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EFFECTIVENESS OF THE "NGANAK KODEK" ANDROID APP IN ENHANCING KNOWLEDGE OF BIRTH PREPAREDNESS, BREASTFEEDING TECHNIQUE, AND EXCLUSIVE BREASTFEEDING AMONG ADOLESCENT PRIMIGRAVIDAS

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ABSTRACT

Stunting remains a major public health issue that begins early in life and is strongly associated with inadequate maternal care, nutrition, and infant feeding practices. Pregnant adolescents are particularly vulnerable due to limited knowledge and readiness for childbirth and breastfeeding, which are crucial for preventing stunted growth in infants. This quasi-experimental study aimed to evaluate the effectiveness of a Mobile WebApp–based intervention in increasing knowledge related to childbirth readiness and breastfeeding as part of stunting prevention among pregnant adolescents in Narmada Subdistrict, West Lombok Regency, Indonesia. A total of 60 pregnant adolescents who met the inclusion criteria (aged 15–19 years, first pregnancy, and able to use smartphones) were selected using purposive sampling. The instrument, a 25-item questionnaire, was developed based on the Health Belief Model (HBM), covering aspects of perceived susceptibility, perceived benefits, and cues to action related to maternal and infant health. The instrument underwent expert validity testing by three midwifery and maternal health specialists and achieved a validity coefficient of r = 0.78 and a Cronbach's alpha reliability value of 0.86, indicating good consistency. The one-month Mobile WebApp intervention provided educational modules on breast care, signs of labor, early initiation of breastfeeding (EIBF), breastfeeding techniques, and exclusive breastfeeding up to six months of age. Data were analyzed using the Wilcoxon signed-rank test. The results showed a significant improvement in maternal knowledge after the intervention ($p < 0.05$). These findings demonstrate that the Mobile WebApp effectively enhances pregnant adolescents' readiness for childbirth and breastfeeding, thereby supporting efforts to prevent stunting. Integrating mobile health applications into maternal education can strengthen adolescent mothers' capacity to promote optimal maternal and child health outcomes.

Kata Kunci:

Aplikasi android;
Pengetahuan;
Remaja;
Primigravida;

ABSTRAK

Stunting tetap menjadi masalah kesehatan masyarakat yang signifikan yang dimulai sejak awal kehidupan dan sangat berkaitan dengan kurangnya perawatan maternal, gizi yang tidak adekuat, serta praktik pemberian makan bayi yang tidak tepat. Remaja hamil merupakan kelompok yang rentan karena memiliki pengetahuan dan kesiapan yang terbatas dalam menghadapi persalinan dan menyusui, padahal kedua aspek tersebut berperan penting dalam pencegahan terjadinya stunting pada bayi. Penelitian ini merupakan penelitian kuasi-eksperimen yang bertujuan untuk mengevaluasi efektivitas intervensi berbasis Mobile WebApp dalam meningkatkan pengetahuan terkait kesiapan persalinan dan menyusui sebagai bagian dari upaya pencegahan stunting pada remaja hamil di Kecamatan Narmada, Kabupaten Lombok Barat, Indonesia. Sebanyak 60 remaja hamil yang memenuhi kriteria inklusi (usia 15–19 tahun, kehamilan pertama, dan mampu menggunakan smartphone) dipilih dengan teknik purposive sampling. Instrumen penelitian berupa kuesioner dengan 25 butir pertanyaan dikembangkan berdasarkan teori Health Belief Model (HBM), yang mencakup aspek persepsi kerentanan, manfaat yang dirasakan, serta isyarat untuk bertindak terkait kesehatan ibu dan bayi. Uji validitas dilakukan oleh tiga pakar kebidanan dan kesehatan maternal dengan koefisien validitas sebesar r = 0,78 dan nilai reliabilitas Cronbach's alpha sebesar 0,86 yang menunjukkan konsistensi instrumen yang baik. Intervensi Mobile WebApp selama satu bulan memberikan materi edukasi

tentang perawatan payudara, tanda-tanda persalinan, inisiasi menyusu dini (IMD), teknik menyusui, dan pemberian ASI eksklusif hingga bayi berusia enam bulan. Analisis data menggunakan uji Wilcoxon signed-rank test. Hasil penelitian menunjukkan peningkatan pengetahuan ibu yang signifikan setelah intervensi (p < 0,05). Temuan ini menunjukkan bahwa Mobile WebApp efektif dalam meningkatkan kesiapan remaja hamil untuk menghadapi persalinan dan menyusui, sehingga mendukung upaya pencegahan stunting. Integrasi teknologi kesehatan digital dalam pendidikan maternal dapat memperkuat kapasitas ibu remaja dalam mewujudkan kesehatan ibu dan anak yang optimal.

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INTRODUCTION

Stunting is a chronic condition that reflects delayed growth resulting from prolonged nutritional deficiencies. (Darmin, 2023). It is characterized by the failure of linear growth to reach its genetic potential due to inadequate dietary intake and recurrent illness (Beal et al., 2018). Stunting is diagnosed through anthropometric measurements, specifically height-for-age. (Wardani et al., 2023). Children classified as stunted are those whose height falls below the standard for their age (Yeganeh et al., 2018).

