



Effectiveness of communication pathways and educational media in promoting nutrition-related behavioral change among mothers of toddlers: A systematic review

Efektivitas jalur komunikasi dan media edukasi dalam mendorong perubahan perilaku terkait gizi pada ibu yang memiliki balita: Suatu tinjauan sistematis

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Abstract

Stunting remains a major public health problem in many developing countries, primarily due to inadequate nutrition. Nutrition education has been widely implemented; however, comparative evidence on the effectiveness of different communication pathways and educational media in promoting sustained maternal behavioral change remains limited. This study aimed to analyze the effectiveness of communication pathways and educational media in supporting behavior changes related to toddler nutrition. Studies were identified using the PICO framework through searches in PubMed and Scopus, following PRISMA guidelines. The inclusion criteria were open-access articles published between 2020 and 2025 that assessed behavioral outcomes and evaluated communication pathways or educational media. The methodological quality was assessed using the Joanna Briggs Institute (JBI) critical appraisal tools. Of the 2,500 articles identified, 14 studies met the inclusion criteria. The results indicate that interpersonal communication provides the most consistent evidence to support sustained nutrition-related behavioral change through personalized two-way interactions. Community and mass communication pathways mainly improve awareness and attitudes, with less consistent effects on long-term behavior. Educational media, particularly video-based media, enhance engagement and comprehension but are most effective when integrated into interactive communication pathways. Combining communication pathways with educational media appears to be the most effective approach for improving maternal feeding practices.

Keywords: Communication pathways, educational media, feeding practices, mothers of toddlers.

Abstrak

Stunting masih menjadi masalah kesehatan masyarakat di beberapa negara berkembang, terutama disebabkan asupan yang tidak adekuat. Edukasi gizi telah banyak diterapkan, namun bukti yang membandingkan efektivitas jalur komunikasi dan media edukasi dalam mendukung perubahan perilaku ibu secara berkelanjutan masih terbatas. Studi ini bertujuan untuk menganalisis efektivitas jalur komunikasi dan media edukasi dalam mendukung perubahan perilaku terkait gizi pada ibu balita. Artikel diidentifikasi menggunakan kerangka PICO pada PubMed dan Scopus, mengikuti pedoman PRISMA, Kriteria inklusi meliputi artikel *open-access* yang dipublikasikan pada 2020–2025 dan mengevaluasi perubahan perilaku, serta mengkaji efektivitas jalur komunikasi dan media edukasi. Penilaian kualitas metodologis studi dilakukan menggunakan instrumen appraisal dari Joanna Briggs Institute (JBI). Dari 2.500 artikel yang teridentifikasi, sebanyak 14 artikel memenuhi kriteria inklusi. Hasil menunjukkan jalur komunikasi interpersonal paling konsisten dalam mendukung perubahan perilaku gizi yang berkelanjutan melalui interaksi dua arah. Jalur komunikasi komunitas dan media massa

berperan dalam meningkatkan pengetahuan, sikap, dan norma sosial, namun menunjukkan dampak yang lebih bervariasi terhadap perubahan perilaku jangka panjang. Media edukasi berbasis video efektif apabila diintegrasikan dalam jalur komunikasi yang interaktif. Kombinasi antara jalur komunikasi dan media edukasi terbukti efektif dalam meningkatkan perilaku pemberian makan pada ibu balita

Kata Kunci: Jalur komunikasi, media edukasi, praktik makan, ibu balita.

Introduction

Stunting remains a public health concern in several developing countries, such as Indonesia. In Indonesia, the prevalence of stunting among toddlers is 15.8% (Kementerian Kesehatan Badan Kebijakan Pembangunan Kesehatan, 2023), demonstrating that this issue continues to pose a significant challenge to child health and development. Childhood stunting, characterized by reduced height for age, reflects chronic undernutrition and remains a significant public health issue in many developing nations (Bhutta et al., 2020). Beyond the impairment of physical growth, stunting also affects cognitive development, contributing to delayed learning, reduced academic performance, and lower productivity in adulthood (Mangunsong 2025).

