REVIEW ARTICLE

Effects of early childhood growth and development interventions on children less than two years of age

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Abstract

The objective of this study was to determine the effects of early childhood growth and development interventions on children under two years of age. We used PubMed, Science Direct, Scopus, Springer Link, and Wiley to select studies that explored the effects of interventions on the growth and development of children under two years published growth from January 2015 to December 2023. The study used the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. We found 1235 articles, while 26 articles were analyzed thematically. The thematic areas included: impact of intervention, health services implemented, and growth and development of children under two years of age. The results show that providing early and comprehensive education, health and social services has an impact on the growth and development of children under two years of age. Further studies regarding the long-term impact and effectiveness of interventions designed to improve the growth and development of children under two years of age are required. *(Afr J Reprod Health 2024; 28 [10s]: 214-225).*

Keywords: Implementation; providers; early childhood; growth development; children under 2 years

Résumé

L'objectif de cette étude était de déterminer les effets des interventions sur la croissance et le développement de la petite enfance sur les enfants de moins de deux ans. Nous avons utilisé PubMed, Science Direct, Scopus, Springer Link et Wiley pour sélectionner des études explorant les effets des interventions sur la croissance et le développement des enfants de moins de deux ans, croissance publiée de janvier 2015 à décembre 2023. L'étude a utilisé le PRISMA (Preferred Reporting Éléments pour les examens systématiques et les méta-analyses). Nous avons trouvé 1 235 articles, tandis que 26 articles ont été analysés thématiquement. Les domaines thématiques comprenaient : l'impact de l'intervention, les services de santé mis en œuvre, ainsi que la croissance et le développement des enfants de moins de deux ans. Les résultats montrent que la fourniture de services éducatifs, sanitaires et sociaux précoces et complets a un impact sur la croissance et le développement des enfants de moins de deux ans. D'autres études concernant l'impact et l'efficacité à long terme des interventions conçues pour améliorer la croissance et le développement des enfants de moins de deux ans sont nécessaires. *(Afr J Reprod Health 2024; 28 [10s]: 214-225).*

Mots-clés: Mise en œuvre ; prestataires ; petite enfance; développement de la croissance; enfants de moins de 2 ans

Introduction

The period under 2 years old is very important for children because this is the time when children have the fastest growth and development. The World Health Organization (WHO), reports that 7.3% of children under 2 years old are malnourished; 5.9% are overweight; and 21.9% are stunted[1]. However, over 200 million children face the possibility of not reaching their maximum potential, and the majority of children who survive do not thrive[2, 3].

A key period for the development of different social-emotional skills is early childhood growth and development[4]. Growth and development are contextual, meaning that without the support of a specific and active nurturing environment, no child can grow and develop on their own[5]. Programs of coordination and quality of early childhood development differ widely and access in particular to those children less than 2 years of age is inadequate and uneven. In small and medium-sized countries, a staggering 250 million children, which

accounts for 43% of those below 2 years of age, face the threat not reach everything growth potential due to the harsh realities of poverty and stunting[6].

This highlights the need for approaches for improving the growth and development of children less than two years of age. Some of these activities include immunization, providing additional food for pregnant women and infants, monitoring the growth and development of children, administration of iron and folic tablet supplements to pregnant women, promotion of exclusive breastfeeding as well as the provision of additional nutrition in pregnant women. With respect to breast milk, it is to be noted that it is often of a short duration, and its impact can be witnessed within a relatively brief period. Multiple development initiatives beyond the healthcare domain are delicate interventions. The impact of interventional activities, if they are specifically planned and implemented correctly, will affect the development of children under 2 years old[7].

Some simple provider-led interventions during neonatal period: 0 to 27 days, include beginning exclusive breastfeeding at an early age, contact with the skin, and hand washing, have been shown to proven to significantly reduce mortality and morbidity rates in children under 5 years old[8]. The World Health Organization (WHO) and UNICEF developed an evidence-based intervention to support the provision of care for the growth and development of children under 5 years of age. Providing responsive care will have an impact on care practices, feeding, seeking care if sick, child stimulation, learning opportunities, and benefits for parents' mental health[9]. This objective of this review is to examine the effects of early childhood stimulation and development actions carried out by childcare providers in children aged less than 2 years.

