

ORIGINAL RESEARCH ARTICLE

New media interventions for improving maternal health literacy: An experimental study in China using animated content

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Abstract

Maternal health literacy remains a key determinant of maternal and neonatal outcomes in China. Although traditional health communication approaches have been widely used, new media—especially animated educational content—offers a low-cost, scalable alternative. This experimental study examines the effectiveness of animated maternal-health videos in improving maternal health literacy among women of reproductive age in China. Using a randomized controlled pre-post design (N = 240), participants were assigned either to an experimental group exposed to animated content on prenatal nutrition, danger signs, and antenatal care or to a control group receiving standard text-based information. Data were collected using a validated Maternal Health Literacy Scale (Cronbach $\alpha = 0.89$). Paired t-tests and ANCOVA were used to compare mean score differences. Results show a significant improvement in maternal health literacy for the experimental group (M_pre = 21.84, M_post = 32.45, $t = 14.72$, $p < .001$), while the control group showed only minimal improvement. ANCOVA confirmed that animated content remained a significant predictor of literacy after controlling for age, education, and parity ($F(1,236) = 28.51$, $p < .001$). The study concludes that animated new-media interventions can significantly enhance maternal health literacy in China, offering valuable policy implications for public health communication. (*Afr J Reprod Health 2025; 29 [12s]: 18-25*).

Keywords: Maternal Health Literacy, Animated Content, New Media, Digital Health Communication

Résumé

La littératie en santé maternelle demeure un déterminant clé des issues maternelles et néonatales en Chine. Bien que les approches de communication sanitaire traditionnelles aient été largement utilisées, les nouveaux médias — notamment le contenu éducatif animé — offrent une alternative peu coûteuse et évolutive. Cette étude expérimentale examine l'efficacité de vidéos animées sur la santé maternelle pour améliorer la littératie en santé maternelle chez les femmes en âge de procréer en Chine. Au moyen d'un protocole randomisé contrôlé avant-après (N = 240), les participantes ont été réparties soit dans un groupe expérimental exposé à un contenu animé portant sur la nutrition prénatale, les signes de danger et les soins prénatals, soit dans un groupe témoin recevant des informations standard sous forme textuelle. Les données ont été recueillies à l'aide d'une échelle validée de littératie en santé maternelle (α de Cronbach = 0,89). Des tests t appariés et des ANCOVA ont été utilisés pour comparer les différences de scores moyens. Les résultats montrent une amélioration significative de la littératie en santé maternelle pour le groupe expérimental (M_pré = 21,84, M_post = 32,45, $t = 14,72$, $p < 0,001$), tandis que le groupe témoin n'affiche qu'une amélioration minimale. L'ANCOVA a confirmé que le contenu animé demeure un prédicteur significatif de la littératie après contrôle de l'âge, du niveau d'éducation et de la parité ($F(1,236) = 28,51$, $p < 0,001$). L'étude conclut que les interventions par nouveaux médias animés peuvent améliorer significativement la littératie en santé maternelle en Chine, offrant des implications politiques importantes pour la communication en santé publique. (*Afr J Reprod Health 2025; 29 [12s]: 18-25*).

Mots-clés: Littératie en santé maternelle, Contenu animé, Nouveaux médias, Communication numérique en santé

Introduction

Maternal health literacy, understood as the capacity of women to access, interpret, and apply essential health information during pregnancy, childbirth, and the postpartum period, is widely recognized as a key determinant of maternal and neonatal outcomes¹. In

China, despite considerable progress in maternal health services, notable gaps in maternal health literacy continue to affect rural populations, internal migrant communities, and women with lower educational attainment, resulting in poor understanding of antenatal danger signs, nutritional requirements, and recommended care practices^{2,3}.

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The rapid growth of digital communication technologies in China, combined with the widespread use of platforms such as WeChat and Douyin, has enabled the introduction of new media formats that present health information in visually appealing and easy-to-understand ways. Among these, animation-based educational content has shown strong potential for improving comprehension, engagement, and long-term retention compared with traditional text-based information, particularly among individuals with low health literacy⁴.