Stunting is a preventable condition and can be mitigated through proper parenting, dietary patterns, healthy lifestyle, sanitation, and access to clean water. (JS & V, 2016). Malnutrition and stunting may result from early marriage, which contributes to the lack of parental knowledge and preparedness. Limited parental knowledge affects their ability to nurture children, provide adequate nutrition, implement proper parenting and hygiene practices, and ensure access to sufficient nutrients. (García Cruz et al., 2017)

According to the Ministry of Health, the 2022 Indonesian Nutrition Status Survey (SSGI) reported that the national stunting prevalence decreased to 21.6%. However, this figure remains above the national target of reducing stunting to 14% (Kemenkes, 2023). Preventive strategies involve targeting families at risk of stunting, particularly those with one or more risk factors such as adolescent girls, pregnant teenagers, and children aged 0–23 months.

Based on the 2017 National Socioeconomic Survey (Susenas), 63.08% of women experienced their first pregnancy before the age of 18, 30.29% at 18–19 years, and only 5.91% had not yet been pregnant. The 2018 Basic Health Research (Riskesdas) in West Nusa Tenggara (NTB) reported that 67.03% of females aged 10–19 had been pregnant, and 30.80% were currently pregnant. The 2017 Indonesian Demographic and Health Survey (IDHS) revealed that the adolescent birth rate (15–19 years) in Indonesia was 33 per 1,000 live births, while in NTB Province it was relatively high at 48% (Safitri et al., 2021).

One of the significant contributors to stunting is adolescent pregnancy. Interventions should include addressing the health of pregnant teenagers, initiating early breastfeeding (IMD), and promoting exclusive breastfeeding (Edith & Priya, 2016). According to WHO and UNICEF recommendations, exclusive breastfeeding for the first six months of life—preceded by immediate initiation of breastfeeding—is one of the most effective strategies to prevent stunting. The risk of stunting increases when infants are introduced to complementary foods or weaned from breast milk too early (Waliulu, 2018). Stunting is more prevalent among children who are not exclusively breastfed (Sekarwati, 2022). However, in 2018, the exclusive breastfeeding rate in Indonesia was only 37.3%. Adolescent pregnancy may lead to higher stunting risks as teenage mothers often lack adequate knowledge regarding pregnancy and infant care (Alipour et al., 2025).

One innovative method for delivering education is through mobile phone applications. A study by Eliza et al. showed that stunting education using an Android application significantly improved maternal knowledge and attitudes at the Tenayan Raya Public Health Center, Pekanbaru ($p = 0.0001 < 0.05$). This suggests that Android-based applications can be an effective tool for increasing maternal knowledge (Putri et al., 2020).

Although numerous studies have explored the impact of Android-based applications on knowledge improvement, the "Nganak Kodek" application is uniquely designed as a mobile web app specifically targeted at pregnant adolescents. It serves as an educational support tool from the third trimester of pregnancy through the first six months of exclusive breastfeeding, a developmental stage that has not been comprehensively addressed by previous digital interventions. The app provides essential content covering breast care for breastfeeding preparation, signs of labor, early initiation of breastfeeding (EIBF), breastfeeding techniques and skills, and exclusive breastfeeding practices up to six months (Elvina & Suryantara, 2022). Mastery of proper breastfeeding techniques is closely related to stunting prevention, as effective attachment and positioning ensure adequate milk transfer, optimal nutritional intake, and growth during the critical first 1,000 days of life. Inadequate breastfeeding practices, on the other hand, can lead to insufficient nutrition, increased infection risk, and impaired growth. The name "Nganak Kodek" is derived from the Sasak language spoken in West Nusa Tenggara, where *nganak* means "to give birth" and *kodek* refers to "young" or "adolescent," reflecting its focus on empowering young mothers for healthy childbirth and infant growth.

The objective of this study is to evaluate the effectiveness of the "Nganak Kodek" mobile application in enhancing knowledge among adolescent primigravida mothers regarding the signs of labor, early initiation of breastfeeding, breastfeeding techniques and skills, and exclusive breastfeeding practices.

METHOD

Type of Research

This study employed a quasi-experimental design, specifically using a one-group pretest–posttest design. In this design, participants are initially given a pretest to assess their baseline knowledge or condition prior to the intervention. Subsequently, the researcher administers a treatment or intervention, and upon its completion, a posttest is conducted to evaluate any changes or effects resulting from the intervention. This study was approved by the Ethics Committee of the Health Polytechnic of the Ministry of Health Mataram under approval number DP.04.03/F.XL.26/302/2025.

Place and Time of Research

This research was conducted in Narmada Subdistrict, within the working areas of Narmada Public Health Center (Puskesmas Narmada) and Suranadi Public Health Center (Puskesmas Suranadi), located in West Lombok Regency, West Nusa Tenggara Province, Indonesia. The study was carried out in March 2024.