These long-term consequences highlight that stunting is not only a health problem but also a socioeconomic concern, as it may reduce work productivity and ultimately hinder economic growth, while increasing poverty levels within a country (Suryana & Azis, 2023). However, despite the substantial burden and long-term consequences of stunting, effective intervention strategies, particularly those addressing maternal feeding behaviors, remain a critical area for further evidence synthesis.

One of the key determinants of stunting is inadequate nutrition during infancy and early childhood, which is strongly influenced by maternal feeding practice. Limited knowledge and poor feeding practices among mothers often lead to insufficient dietary intake in toddlers (Fauziah et al., 2023). Mothers who lack proper education on balanced diets, food diversity, feeding frequency, and appropriate portion sizes may unintentionally provide meals that are inadequate in terms of both quantity and quality. Addressing these challenges requires strengthening mothers' understanding of nutrition to ensure the provision of appropriate and adequate food. One intervention to improve toddlers' dietary intake is providing nutrition education to enhance maternal nutrition knowledge, which can help promote healthier

feeding practices (Perdana et al., 2017). Education equips mothers with the necessary skills and information to make informed decisions about their children's diets, potentially preventing undernutrition in their children.

Nutrition education has been widely implemented as a strategy to improve maternal knowledge and feeding practices in developing countries. However, increasing knowledge alone does not necessarily lead to sustained behavioral changes (Heikkilä et al., 2019; (Al Rahmad et al., 2025). Communication pathways, such as interpersonal communication, community-based approaches, and mass media, play a crucial role in reinforcing and sustaining behavior change through interactive and tailored message delivery (Nancy & Dongre, 2021).. Effective communication plays a key role in shaping maternal attitudes, increasing awareness, and motivating behavioral changes. Research has shown that communication approaches can successfully promote positive practices, such as the initiation and continuation of breastfeeding and the timely introduction of complementary foods (Dhawan et al., 2020). This highlights the importance of designing communication interventions that are clear, culturally appropriate, and capable of consistently engaging mothers.

Educational media provide an additional avenue for improving mothers' nutrition-related knowledge and practices. Various media formats, including videos, flipcharts, posters, leaflets, and booklets, have been used to support maternal learning and promote recommended feeding practices (Arikpo et al., 2018; Rahmad & Shavira, 2024). Research in developing nations has shown that educational media can effectively improve maternal knowledge and practices related to child feeding and healthcare utilization (Vaivada et al., 2020). The media allows repeated exposure to recommended practices, increasing the likelihood of adoption and long-term retention (Morgado et al., 2024).

Combining effective communication pathways with appropriate educational media provides a comprehensive strategy for

improving maternal feeding behaviors. The novelty of this review lies in its specific focus on comparing communication pathways and educational media that are most effective in promoting and sustaining long-term behavioral change, rather than merely assessing short-term improvements in knowledge. Through this approach, the review offers a clearer and more directed understanding of the communication strategies and educational media that can be applied in stunting prevention programs. This focus is particularly relevant in communities where knowledge gaps, limited access to health information, and resource constraints hinder optimal child feeding practices.

Methods

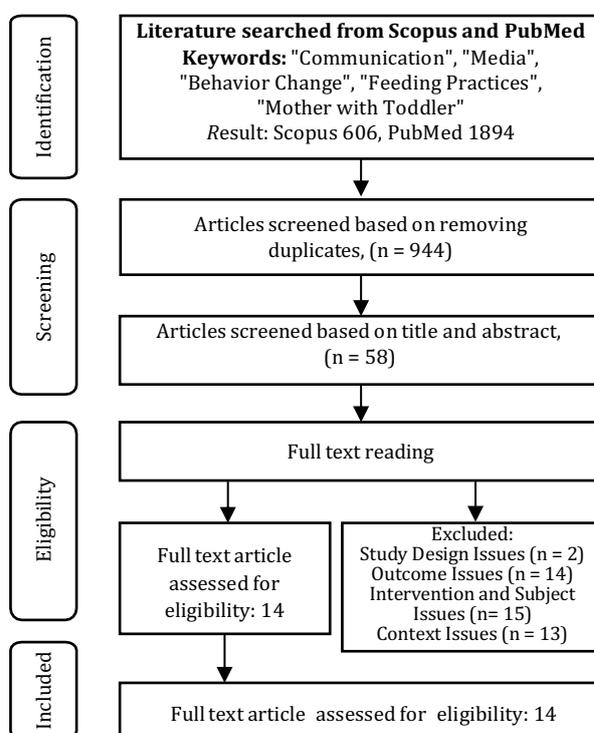
This study employed a systematic literature review according to the PRISMA 2020 guidelines. A systematic review approach was chosen to comprehensively identify, appraise, and synthesize evidence on the effectiveness of communication pathways and educational media in promoting nutrition-related behavioral changes among mothers of toddlers.