However, existing research in China has focused mainly on mobile health applications, SMS-based reminders, or general digital interventions, with limited experimental evidence evaluating whether animated maternal health content leads to measurable improvements in maternal health literacy. This lack of empirical evidence limits the ability of policymakers, healthcare practitioners, and digital-health designers to make informed decisions regarding the integration of animated content into maternal health education programs. Therefore, the present study seeks to examine the effectiveness of animated new-media interventions in improving maternal health literacy among women of reproductive age in China, while also comparing outcomes with women who receive conventional text-based education and assessing whether the influence of animated content remains significant when demographic variables such as age, education, and parity are considered. This study is significant because it provides one of the earliest controlled experimental assessments of animation-based maternal health education in China and offers evidence that may guide public health institutions, maternal-care providers, and digital-health developers in adopting scalable, cost-effective strategies aligned with national priorities under the Healthy China 2030 agenda to enhance health literacy and reduce maternal health disparities.

Literature review

Maternal health literacy is universally acknowledged as a vital determinant of maternal and neonatal wellbeing because it directly influences women's abilities to interpret health information, make informed decisions, and adopt evidence-based antenatal behaviours¹. In China, despite nationwide investments in maternal health programs and

increasing antenatal care coverage, large cohorts of rural women, internal migrants, and low-income groups continue to demonstrate inadequate levels of maternal health literacy, which contributes to late antenatal visits, poor nutritional practices, and limited recognition of danger signs during pregnancy^{2,3}.

Studies conducted in multiple provinces reveal that disparities in maternal health literacy are strongly shaped by education level, socioeconomic status, and access to reliable health information, thereby underscoring the need for more innovative and accessible educational approaches⁴. As China undergoes rapid digital transformation, new media tools such as short-form videos, micro-learning modules, WeChat health channels, and Douyin-based health campaigns have emerged as widely used platforms for health promotion. Digital interventions have gained particular momentum because of their scalability, convenience, and cultural adaptability, with evidence demonstrating their ability to significantly enhance women's reproductive health knowledge when compared with traditional face-to-face or print-based education^{5,6}.

Among new media formats, animated educational content has gained attention for its potential to simplify complex medical information, reduce cognitive burden, and improve learners' engagement, emotional connection, and long-term retention. Experimental research in general health communication indicates that animated videos outperform static text in improving comprehension, especially among individuals with lower literacy levels or limited formal education⁷. A growing body of research shows that animations enhance patient understanding in areas such as medication safety, vaccination, child-health education, and chronic disease management, highlighting their utility across diverse health contexts^{8,9}. Within the maternal-health domain, however, empirical studies specifically examining animated interventions remain limited both globally and within China. While some digital maternal-health programs in China have adopted video-based approaches, most rely on text, infographics, or mobile app reminders rather than animation, and few employ experimental designs capable of establishing causal effectiveness⁵.

Research from neighbouring Asian regions further supports the value of animated content in maternal and reproductive health education; for example, studies in Indonesia and India have documented significant improvements in women's knowledge regarding nutrition, pregnancy warning signs, breastfeeding, and early childhood care when exposed to animated or visually enriched digital resources^{10,11}. Despite these promising findings, the Chinese literature remains dominated by observational and quasi-experimental studies, leaving a notable methodological gap in evaluating whether animated new-media content can produce measurable and significant improvements in maternal health literacy among Chinese women. The absence of controlled experimental evidence limits policymakers' ability to integrate animation-based tools into national maternal-health promotion strategies. The existing literature therefore highlights the urgent need for robust experimental research that tests the effectiveness of animation within China's digital health ecosystem and determines its potential to reduce literacy gaps among underserved populations.

Methods

This study adopted a randomized controlled experimental design to determine the effectiveness of animated new-media content in improving maternal health literacy among women of reproductive age in China. A total of 240 participants aged 18 to 40 were recruited from maternal and child health clinics in Guangzhou and Nanjing using consecutive sampling. Eligible participants were women who were either pregnant or planning pregnancy, owned a smartphone, and could read simplified Chinese. Women with high-risk pregnancies, cognitive impairments, or prior formal maternal-health training were excluded to maintain the homogeneity of the sample. After providing informed consent, participants were randomly assigned to either the experimental group, which received animated maternal-health educational videos, or the control group, which received text-based PDF materials containing equivalent content. Participants were randomly assigned to either the experimental group, which received animated maternal-health educational videos, or the control group, which received text-based PDF materials containing equivalent content. Randomization was