Methods

The recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocol (PRISMA-P) were used for this study[10]. We conducted an electronic search using PubMed, ScienceDirect, Scopus, SpringerLink, and Wiley to select studies on intervention effects, and developmental growth in children under 2 years, and implemented by providers published from January 2015 to December 2023. For further citations, references from the included studies and relevant systematic reviews were examined.

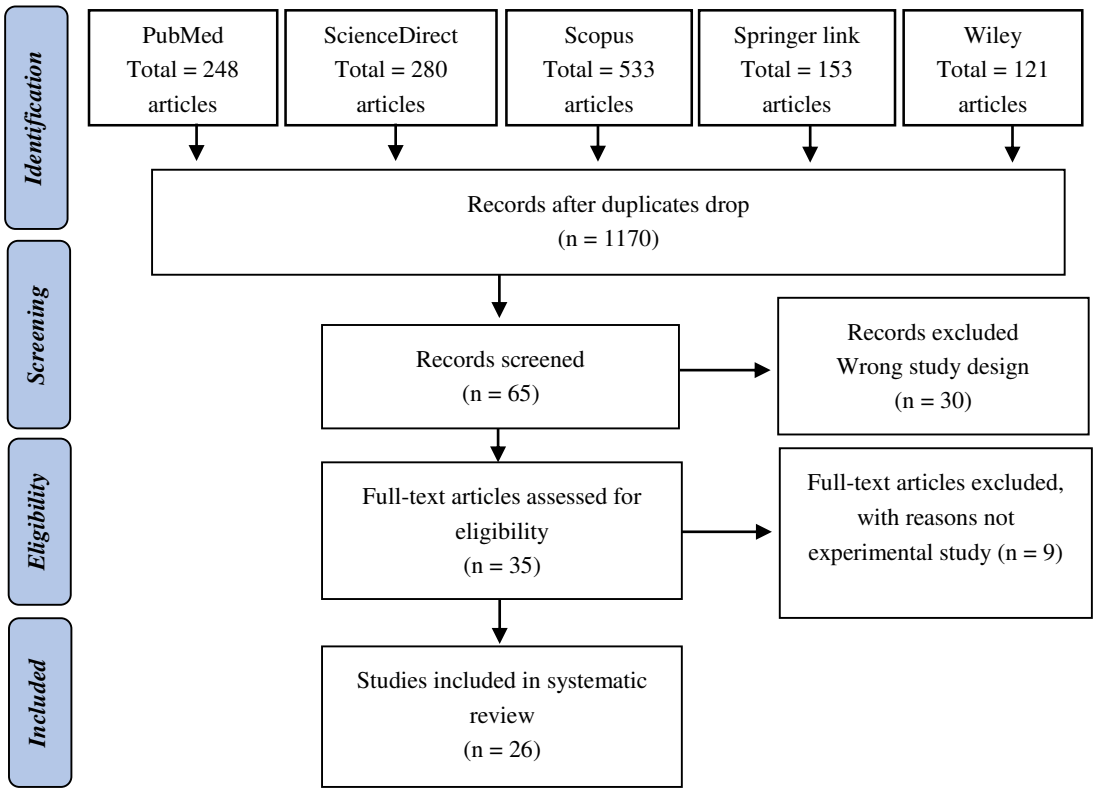

Figure 1: Flow diagram based on PRISMA guideline

Two review authors independently reviewed and extracted all title, abstract or full text articles. Any disagreement has been settled through discussions with the other author. The forms used are standardized, pretested form of data collection. Data collection included design, study setting, intervention components, the demographic profile of participants and results. Articles that are excluded from the category are the ones that are not published in any journal or are published in the form of a review.

According to the article search result with the keywords mentioned above showed that there were 280 articles retrieved from PubMed, 533 articles from Science Direct, 153 articles from Scopus, 121 articles from Springer Link, and 121 articles from Wiley. The subsequent stage involves reviewing the abstracts. After carefully reviewing the abstracts of the 1170 selected articles, 90 articles were excluded as they did not pertain to studies on growth and development. Sixty-five (65) articles were deemed suitable for the next step, which involved conducting a full-text review of each article. Out of the 35 articles selected for full-text retrieval, 9 articles were excluded due to their lack of experimental study methods. Among the 26 articles chosen to be included for analysis (Figure 1).

Results

Public health service stimulation interventions

Eight studies have demonstrated that interventions involving stimulation through public health services significantly enhance child development and care[17,19,21,23,28-30]. This stimulation intervention involves various forms of activities designed to stimulate aspects of child development, such as cognitive, motor and social-emotional skills. The results of these studies show that stimulation provided through public health services can have a significant positive impact on child development.