A literature search was conducted using the PubMed and Scopus databases. The search strategy was developed based on the PICO framework, where the population (P) was mothers of toddlers, the intervention (I) involved communication pathways and educational media, the comparison (C) examined differences across types of communication pathways and educational media, and the outcome (O) focused on changes in nutrition-related behavior. Boolean operators were used to combine keywords such as communication, educational media, behavior change, feeding practices, and mothers of toddlers. The inclusion criteria were studies published between 2020 and 2025, open-access full-text articles assessing behavioral outcomes, and studies examining the effectiveness of communication pathways and educational media. The exclusion criteria were studies focusing solely on knowledge, using only a single intervention component, or lacking full-text access.

Nutrition-related behavioral change was operationalized using measurable behavioral indicators, including feeding practices (e.g., breastfeeding initiation and continuation, complementary feeding practices), dietary diversity, meal frequency, and the sustainability

of recommended behaviors over time. This operationalization enables consistent comparisons of behavioral outcomes across studies with heterogeneous designs and contexts. Study selection followed the PRISMA 2020 flow process, including identification, screening, eligibility assessment, and final inclusion of studies. Duplicate records were removed prior to the title and abstract screening. Full-text articles were subsequently assessed using the predefined eligibility criteria. Any discrepancies during the selection process were resolved through discussion to reach a consensus, resulting in 14 eligible articles, as depicted in the PRISMA flowchart.

Data were extracted using a structured table capturing study design, intervention type, population characteristics, and behavioral outcomes. Study quality was appraised using the Joanna Briggs Institute (JBI) Critical Appraisal Tools. The results of the quality appraisal were considered during the interpretation of the findings to ensure that the conclusions reflected the strength of the available evidence. A narrative thematic synthesis was then conducted to compare communication pathways, types of educational media, and their effectiveness in supporting long-term nutrition-related behavioral changes among mothers of toddlers.



Picture 1. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow chart

Result and Discussion

This review synthesizes the findings of 14 studies examining the effectiveness of communication pathways and educational media in promoting nutrition-related behavioral changes among mothers of toddlers. Rather than

reporting each study separately, the results are organized thematically based on communication pathways, educational media types, and the strength of evidence, with greater interpretive weight given to studies assessed as having moderate to high methodological quality using the JBI appraisal tools.

Table 1. Summary of studies on communication pathway and educational media that can support behavioral change