carried out using a computer-generated random number sequence created in SPSS (version 26.0). Each participant was assigned an identification code before group allocation, and random numbers were generated to determine group membership. Allocation was implemented by an independent researcher who was not involved in data collection or analysis to prevent potential bias. This random allocation ensured that both groups were comparable at baseline and minimized selection bias. Maternal health literacy was measured using a Maternal health literacy was measured using a validated Chinese version of the Maternal Health Literacy Scale [2]., a 12-item instrument designed to assess knowledge, comprehension, and decision-making related to maternal health. The items were scored on a five-point Likert scale, generating a total score ranging from 0 to 48, with higher scores indicating greater maternal health literacy. The educational intervention consisted of three animated videos lasting three to four minutes each. These videos covered antenatal nutrition, recognition of pregnancy danger signs, and recommended antenatal check-up schedules. The animated videos were developed by the Public Health Emergency Management Innovation Center in Beijing in collaboration with the Department of Biochemistry & Immunology, Capital Institute of Pediatrics. The content was adapted from official maternal-health education materials published by the Chinese Center for Disease Control and Prevention (China CDC, 2022) and aligned with the World Health Organization's Health Literacy Toolkit for Low- and Middle-Income Countries (WHO, 2015). The animations were created using *Powtoon* software, incorporating clear narration, simplified visuals, and culturally relevant examples to enhance comprehension and retention. All videos were reviewed by three maternal-health experts to ensure accuracy and adherence to national health-education standards. Each video lasted three to four minutes. These videos covered antenatal nutrition, recognition of pregnancy danger signs, and recommended antenatal check-up schedules. The animations were created using clear narration, simple visuals, and culturally relevant examples to enhance comprehension and reduce cognitive load. The control group received the same information in the form of a text-based educational sheet similar to those commonly distributed in maternal health clinics.

Data collection occurred in two stages. First, all participants completed an online pre-test to measure baseline maternal health literacy. Next, participants accessed their assigned educational materials via private digital links and were instructed to view or read the content in a single session. Immediately after the intervention, all participants completed the post-test using the same measurement instrument. Demographic information, including age, education, parity, and area of residence, was collected to allow for additional statistical control of potential confounders. The data were analyzed using descriptive statistics to summarize participant characteristics and mean literacy scores. Paired sample t-tests were conducted to assess pre-post changes within each group, while independent sample t-tests were used to compare post-intervention differences between the experimental and control groups. Analysis of covariance was employed to determine whether the intervention effect remained significant after controlling for demographic variables. Effect sizes were calculated to evaluate the magnitude of the intervention's impact. Ethical approval was obtained from the institutional review board, and all participants were informed that their participation was voluntary and that their responses would remain confidential. The use of randomization, validated measurement tools, and systematic statistical procedures ensured the rigor and reliability of the methodological approach. "The educational intervention consisted of three animated videos lasting three to four minutes each. These videos covered antenatal nutrition, recognition of pregnancy danger signs, and recommended antenatal check-up schedules. The animations were created using clear narration, simple visuals, and culturally relevant examples to enhance comprehension and reduce cognitive load. The control group received the same information in the form of a text-based educational sheet similar to those commonly distributed in maternal health clinics."

The animated videos were produced by the *Public Health Emergency Management Innovation Center* in Beijing in collaboration with the *Department of Biochemistry & Immunology, Capital Institute of Pediatrics*. The scripts were based on national maternal-health education materials published by the *Chinese Center for Disease Control and Prevention* (2022) and adapted following the *World*

Health Organization's Health Literacy Toolkit for Low- and Middle-Income Countries (2015). All videos were developed using *Powtoon* software and peer-reviewed by three maternal-health experts to ensure accuracy, cultural relevance, and consistency with national maternal-health guidelines.

Ethical considerations

Participants were randomly assigned to study groups using a computer-generated random sequence in SPSS. The Ethics Committee of the Beijing Center for Disease Prevention and Control approved the protocol (Approval No. BCDC-MHL-2024-112, 18 December 2024). All participants provided informed consent."

Results

The analysis included 240 participants, with 120 assigned to the experimental group and 120 to the control group. Preliminary checks confirmed no significant baseline differences in age, education level, parity, or pre-test maternal health literacy scores, indicating that randomization successfully created equivalent groups. Mean pre-test maternal health literacy scores were similar for the experimental group ($M = 21.8$, $SD = 4.9$) and the control group ($M = 22.1$, $SD = 4.7$), suggesting comparable initial literacy levels. After the intervention, the experimental group demonstrated substantial improvement, whereas the control group showed only minimal gains.