Complementary foods and growth

Three studies indicate that providing complementary foods in addition to breast milk can significantly improve linear growth and reduce stunting in children[12,25,26]. Providing complementary foods that suit children's nutritional needs can support optimal growth and reduce the risk of malnutrition which often leads to stunting. This emphasizes the importance of strategies for providing MPASI that are based on good nutritional guidelines and strict monitoring of child development.

Maternal nutrition education via smartphone

Two studies have shown that maternal nutrition education delivered through smartphone-based complementary breastfeeding (MPASI) programs is effective in reducing malnutrition among children under three years old in food-secure communities[17,26]. This technology-based nutrition education enables the delivery of relevant and timely information to mothers, and supports them in making better nutritional decisions. By utilizing easily accessible technology, this intervention can reach more mothers and improve their knowledge about proper complementary feeding.

Growth monitoring in home-based health services

Four studies demonstrate that growth monitoring interventions conducted in home-based health services positively impact children experiencing growth delays[13,14,29,35]. Home monitoring allows for more personalized monitoring and tailoring of interventions to suit the child's individual needs. It also helps in detecting growth problems early and providing prompt and appropriate interventions.

Innovative parenting interventions

Four studies suggest that innovative parenting interventions, which do not require additional clinic staff or extensive maternal time, can enhance children's cognitive development and parental knowledge[16, 18, 20, 36]. These interventions can take the form of programs that integrate parenting education and support into existing health services. By optimizing existing resources, these interventions can improve the quality of care without overburdening parents.

Nurturing care access

One study concluded that access to nurturing care provided through health services can significantly improve the growth and development of children under five[19]. Nurturing care involves an approach that supports the child's emotional and physical needs, as well as ensuring that they receive adequate attention and care for optimal development.

Table 1: Summary of selected studies

Study	Research topic	Methods	Results
Yousafzai *et al* (2016) [11]	Long-term follow-up of a randomized controlled trial evaluating the effect of active stimulation and nutrition interventions on the development and growth of children under 4 years of age in in the poor population in Pakistan.	community-based cluster-randomized effectiveness trial	Responsive incitement conveyed in a community well-being benefit can progress child improvement and care, two a long time after the conclusion of intercession. Future investigations of this information are required to distinguish Which over time is more advantageous for children and families.
Christian *et al* (2015) [12]	The effect of fortified supplementary food the growth of the baby in this age group in rural Bangladesh: a cluster randomized study	Cluster-randomized controlled trial	Little sums of everyday invigorated complementary nourishments, given for a year in expansion to nourishment directing, humbly expanded straight development and diminished hindering at 18 months of age.
Fink *et al* (2017) [13]	An open-label, cluster-randomized trial was conducted to test the effectiveness of home and community developmental screening in reducing developmental disability early in life	randomized controlled trial	Development observing incorporates a constrained impact on children's stature and advancement, despite enhancements in self-reported nourishing hones. home-based development observation had unassuming positive impacts on children with hindered development. Given its generally moo-fetched, this mediation expanding parental efforts to reduce the physical development gap of children may be a cost-effective instrument.
Martinez e ta *al* (2018) [14]	Effect of child and youth nutrition home based participatory play intervention in El Alto, Bolivia: a randomized trial amongst households with incomes below the poverty line	randomized controlled trial	Participatory play-based behaviour alter techniques are a promising nourishing show for making strides suggested newborn child and youthful child bolstering hones. The investigation comes about appeared a feasible positive effect on caregivers' information and progressed newborn child and child bolstering hones, but did not affect wholesome status
Rockers *et al* (2016) [15]	A cluster randomized control trial has been conducted in Zambia to assess the impact of a community intervention package on infant development.	Cluster-randomized controlled trial	The intervention bundle made strides in child-rearing behaviours and had a little positive, even though measurably inconsequential, effect on child improvement. Given brief time outline of the venture, a bigger formative effect is likely in case differential child-rearing behaviours continue.
Chang *et al* (2015) [16]	To evaluate the integration of parenting intervention with regular general medical care, a randomised cluster trial has been conducted	Cluster randomized trial	An innovative parenting intervention, which does not require additional clinical personnel or mothers' time have been included in medical care, it benefits children's cognitive development and parents' knowledge. That's a promising strategy that should be thoroughly evaluated for much larger scale.
Muhoozi *et al* (2018) [17]	A cluster randomised study was conducted in Uganda to evaluate the effects of nutrition, hygiene and stimulation training on growth, cognitive, language and motor development in infants	Cluster randomized trial	In Uganda, education interventions provided to mothers promoted the early stages of cognition, language and motor skills but did not support linear development for young children in poor rural communities. Our research shows that, through relatively inexpensive intervention strategies, children's development can be improved.