Author	Study Design	Intervention		Main Finding
		Communication	Media	
Fahmida et al. (2020)	Cluster randomized cohort trial with 692 mother-child pairs followed from late pregnancy to 18 months postpartum; 346 in the intervention group and 345 in the control group.	Community, mass media (National television campaign)	Video	<ul style="list-style-type: none"> - Dietary diversity improved significantly ($p < 0.05$) in the 6–8 months age group. - Dietary diversity improved significantly ($p = 0.000$) in the 9–11 and 16–18 months age groups. - Acceptable diet significantly ($p = 0.000$) higher in the 9–11 months and 16–18 months age groups.
Soofi et al. (2024)	Quasi-experimental pre-post study with control group in intervention and control districts; baseline and endline household surveys conducted; over 6000 households were surveyed.	Community, interpersonal (face to face)	Flipchart	<ul style="list-style-type: none"> - There was a significant reduction in stunting ($-p = 0.041$). - There was a significant reduction in the number of underweight patients ($p = 0.028$). - Reduction in wasting but no significant change $p = 0.315$
Admasu et al. (2022)	Cluster randomized, parallel-group, single-blinded trial with 310 pregnant women; intervention group ($n=155$), control group ($n=155$).	Community	Poster	<ul style="list-style-type: none"> - The increase in initiating breastfeeding within 1 h was significant ($p = 0.022$). - Exclusive breastfeeding practice ($p = 0.015$).
Titaley et al. (2022)	Cluster-randomized controlled trial with 5175 mothers of children aged 0–23 months; intervention and comparison groups from 12 subdistricts.	Interpersonal (face to face and text messages), mass media (TV commercial)	Flipchart, leaflet, poster	<ul style="list-style-type: none"> - Exclusive breastfeeding under 6 months increases significantly (adjusted OR=1.85; 95% CI: 1.35–2.53). - Prolacteal feeding significantly reduced (adjusted OR=0.52; 95% CI: 0.41–0.65). - No significant differences were observed in early breastfeeding initiation. continued breastfeeding beyond 12 months. or predominant breastfeeding.

Ninamou et al. (2022)	Quasi-experimental design with 300 mothers of infants under 6 months: Intervention group (n=150) and control group (n=150).	Community	Poster	<ul style="list-style-type: none"> - The proportion of mothers who administered water to infants under 6 months significantly decreased ($p < 0.001$). - Exclusive breastfeeding rates increased significantly ($p < 0.001$).
Hu et al. (2020)	A randomized controlled trial with 346 women who underwent cesarean section was conducted. The intervention group (n=173) received HBM-based education, while the control group (n=173) received conventional breastfeeding guidance.	Interpersonal (face to face), mass media (WeChat group)	Video, leaflet	<ul style="list-style-type: none"> - Breastfeeding knowledge significantly improved ($p < 0.001$). - Exclusive breastfeeding rates were higher in the intervention group at discharge ($P < 0.05$).
Wen et al. (2020)	Three-group randomized clinical trial with 1155 pregnant women: telephone support group (n=386), SMS support group (n=384), and control group (n=385).	Interpersonal (telephone)	Booklet	<ul style="list-style-type: none"> - Telephone support significantly increased the timely introduction of solid foods at 6 months ($p < 0.05$). - No interventions significantly changed the breastfeeding rates ($p > 0.005$).
Tizvir et al. (2024)	A randomized controlled trial with 230 mothers was conducted. The intervention group (n=115) received peer education and optional social network education, while the control group (n=115) received usual care.	Community, interpersonal (SMS messages), mass media (telegram group)	Video, leaflet, poster	<ul style="list-style-type: none"> - Attitudes, subjective norms, and perceived behavioral control related to breastfeeding continued improved significantly at 3 and 6 months ($p < 0.001$). - Reduced mixed feeding behavior ($p < 0.001$). - Breastfeeding continuation behavior improved in the intervention group but was not statistically significant ($p > 0.05$).
Kimani-Murage et al. (2021)	Community-based cluster randomized controlled trial with 823 pregnant women: Intervention group (n=351) and control group (n=472).	Interpersonal (face to face), community	Leaflet, poster	<ul style="list-style-type: none"> - Exclusive breastfeeding rates at 6 months were significantly higher ($p < 0.05$). - Exclusively breastfed infants were breastfed for an average of 0.62 months longer than the controls ($p < 0.001$).
Bueno-Gutiérrez et al.	This randomized controlled pilot trial included mothers of	Interpersonal (face to face), community	Leaflet, poster	<ul style="list-style-type: none"> - Interpersonal breastfeeding counseling significantly increased exclusive

