., 2021b), reduced bottle-feeding, and timely introduction of complementary feeding (Owais et al., 2017; Sharma et al., 2020). Owais et al. (2017) and Yao et al. (2022) observed increased consumption of iron-rich foods, dietary diversity, and animal protein intake. Ara et al. (2019) also noted improved adherence to recommended feeding practices, including dietary diversity and animal protein intake.

DISCUSSION

One form of digital technology employed in educational efforts is the smartphone. The use of smartphones has proven effective in enhancing knowledge and behavior related to complementary feeding of breastfeeding infants and children. Findings from (Seyyedi et al., 2020) study revealed that the smartphone-based education group exhibited a higher level of knowledge compared to the direct intervention group. Furthermore, there was a notable enhancement in maternal nutritional literacy, critical knowledge, feeding attitudes, and nutrition practices concerning complementary feeding. Young et al. (2021) research further emphasized the effectiveness of smartphone use in education, demonstrating increased knowledge and practices in complementary feeding compared to

standard care methods, along with potential cost reduction and decreased direct exposure. In this study, cost reduction plays a crucial role in infant and child feeding education to enhance outreach and minimize the expenses incurred by volunteers in conducting educational activities.

Billah et al. (2022) study found that the use of digital technology, such as android-based software applications customized according to the age and needs of the child, to aid in scheduling and providing nutrition counseling by community health workers in nutrition counseling regarding a variety of complementary feeding was more effective compared to the control group, which received standard care and nutrition counseling for children at health facilities. It is attributed to the fact that in the implementation of counseling through digital applications, healthcare providers are equipped with tailored messages and age-appropriate educational content on complementary feeding that caters to the specific needs of the child.

The application of smartphone-based apps can enhance knowledge and practices in complementary feeding. A study conducted by Wu et al. (2023) revealed that an education program through WeChat, starting with a pre-intervention questionnaire aligned with WHO UNICEF's complementary feeding indicators, proved effective as the caregivers/parents received personalized feedback based on their questionnaire assessments. The WeChat-based educational intervention introduced a novel approach with a combination of self-assessment data collection. This individually designed intervention proved acceptable and beneficial in improving knowledge and behavioral changes in complementary feeding practices.

Another smartphone-based digital application proven effective in enhancing maternal knowledge and behaviors related to infant and child feeding is Whatsapp, as reported by Rachmah et al. (2023). Nutrition education through WhatsApp also increased mothers' confidence and behavior after 10 sessions of education through the application. The choice of WhatsApp was attributed to its ability to send text messages containing educational content. Several studies have indicated the usefulness of text messages, whether through short message service (SMS) or WhatsApp, in education delivery due to their convenience and personalized nature (Brown & Rowan, 2016; Gebremariam et al., 2020).

Apart from the use of digital technology, direct education also has a significant positive impact on infant and child feeding practices. Studies conducted by Cândido et al. (2018), Sharma et al. (2020), and Yao et al. (2022) highlighted the effectiveness of face-to-face education in improving knowledge, attitudes, and behaviors related to infant and child feeding. This method proves effective with a personalized intervention design tailored to the needs of the child. Another effective method of direct education is peer counseling, as demonstrated by (Owais et al., 2017).

This research is valuable for child health as it can be applied in child health services and public health with an approach aligned with current technology. However, there are some limitations to this study. Firstly, publication bias may occur as the findings only reflect data published in academic journals, excluding unpublished articles such as theses, dissertations, and proceedings. Additionally, the review only considered English-language articles published between 2013 and 2023, potentially excluding relevant studies.

CONCLUSION

This study focuses on the education of complementary feeding for infants and children. The findings suggested that digital-based education could be conducted through various technologies such as smartphones, tablets, WeChat, and Whatsapp applications. The research findings indicated that digital-based education emerged as one of the effective methods for enhancing knowledge and practices related to complementary feeding for infants and children. This method offered advantages in terms of cost-effectiveness, personalized interventions based on individual needs, and reduced direct exposure. On the other hand, direct education methods such as personal counseling, peer counseling, and home visits have also been proven effective in improving knowledge, attitudes, and practices related to complementary feeding for infants and children, given their

personalized nature tailored to the needs of mothers.

This research can serve as a guide for nurses embracing digital education as a potential solution in providing education on complementary feeding practices as recommended by WHO, taking into account cultural sensitivity and tailored education suited to the uniqueness of diverse populations. Nurses can develop digital content to educate internet-literate populations about complementary feeding practices, while for mother who require face-to-face interaction and hands-on practice, direct education methods can be developed. Future research opportunities related to this study include an in-depth examination of cultural factors that may influence the effectiveness of both digital and direct interventions, as well as the utilization of advanced digital technologies such as virtual reality (VR) or augmented reality (AR) in educating about complementary feeding practices.

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