Luoto *et al* (2021) [18]	A group-based parenting intervention to promote child development in rural Kenya: a cluster-randomized multi-group community effectiveness trial	Cluster-randomized community effectiveness trial	An effective promotion of childhood development in poor, resource constrained environments and an ability to expand greatly can be achieved by the administration of parenting intervention through qualified community health workers within mother childcare groups.
Barnhart *et al* (2020) [19]	Home visits by lay workers promote early childhood development and reduce violence in Rwanda: a randomized trial	Cluster-randomized pilot study	Volunteers in the community can achieve Sugira Muryango, improve access to care and support for children living in poverty as well as reduce family conflicts. A major scale effectiveness study is ongoing to evaluate the effects of interventions on children's development and health.
Murray *et al* (2016) [20]	Randomized controlled trial of a home visiting intervention on infant cognitive development in Suburban South Africa	Randomized controlled trial	In addition to supporting attachment in children over 6 months of age, the inclusion of certain components for child cognition development could benefit parents' interventions with regard to infant cerebral development and increase its effectiveness. In case of extreme difficulties, they may need reinforcement from other sources.
Attanasio *et al* (2022) [21]	The effects of a scalable intervention on early stimulation and nutrition:	Cluster-Randomized Controlled Trial	We have shown that at a minimal cost and on the basis of government infrastructure, a Scalable Program could significantly affect child development in disadvantaged populations. Improving the quality of large-scale programmes in developing countries is an essential part of a policy instrument kit for fighting poverty.
Weisleder *et al* (2016)[22]	Fostering a culture of positive parenting and preventing social inequalities	randomized controlled trial	The effectiveness of the Video Interaction Project, a prevention intervention targeting parent-child interactions, improving social emotional outcomes for children living in poverty. The findings support expanding the paediatric parenting programs, such as interactive video projects designed for early social emotional risk prevention before school entry, given low costs and scale of primary care interventions.
Andrew *et a*l (2018)[23]	Cluster Randomized Controlled Trial Follow-up: 2 Years After a Scalable Early Childhood Development Intervention to Increase Psychosocial Stimulation at Home in Colombia	Cluster-Randomized Controlled Trial	There is no evidence that scalable psychosocial stimulation interventions benefit child development 2 years after completion. Both are likely to involve implementation trade-offs when scaling up and suggest that medium-term impact should not be extrapolated from small effectiveness trials to scale up interventions. Understanding the striking differences between small effectiveness trials and larger-scale versions will be essential for turning childhood development interventions into effective tools for policymakers
Kirkwood *et al* (2023) [24]	Effect of SPRING Home Visiting Intervention on Early Childhood Development and Growth in Rural India and Pakistan: A Parallel Cluster Randomized Controlled Trial	Cluster-Randomized Controlled Trial	To maximize the capacity and quality of interventions, programmes will need strategies to define a clear plan for planning visits, monitoring coverage and process indicators, identification and management of weak performers as well as setting out feedback loops in order to correct them. Sufficient attention is therefore needed for the determination of solid administration and system managements in order to support fast expansion.