(2021)	infants under 4 months of age. The intervention group (n=40) received breastfeeding counseling, the while control group (n=40) received standard counseling.			breastfeeding rates at 2 months postpartum (p=0.0001).
Hitachi et al. (2020)	Cluster-randomized trial with 662 caregiver-child pairs; the intervention group (n=323) received tailored nutrition education plus follow-up visits, the while control group (n=339) received no education.	Interpersonal (face to face), community	Booklet	<ul style="list-style-type: none"> - There was a significant increase in the dietary diversity scores p < 0.01) compared to the control group. - There was a significant increase in attitude scores toward recommended feeding (p < 0.01) compared to the controls.
Teshome et al. (2020)	A cluster-randomized trial involving 772 mother-child pairs was conducted. The intervention group (n=386) received pulse-focused nutrition education, while the control group (n=386) received routine health education.	Interpersonal (face to face), community	Poster	<ul style="list-style-type: none"> - Significant improvements in knowledge, attitudes, and practices regarding pulses (p < 0.001). - Better anthropometric outcomes, including lower rates of stunting (p = 0.02), wasting (p = 0.001), and underweight (p = 0.001) compared to controls.
Eluri et al. (2022)	This was a single-blind parallel randomized controlled trial with 120 primigravida women: intervention group (n=60) and control group (n=60).	Community	Flipchart	<ul style="list-style-type: none"> - Significant improvements in exclusive breastfeeding at 6 months (p < 0.001).
Puharić et al. (2020)	This was a single-center randomized controlled trial with three groups: intervention (n=129), active control (n=103), and standard care (n=123).	Interpersonal (telephone)	Booklet	<ul style="list-style-type: none"> - Exclusive breastfeeding at 3 months was highest in the intervention group (81%), 68% the active control, and 47% (and standard care). - Exclusive breastfeeding at 6 months was highest in the intervention group (64%), 16% the active control, and 3% (and standard care).

Communication Pathway

Various communication pathways can be used to improve the nutritional behavior of mothers of toddlers, such as interpersonal, community, and mass media communication. Across studies, interpersonal communication demonstrated the

strongest and most consistent evidence in supporting sustained nutrition-related behavioral change, particularly for exclusive breastfeeding and complementary feeding practices. Evidence from moderate-to high-quality randomized and cluster trials suggests

that two-way, personalized interactions delivered through face-to-face counseling or structured telephone support enable mothers to address individual barriers, enhance self-efficacy, and sustain behavior over time (Bueno-Gutiérrez et al., 2021; Kimani-Murage et al., 2021; Puharić et al., 2020; Soofi et al., 2024).

These findings suggest that the effectiveness of nutrition-related behavior change interventions depends not only on the delivery of information but also on the depth of interaction and relational support provided to mothers. Sustained behavioral change appears more likely when mothers are actively engaged through dialogic and personalized communication rather than through passive exposure to health messages. In contrast, one-way or low-intensity communication (e.g., brief SMS reminders) showed weaker or inconsistent effects, highlighting the importance of interaction depth and responsiveness (Tizvir et al., 2024; Wen et al., 2020). This pattern indicates that limited opportunities for feedback and clarification may reduce the capacity of low-intensity communication to address individual concerns and contextual barriers, thereby constraining its effectiveness in supporting long-term behavioral changes.

Interpersonal communication facilitates these mechanisms by allowing mothers to observe recommended practices, receive personalized feedback, and build confidence in their ability to implement appropriate feeding behaviors in their children. The effectiveness of interpersonal communication in supporting sustained nutrition-related behavior change can be explained through the Behavior Change Communication (BCC) approach, which emphasizes personalized interaction, problem-solving, and reinforcement as core mechanisms of change. Interpersonal communication in behavior change communication (BCC) for maternal and child feeding is characterized by interactive, two-way dialogue in which health workers not only deliver information but also listen, respond to, and provide feedback tailored to each caregiver's needs. This interactive counselling model enables caregivers to reflect on their practices, ask questions, and receive personalized support and encouragement, which enhances their motivation and confidence to adopt the recommended feeding behaviors. Evidence from large-scale nutrition programmes shows that intensified interpersonal counselling delivered through repeated contacts with

trained frontline workers significantly contributed to improvements in breastfeeding and complementary feeding practices beyond what was achieved by one-way information alone, demonstrating the value of two-way interpersonal engagement in promoting sustained behavior change (Barnett et al., 2022; Menon et al., 2016). These findings underscore that BCC interpersonal communication functions not only as education but also as an iterative feedback process, facilitating responsive support that adapts to caregivers' circumstances and readiness to change.