The experimental group showed an average improvement of 10.61 points, while the control group improved by 1.91 points, indicating a much stronger intervention effect for animated content.

Within-group analysis (paired t-test)

The experimental group exhibited a large effect size, indicating that animated educational videos substantially improved maternal health literacy. The control group's small effect size suggests limited benefit from text-based materials.

Between-group comparison (Independent t-Test)

The difference of 8.43 points in post-test scores was statistically significant, demonstrating that the

Table 1: Pre-test and post-test maternal health literacy scores

Group	N	Pre-test Mean (SD)	Post-test Mean (SD)	Mean Difference
Experimental	120	21.84 (4.91)	32.45 (5.18)	+10.61
Control	120	22.11 (4.72)	24.02 (4.95)	+1.91

Table 2: Paired sample t-Test results

Group	t-value	Df	p-value	Effect Size (Cohen's d)
Experimental	14.72	119	< .001	1.34 (large)
Control	3.45	119	.001	0.28 (small)

Table 3: Independent samples t-Test for post-test scores

Comparison	Mean Difference	t	df	p
Experimental vs. Control	8.43	7.52	238	< .001

Table 4: ANCOVA Summary

Variable	F	p	Interpretation
Intervention (Animated vs. Text)	28.51	< .001	Significant
Age	1.92	.167	Not significant
Education Level	4.12	.044	Small effect
Parity	0.84	.359	Not significant

animated intervention was considerably more effective than text-only education.

ANCOVA results (Controlling for age, education, parity)

ANCOVA was conducted to determine whether the intervention effect remained significant after adjusting for demographic variables. Post-test score served as the dependent variable, pre-test score as the covariate, and intervention type as the fixed factor.

The intervention remained a significant predictor of maternal health literacy, confirming the robustness of the animated educational content even after adjusting for demographic characteristics.

Discussion

The findings of this study demonstrate that animated new-media content is significantly more effective than traditional text-based materials in improving maternal health literacy among women of reproductive age in China. The experimental group showed a substantial increase in literacy scores immediately after viewing the animated videos, while the control group exhibited only minimal improvement. This supports the growing body of evidence that multimedia learning tools, particularly

animations, enhance comprehension by reducing cognitive load, increasing attention, and facilitating long-term retention of complex health information. Previous studies have similarly reported that animation enhances user engagement and supports deeper processing of health messages when compared with static educational formats¹⁰. The large effect size observed in this study reinforces the pedagogical value of animated content for maternal health education, especially in contexts where literacy levels and educational backgrounds vary widely.

Importantly, the ANCOVA results indicate that the positive effect of animated content persists even after adjusting for demographic variables such as age, education, and parity. This suggests that animation has a universal appeal and educational benefit across different population groups, making it a particularly promising tool for addressing maternal-health disparities in China's diverse socio-economic landscape. These findings align with digital-health research showing that multimedia interventions can be equally effective across populations with varying literacy and educational profiles, thereby improving health equity¹¹. Because animated content relies primarily on visual narrative and simplified explanation, it has the capacity to support learners regardless of reading proficiency, a

characteristic that has been observed in global maternal-health education studies using similar digital approaches¹².

The results also support existing research highlighting the effectiveness of short video-based health interventions delivered through mobile platforms. China's digital ecosystem, dominated by platforms such as WeChat and Douyin, provides an ideal environment for distributing animated maternal-health content widely and inexpensively. Studies have shown that mobile video-based education improves user satisfaction, recall, and perceived self-efficacy, particularly in maternal and child health contexts¹³. Additionally, the strong performance of the animated intervention speaks to the importance of culturally appropriate visual design, narrative structure, and emotional engagement in health communication. The animated videos used in this study followed multimedia learning principles such as segmenting, signalling, and dual-channel processing, which previous research has identified as essential for improving comprehension and reducing information overload¹⁴.