Kumar *et al* (2021) [25]	Promoting the use of mHealth for early childhood development in Haryana: lessons learned from the implementation experience	Randomized Controlled Trial	In the intervention group, caregivers and service providers received, read, and acted on more text messages than in the control group. Malnutrition and wasting are increasing; Nevertheless, there was no significant reduction of stunting malnutrition rates in the intervention area were compared to both control groups. This is due to implementing all strategies in a complementary approach to mHealth usage. The adoption of SMS and telephone communication remains relevant because those who need it most are the poor and need the maximum integrated package of services to enhance equity and service coverage.
Seyyedi *et al* (2020) [26]	For mobile based training of mothers on supplementary feeding for malnutrition children less than 3 years old in a secure food community: A randomized trial in Urmia, Iran	Randomized Controlled Trial	We've concluded that the use of smartphones as a complementary source of maternal nutrition education is more efficient than traditional medical therapy in reducing the rate of malnutrition for children under 3 years in Food Security Communities.
Hamadani *et al* (2019) [27]	Integrating Bangladesh's early childhood development programme with Primary Health Care Services: Open Label, cluster randomized controlled trial	Cluster-randomized controlled trial	The scale and extent of the benefits resulting from our intervention are cause for encouragement. Most sessions have been conducted efficiently and with good participation by healthcare personnel, which promises to replicate the intervention model. However, the training and supervision of medical personnel is already being carried out by researchers; a further task will be to determine whether tasks can be carried out by the Ministry of Health Bangladesh's. More attention to children needs to be paid over the next programmes.
Galasso *et al* (2019)[28]	The effects of vitamin supplementation and house visits on the growth and development of children in Madagascar: a systematic randomised controlled trial	Cluster-randomized controlled trial	Lipid-based nutritional supplementation of 12-month-old infants only provides growth benefits when initiated at an early age, demonstrating the need for nutritional supplementation of In the context of income, infants from six months of age very low. It can be that there is a lack of uptake of behaviour change message early stimulation reminders and home visits are not effective and the implementation difficulties faced by community health workers.
Hartinger *et al* (2017) [29]	Child Stimulation Intervention and Early Development in Rural Peru: A Cluster Randomized Study with a Reciprocal Control Design.	Cluster-randomized controlled trial	ECD intervention at home effectively improved children's development in general in all domains and specifically by domain studied. A promising component of poverty reduction programmes aiming at improving the development prospects of rural Peruvian children may be home based strategies.
Helmizar *et a*l (2017)[30]	In Indonesia, linear growth and cognitive development in infants aged 6 to 9 months is improved through the use of nutrition supplements and psychotherapeutic stimulation.	Randomized Controlled Trial	Paediatric growth, cognitive development and motor development has been enhanced by combined intervention with local dietary supplementation and psychosocial stimulation.

Khan *et al* (2021) [31]	Prevention of development delays among Pakistani children at public health establishments: protocol for a cluster randomized controlled trial	Cluster Randomized Controlled Trial	The coordinated model of paediatric consideration in essential medical care can possibly give a feasible and economical model for further developing youngster improvement.
Khan *et al* (2018)[32]	Does early integrated paediatric growth and development care through private clinics have an effective effect? A randomized cluster study in Pakistan	Cluster Randomized Controlled Trial	Contextual early childhood development care, when delivered in the first 12 months of a child's life, general practitioner offices in poor urban environments may be able to significantly reduce developmental delays.
Kristensen *et al* (2020)[33]	What is the impact of supporting early care through newborn behavioural observation (NBO)? Cluster randomized trial.	Cluster Randomized Controlled Trial	The infant behavioural observation system provided in a general setting for all families in these areas does not affect a community setting. A greater level of maternal knowledge about early parenting in the intervention group was the only significant difference between groups.
Robling *et al* (2016)[34]	Effectiveness of home visiting program an intensive nurse-led for first-time teenage mothers (Building Blocks): a pragmatic randomized controlled trial	Pragmatic randomized controlled trial	There was no additional short-term advantage to our key outcomes with the addition of a family nurse partnership into an existing health and social care service. The continuation of the programme based on available evidence is not justified and can be reassessed where it becomes more likely that there will be longer term supportive evidence.
Sawyer *et al* (2017)[35]	A non-inferiority, randomized, controlled trial of internet-based support for new mothers moderated by nurses	Randomized Controlled Trial	The outcomes of the postpartum clinic-based health screening and nurse moderate online support were no inferior to that of a universal home care programme for mothers and children. Postpartum support for mothers and new-borns a promising alternative to universal home-based support programmes is via internet
Shi *et al* (2020)[36]	The effectiveness and cost efficiency of family intervention in the context of primary healthcare for Early Childhood Development: Cluster randomised controlled study	Cluster-Randomized Controlled Trial	The results suggest that it is economically feasible to improve the development of young children by integrating parenting interventions with existing primary health care.

Integrated child care and primary health care

Two studies reveal that integrating child care with primary health care can create an effective and sustainable system for enhancing children's development[31,32,37]. This integration allows for better coordination between health and child care services, ensuring that children receive holistic and continuous care.

Public health service stimulation interventions

Eight studies have demonstrated that interventions involving stimulation through public health services significantly enhance child development and care[17,19,21,23,28-30]. This stimulation intervention involves various forms of activities designed to stimulate aspects of child development, such as cognitive, motor and social-emotional skills. The results of these studies show that stimulation provided through public health services can have a significant positive impact on child development.