In contrast, studies integrating interpersonal communication with community-based approaches consistently reported improvements in breastfeeding practices, dietary diversity, and, in some cases, anthropometric outcomes. These findings suggest that social support and normative reinforcement at the community level enhance the effectiveness of individualized counseling (Hitachi et al., 2020; Soofi et al., 2024; Teshome et al., 2020). These findings indicate that community-level social support and normative reinforcement can amplify the impact of individualized counseling by shaping shared expectations and collective motivation around recommended feeding practices.

Community communication pathways also play a significant role in promoting positive changes in maternal and child nutrition behaviors, including improvements in the early initiation of breastfeeding and exclusive breastfeeding practices (Admasu et al., 2022; Eluri et al., 2022; Ninamou et al., 2022). This suggests that leveraging familiar community structures may enhance message relevance and acceptability; however, the effectiveness of community communication is likely contingent on the level of community engagement and the ability to ensure equitable message reach. From the (SCT) perspective, community-based communication contributes to nutrition-related behavior change by creating a social environment that facilitates interaction, observational learning, and reinforcement. The findings of this review suggest that the formation of community support groups can strengthen healthy feeding behaviors by enabling mothers to learn from peers, observe recommended practices in real-life contexts, and receive social encouragement. Through repeated group interactions, shared experiences, and

collective problem-solving, mothers may gradually develop greater confidence in their ability to implement appropriate feeding practices in their infants.

However, the effectiveness of community-based approaches often requires a longer implementation period, as sustained behavior change depends on continuous social interaction, trust-building among group members, and consistent support from the surrounding community (Savage et al., 2017). SCT can assist in enhancing mothers' comprehension of the significance of nutrition by influencing attitudes, social norms, and behaviors through social support. SCT is based on social learning and incremental behavioral modification, which may result in a longer timeframe for observable changes.

Mass media communication, particularly when combined with interpersonal strategies, contributes to improved reach and reinforcement of key messages; however, its independent effect on sustained behavior change is generally weaker than that of interpersonal approaches (Fahmida et al., 2020; Hu et al., 2020; Titaley et al., 2022). This pattern indicates that while mass media is effective for broad dissemination and message reinforcement, it may lack the interpersonal engagement required to address individual barriers and sustain complex behavior changes when used as a stand-alone strategy.

In contrast, studies employing combined community and mass media communication demonstrated improvements in selected nutrition-related outcomes, particularly dietary diversity and psychosocial determinants of behavior. For example, a national television-based campaign integrated with community engagement significantly improved dietary diversity among children aged 6–18 months, although the magnitude of the effect varied across age groups (Fahmida et al., 2020). These findings suggest that mass media, when reinforced through community-level exposure, may enhance awareness and recall of recommended practices, thereby supporting the early stages of behavior change.

Similarly, interventions combining community communication, interpersonal messaging, and mass media platforms improved maternal attitudes and subjective norms related to breastfeeding continuation; however, these

changes did not consistently translate into sustained breastfeeding behaviors (Tizvir et al., 2024). This pattern indicates that while multichannel communication strategies are effective in shaping psychosocial determinants, additional reinforcing factors, such as family involvement and household-level support, may be required to convert attitudinal change into long-term behavioral maintenance.

Behavioral changes associated with mass media communication can be primarily interpreted through the Health Belief Model (HBM), as exposure to health messages through mass media increases awareness, perceived susceptibility, perceived severity, and cues to action related to recommended health behaviors (Jones et al. 2015). Mass media communication is effective in shaping the cognitive determinants of behavior by broadly disseminating information about health risks and benefits. However, because mass media communication is predominantly one-way, it provides limited opportunities for feedback and personalized support, which may restrict the development of self-efficacy needed to sustain behavior change over time. This helps explain why mass media interventions often demonstrate stronger effects on knowledge, attitudes, and intentions than on long-term behavioral maintenance. Consistent with the Behavior Change Communication perspective, mass media is most effective when integrated with interactive communication pathways, such as interpersonal or community-based approaches, that provide reinforcement, social support, and opportunities to translate increased awareness into sustained behavioral practices.