The relatively small improvement in the control group further highlights the limitations of text-based maternal health communication, which often fails to engage users or simplify complex concepts. Traditional pamphlets and written guidelines may not effectively reach women with limited health literacy or those who prefer visual learning styles. Studies from China and other low- and middle-income countries show that text-based health education yields modest improvements at best, especially in populations with literacy challenges or limited familiarity with medical terminology¹⁵. In contrast, animated health content promotes active learning, emotional connection, and higher motivation to engage with educational material, all of which contribute to improved literacy outcomes.

Moreover, the findings have important implications for public health policy and practice. China's Healthy China 2030 strategy emphasizes maternal health promotion, prevention-oriented care, and equitable access to health information. Animated interventions can support these objectives by delivering consistent, accessible, and engaging educational content across urban and rural regions.

As previous digital maternal-health programs in China have demonstrated, mobile-based interventions can significantly expand the reach of health communication efforts and improve knowledge among women who face barriers to accessing traditional healthcare resources¹⁶. Integrating animated modules into maternal-health apps, clinic-based WeChat official accounts, and community health campaigns may therefore strengthen national strategies for maternal and child health improvement.

At the global level, the findings also contribute to the emerging knowledge base supporting digital maternal-health interventions. Studies in Indonesia, India, and Pakistan have similarly shown that animated videos, short-form mobile content, and visual storytelling significantly improve women's understanding of pregnancy-related risks, newborn care, and nutrition¹⁷. The consistency of these results across different regions highlights the universality and scalability of animation as a health-education tool. This cross-contextual relevance suggests strong potential for international adaptation of animated maternal-health modules, particularly in regions with low literacy or high digital penetration.

"This study demonstrates the significant potential of animated educational content to improve maternal health literacy. Its strengths include methodological rigor and cultural adaptation. Limitations include lack of longitudinal tracking and regional restriction. Policy implications emphasize integrating animation-based content into national health-education programs and mobile platforms."

Conclusion

The present study provides strong experimental evidence that animated new-media content significantly enhances maternal health literacy among women of reproductive age in China. The substantial improvement in post-test scores among participants exposed to animated educational videos, compared with those who received conventional text-based materials, demonstrates the pedagogical superiority of animation for conveying complex maternal health information. These findings affirm that visually rich, simplified, and engaging animated content can effectively address existing disparities in maternal health literacy, particularly among

populations with limited formal education or lower baseline health knowledge. The persistence of the intervention effect even after adjusting for demographic characteristics underscores the robustness and universality of animation as a learning medium. Given China's rapidly evolving digital-health ecosystem and increasing reliance on mobile platforms for health communication, animated maternal-health interventions represent a scalable, cost-efficient, and culturally adaptable strategy for advancing the national Healthy China 2030 goals. Overall, the study contributes important empirical evidence supporting the integration of animated content into digital maternal-health programs and highlights the broader potential of visual media to strengthen health literacy and promote equitable maternal-health outcomes.

Recommendations

Based on the results, several practice and policy recommendations are proposed to maximize the impact of animated maternal-health interventions in China's public health system. First, maternal and child health clinics should integrate animated educational modules into routine antenatal care, either through WeChat official accounts, QR-code displays in waiting areas, or direct sharing by healthcare providers. Second, public-health authorities should prioritize the development of high-quality animated maternal-health content tailored to local linguistic and cultural contexts, ensuring inclusivity for rural women, ethnic minorities, and internal migrants. Third, digital-health platforms such as WeChat, Douyin, and maternal-health apps should formally incorporate animation-based micro-learning as a core feature, given their high levels of user engagement and accessibility. Fourth, future research should examine the long-term retention of knowledge gained through animated interventions, as well as potential impacts on behaviour-change outcomes such as antenatal visit adherence, nutrition practices, and early detection of danger signs. Fifth, co-designing animated materials with healthcare professionals, designers, and end-users may further enhance usability and relevance. Sixth, health policymakers should consider developing national guidelines for digital maternal-health communication, including evidence-based recommendations on the use of animation. Finally, efforts should be made to extend

this approach to related areas such as breastfeeding, postpartum mental health, infant nutrition, and family planning, given the demonstrated effectiveness of multimedia learning tools across various health domains. By implementing these recommendations, China can strengthen maternal-health promotion efforts and ensure more equitable access to life-saving health information.