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Discussion

Public health service stimulation interventions

The evidence from eight studies indicates that stimulation interventions provided through public health services substantially benefit child development and care[17,19,21,23,28-30].

These interventions, which include activities aimed at enhancing cognitive, motor, and social-emotional skills, demonstrate significant improvements in child developmental outcomes. This aligns with findings that suggest early stimulation through public health services can offer crucial support during the formative years, thus promoting more robust developmental trajectories[17]. Further research highlights the effectiveness of such programs in diverse settings, reinforcing their value in comprehensive child care strategies[19, 21].

Complementary foods and growth

The findings from three studies underscore the role of complementary foods in improving linear growth and reducing stunting in children[12,25,26]. This evidence supports the notion that well-chosen complementary foods can address nutritional gaps and prevent malnutrition-related growth issues. Effective complementary feeding strategies that adhere to nutritional guidelines are critical in achieving optimal growth and mitigating the risks associated with stunting[12]. The importance of tailored nutritional interventions is emphasized by these studies, highlighting the need for careful monitoring and adherence to dietary recommendations[25, 26].

Maternal nutrition education via smartphone

Two studies show that maternal nutrition education delivered through smartphone-based programs is effective in reducing malnutrition among children under three years old in food-secure communities[17,26]. This approach leverages technology to provide timely and relevant information, thereby empowering mothers to make informed nutritional choices. Smartphone-based interventions facilitate widespread dissemination of educational resources and can reach a larger population, enhancing the overall effectiveness of maternal nutrition programs[17]. The integration of technology into nutrition education offers a practical solution for improving maternal and child health outcomes[26].

Growth monitoring in home-based health services

The positive impact of growth monitoring interventions conducted through home-based health services is evidenced by four studies[13,14,29,35]. These interventions allow for individualized monitoring and intervention, which can be crucial in addressing growth delays early. Personalized care, facilitated by home-based services, enables timely adjustments to treatment plans based on the child's specific needs[13]. Early detection and intervention provided through these programs contribute significantly to better growth outcomes and overall child development[14, 29, 35].

Innovative parenting interventions

Four studies suggest that innovative parenting interventions, which optimize existing resources without requiring extensive additional support, effectively enhance children's cognitive development and parental knowledge[16,18,20,36]. These programs often integrate educational components into existing health services, maximizing resource utilization and reducing the burden on parents. Such approaches demonstrate that it is possible to achieve significant improvements in parenting and child development without necessitating large-scale changes to existing systems[16]. By enhancing parental support through innovative means, these interventions contribute to better developmental outcomes for children[18,20,36].

Nurturing care access

One study highlights that access to nurturing care through health services significantly improves the growth and development of children under five[19]. Nurturing care encompasses an approach that addresses both emotional and physical needs, ensuring comprehensive support for children's development. This study emphasizes the importance of integrating nurturing care principles into health services to promote optimal child development outcomes[19].

Integrated child care and primary health care

The integration of child care with primary health care has been shown to create effective and sustainable systems for enhancing children's development, as evidenced by two studies[31,32, 37]. This integration facilitates better coordination between health and child care services, providing a holistic approach to child development. Such systems ensure continuous and comprehensive care,

which is crucial for supporting children's overall growth and development[31,32]. By merging these services, it is possible to achieve a more cohesive and effective care model that addresses various aspects of child well-being[37].

Conclusions

The identified studies show that providing early and comprehensive education, health and social services, complementary food with breastfeeding, maternal nutrition education through smartphone-based complementary breastfeeding, monitoring growth and development in home-based health services for mothers, innovative childcare interventions integrated into health services, access to care provided by the service health, and child care models integrated into primary health care has an impact on the growth and development of children less than 2 years old. We found interventions such as responsive stimulation provided in health services can improve the growth and development of children less than 2 years old. Further studies regarding the long-term impact of effectiveness growth and development of children less than 2 years old.

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Authors contribution

Rahma Kusuma Dewi and Sri Sumarmi: conceptualized and designed the study. Rahma Kusuma Dewi: collected and analysed the data. Irwanto: reviewed empirical studies. Sri Sumarmi: designed the methodology. Dewi Retno Suminar: wrote the introduction and edited the paper.

Competing interests

The authors declare that they have no competing interests.

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