Media

Various educational media, such as flipcharts, posters, leaflets, videos, and booklets, have enhanced maternal knowledge and influenced nutritional behaviors.

Flipcharts in nutrition education for mothers of toddlers effectively support behavior change regarding nutrition in mothers with toddlers. Soofi et al. (2024) employed flipchart media, which resulted in a significant reduction in stunting ($p = 0,041$) and underweight ($p = 0,028$). Similarly, Eluri et al. (2022) used a flipchart in their intervention, leading to significant improvements in exclusive

breastfeeding rates at 6 months in the intervention compared to the control group ($p < 0,001$), which continued for six months after the intervention. Eluri et al. (2022) highlighted that flipcharts effectively visualize complex information, allowing mothers from various educational backgrounds to understand what may be difficult to explain in words, although flipcharts are less interactive than other media, such as videos. Soofi et al. (2024) integrated flipcharts with community-based behavior change communication (SBCC) strategies, which showed that the use of flipcharts supported key messages in the community and was flexible in individual and community education. However, its effectiveness was influenced by delivery quality, material reinforcement by facilitators, and management of exposure to educational messages in research and program settings.

Posters can be used as educational media to convey nutritional messages. Teshome et al. (2020) employed posters, which resulted in significant improvements in knowledge, attitudes, and practices regarding pulse consumption, dietary diversity, and anthropometric outcomes, including lower rates of stunting. Similarly, Admasu et al. (2022) employed posters in their intervention, leading to a significant increase in early breastfeeding initiation within the first and exclusive breastfeeding rates. Furthermore, Ninamou et al. (2022) used posters to reduce the proportion of mothers who gave water to infants under 6 months, with exclusive breastfeeding rates increasing from 24% to 54%. Teshome et al. (2020) reported that the posters used were culturally adapted and visually understandable. Similarly, Admasu et al. (2022) stated that posters were used as visual aids to reinforce the material taught through direct discussion. Ninamou et al. (2022) used large-sized (A2) colored posters to convey messages so that the messages. Posters can bridge literacy barriers. However, their effectiveness depends heavily on the quality of educational facilitation and the suitability of the visual content to the local cultural context.

The use of booklets as nutritional educational media has proven effective in supporting behavioral changes related to nutrition. Hitachi et al. (2020) used booklets, leading to significant improvements in dietary diversity and attitudes toward recommended feeding practices. Puharić et al. (2020) also

employed booklets in their intervention, which resulted in higher exclusive breastfeeding rates at 3 months (81%) and 6 months (64%) compared to the control groups (16% and 3%, respectively). Another study showed that the booklet did not significantly change breastfeeding rates, but significantly increased the timely introduction of solid foods at 6 months (48% vs. 35%) (Wen et al., 2020). Studies by Wen et al. (2020) point out that booklets are an effective educational media for providing more detailed information because booklets contain more comprehensive information than leaflets, and mothers can refer to them repeatedly for a deeper understanding, but booklets require more time to read and comprehend. The advantages of the booklet in the study by Puharić et al. (2020) were its simple presentation, use of relevant illustrations, and content that had been tested in advance so that it was easy for mothers to understand. In contrast, Hitachi et al. (2020) developed a booklet that was contextually adapted to the local culture and equipped with visuals. The booklet was then delivered through nutrition counseling, showing the challenge of measuring how often it was read. This comparison indicates that booklets are effective when used in a structured and contextual manner, especially when accompanied by direct interaction. However, long-term effectiveness still depends on exposure and reinforcement.

Fahmida et al. (2020) used video as part of a mass media strategy to improve dietary diversity, result showing significant improvements dietary diversity in the 6–8 months age group, as well as in the 9–11 and 16–18 months age groups. Emphasize, that videos are an approach that can deliver messages consistently but needs to be supported by communication strategies such as interpersonal communication to maximize behavioral change in maternal and child nutrition interventions (Al Rahmad & Annisa, 2025).