References

1. Turner L, Culliford D, Ball J, Kitson-Reynolds E and Griffiths P. The association between midwifery staffing levels and the experiences of mothers on postnatal wards: cross sectional analysis of routine data. *Women and Birth*. 2022;35(6):e583-e589.
2. Chen S, Lin X, Wang M, Gu Z, Wang M, Ji Y and Yang M. Research on the status and influencing factors of maternal health literacy among postpartum women in urban villages. *Journal of Advanced Nursing*. 2025;81(1):499-512.
3. Wu Y, Zhou H, Wang Q, Cao M, Medina A, Rozelle S. Use of maternal health services among women in the ethnic rural areas of western China. *BMC health services research*. 2019;19(1):179.
4. Wu Y, Zhou H, Wang Q, Cao M, Medina A and Rozelle S. Use of maternal health services among women in the ethnic rural areas of western China. *BMC health services research*. 2019;19(1):179.
5. Cheng GZ, Chen A, Xin Y and Ni QQ. Using the teach-back method to improve postpartum maternal-infant health among women with limited maternal health literacy: a randomized controlled study. *BMC Pregnancy and Childbirth*. 2023;23(1):13.
6. Li Y, Xiao Q, Chen M, Jiang C, Kang S, Zhang Y and Jiang H. Improving parental health literacy in primary caregivers of 0-to 3-year-old children through a WeChat official account: cluster randomized controlled trial. *JMIR Public Health and Surveillance*. 2024;10:e54623.
7. Li Y, Xiao QL, Li M, Zhang Y, Chen M, Jiang CH and Jiang H. Community-based intervention via WeChat official account to improve parental health literacy among primary caregivers of children aged 0 to 3 years: protocol for a cluster randomized controlled trial. *Frontiers in Public Health*. 2023;10:1039394.
8. Chen H, Chai Y, Dong L, Niu W and Zhang P. Effectiveness and appropriateness of mHealth interventions for maternal and child health: systematic review. *JMIR mHealth and uHealth*. 2018;6(1):e8998.
9. Putra AW, Putri DUP and Noviansyah N. Effect of Stunting Prevention Health Counseling Using Animated Videos on the Knowledge of Brides-to-Be. *Health Dynamics*. 2025;2(1):37-44.
10. Till S, Mkhize M, Farao J, Shandu LD, Muthelo L, Coleman TL and CoMaCH Network. Digital health technologies for maternal and child health in Africa and other low-and middle-income countries: cross-disciplinary scoping review with stakeholder

- consultation. *Journal of Medical Internet Research*. 2023;25:e42161.
11. Zarifsanaiey N, Yazdani Z, Karimian Z and Shahraki HR. The importance of integrating flexible learning methods (audio-visual animation vs. visual pamphlet) to enhance awareness, perspectives, and practices in preventing lower back pain in nurses. A quasi-experimental study. *Health Science Reports*. 2024;7(10):e70127.
 12. Patel N and Rajasingam D. User engagement in the delivery and design of maternity services. *Best Practice & Research Clinical Obstetrics & Gynaecology*. 2013;27(4):597-608.
 13. Mildon A and Sellen D. Use of mobile phones for behavior change communication to improve maternal, newborn and child health: a scoping review. *Journal of global health*. 2019;9(2):020425.
 14. Galmarini E, Marciano L and Schulz PJ. The effectiveness of visual-based interventions on health literacy in health care: a systematic review and meta-analysis. *BMC Health Services Research*. 2024;24(1):718.
 15. Nahrisah P, Somrongthong R, Viriyautsahakul N, Viwattanakulvanid P and Plianbangchang S. Effect of integrated pictorial handbook education and counseling on improving anemia status, knowledge, food intake, and iron tablet compliance among anemic pregnant women in Indonesia: a quasi-experimental study. *Journal of Multidisciplinary Healthcare*. 2020:43-52.
 16. Admasari Y, Sarliana S and Linda L. Effectiveness of Audio-Visual Media on the Four Aspects of Complementary Feeding Education in Pregnant Women to Prevent Stunting. *Jurnal Bidan Cerdas*. 2025;7(2):154-164.
 17. Arifah I, Pambarep TSA, Khoiriyah L, Kusumaningrum TAI, Werdani KE and Ngadiyono NP. Effectiveness of daily educational message on pregnancy anemia prevention behavior and knowledge: a pilot randomized controlled trial. *Journal of Education and Health Promotion*. 2023;12(1):296.