Kimani-Murage et al. (2021) employed a combination of leaflets and posters, which led to higher exclusive breastfeeding rates at 6 months (79,2% vs. 54,5%), as well as a longer duration of exclusive breastfeeding compared to the control group. Bueno-Gutiérrez et al. (2021) found that leaflets and posters significantly increased exclusive breastfeeding rates at 2 months (70% vs. 22,5%). Bueno-Gutiérrez et al. (2021) used leaflets to convey practical

information, while posters were used for psychosocial problems to make them more emotionally relatable. In contrast, Kimani-Murage et al. (2021) used brightly colored educational cards as the primary visual media to convey key messages about breastfeeding practices and maternal and child nutrition.

Hu et al. (2020) employed a combination of video and leaflets, which significantly improved breastfeeding knowledge, with higher exclusive breastfeeding rates in the intervention group. Utilized leaflets and videos in hospitals accompanied by ongoing education through WeChat, which was highly relevant for mothers who had undergone cesarean sections and needed ongoing support. Hu et al. (2020) considered this approach to be effective because it allowed for repeated and personalized education, but also noted that its effectiveness depended on the active involvement of mothers and the availability of healthcare personnel. In contrast, the combination of videos, leaflets, and posters showed no statistically significant changes in breastfeeding continuation behavior, but significantly improved attitudes and subjective norms related to breastfeeding continuation (Tizvir et al., 2024). Combined video media, leaflets, and educational video posters were sent through Telegram groups, providing flexibility and reinforcing messages through various channels. Tizvir et al. (2024) stated that while digital and print media offer flexibility, constant accessibility, and reinforcement through multiple formats, their limitation lies in the lack of active engagement when not paired with interactive components. In contrast to other studies, Titaley et al. (2022) used a combination of flipcharts, leaflets, and posters, which significantly increased exclusive breastfeeding under 6 months. This combination of media can reach a large audience but lacks depth on an individual level, while digital media has increasing potential to support the sustainability of breastfeeding behavior outside health facilities (Titaley et al., 2022).

In summary, interpersonal communication through face-to-face interactions, telephone calls, and text messages can improve maternal behavior. Face-to-face interactions tend to have more lasting effects because they provide emotional support and personalized advice. Telephone communication offers flexibility and, with new technologies such as video calls,

increasingly mirrors face-to-face interactions. Community communication effectively improves breastfeeding practices by providing social support and motivation to mothers. Mass media, such as TV campaigns or WhatsApp groups, broadens access to information and supports ongoing discussions, although it lacks the emotional depth of interpersonal support. Combining mass media with interpersonal or group communication ensures that mothers receive the comprehensive support they need.

Visual media, such as videos, flipcharts, and posters, effectively promote changes in mothers' nutritional behavior. Simpler materials, such as leaflets and posters, provide practical information but lack emotional support. The effectiveness of each medium increases when combined with other approaches, such as face-to-face or group communication, to foster long-term behavioral changes. Videos and flipcharts offer clear visuals, whereas booklets provide detailed and referenceable information. The combination of these media creates a more comprehensive educational approach that informs and supports mothers. Future research should examine the effectiveness of tailored interventions in different cultural contexts and explore how digital technologies, such as video calls, can enhance emotional support to optimize nutritional behavior changes in mothers of toddlers.

Conclusion

In conclusion, the effectiveness of nutrition-related behavior change interventions among mothers of toddlers is primarily determined by the communication pathways through which the messages are delivered. Interpersonal communication provides the most consistent support for sustained behavioral change, whereas community and mass communication mainly influence awareness, attitudes, and social norms.

Accordingly, nutrition programs and stunting prevention policies should prioritize strengthening the interpersonal communication skills of health workers and community facilitators through structured training, supervision, and continuous support. Community and mass communication strategies should be strategically integrated to reinforce key messages, expand reach, and shape

supportive social norms rather than being implemented as stand-alone interventions. Educational media should be positioned as complementary tools embedded within these integrated communication strategies to enhance message clarity, engagement, and consistency, thereby increasing the likelihood that improvements in knowledge and attitudes will translate into sustained maternal feeding practices.

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