Population and Sample

The population in this study consisted of pregnant adolescents aged 11 to 19 years residing in Narmada Subdistrict, an area with a relatively high adolescent pregnancy rate. Specifically, the target population was drawn from the working areas of Narmada and Suranadi Public Health Centers, comprising a total of 196 pregnant adolescents. The sample was selected using a purposive sampling technique, which involves selecting participants based on specific criteria relevant to the research objectives. The sample consisted of 60 pregnant adolescents who met the inclusion and exclusion criteria, with 30 participants each from Narmada Public Health Center and Suranadi Public Health Center, both located in Narmada Subdistrict, West Lombok Regency. The sample size was determined using the Lemeshow formula for hypothesis testing of two means, which is commonly applied in quasi-experimental studies. The inclusion criteria are aged 15–19 years, first pregnancy, and able to use smartphones.

Data Collection

The intervention implemented in this study involved providing continuous support to pregnant adolescents through a Mobile WebApp-based medical service, starting from the third trimester of pregnancy (8 months gestational age). The application content included educational material on breast care for breastfeeding preparation, signs of labor, early initiation of breastfeeding (EIBF), breastfeeding techniques and skills, and exclusive breastfeeding practices up to six months.

The intervention was carried out over one month and involved midwives serving as enumerators from both Narmada and Suranadi Public Health Centers. The participants were provided with access to the application, and their knowledge levels were measured using a 25-item questionnaire developed in alignment with the application content. Each item consisted of multiple-choice questions with one correct answer, scored as 1 for a correct answer and 0 for an incorrect answer. The total possible score ranged from 0 to 25. The knowledge level was categorized into three groups based on the total score obtained: good (≥ 76% or 19–25 points), moderate (56–75% or 14–18 points), and poor (≤ 55% or 0–13 points). These criteria were adapted from the standard classification used in health education assessment. Higher scores indicated a better understanding of childbirth readiness, breastfeeding practices, and stunting prevention.

Each item in the questionnaire was validated by comparing the calculated correlation coefficient (r-count) with the critical value (r-table) of 3.60. The validity of the Android-based application was assessed and approved by an expert research team from the Sepuluh Nopember Institute of Technology (ITS). The reliability of the knowledge questionnaire, measured by Cronbach's alpha, was 0.864, indicating a high degree of internal consistency.

Data Analysis and Processing

A bivariate analysis was performed to evaluate the impact of stunting education provided via an Android-based application on maternal knowledge. The Wilcoxon signed-rank test was applied to determine the changes in knowledge levels before and after the intervention.

RESULT

Table 1. Frequency Distribution of Respondents' Characteristics

Respondents' Characteristics	Adolescent Pregnant Women n (60)	
	f	%
Age		
11 - 14 years old	2	4.0
15 – 17 years old	29	48.0
18 – 19 years old	29	48.0
Highest Education Level		
Elementary School	12	20.0
Junior High School	42	70.0
Senior/Vocational High School	6	10.0
Ocupation		
Housewife	60	100.0

From Table 1, it is evident that the majority of respondents are aged between 15–17 years and 18–19 years, each group representing 48%. The most common level of education among the respondents is Junior High School, with 70% having completed this level. Furthermore, all respondents are housewives, representing 100% of the sample.

Table 2. Bivariate Analysis Results of Pre-Test and Post-Test Knowledge

Sample	n	Mean	St Dev	SE Mean	P Value
Pre test	60	12.533	1.171	0.151	0.001
Post test	60	17.967	1.727	0.223	

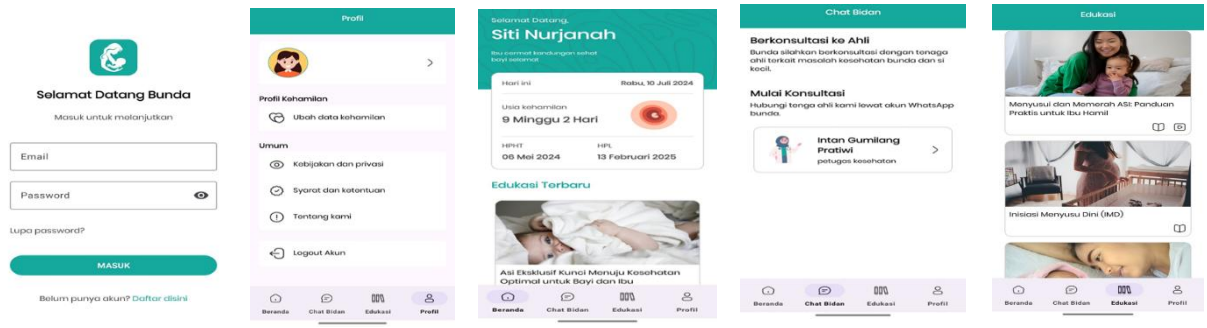
Table 2 shows an increase in the respondents' mean knowledge scores from 12.53 in the pre-test to 17.97 in the post-test. The increase of 5.43 points, accompanied by relatively small standard deviations (1.17 and 1.73), indicates a homogeneous data distribution. These results suggest that the use of the "Nganak Kodek" Mobile WebApp was effective in improving pregnant adolescents' knowledge regarding childbirth readiness and breastfeeding as part of stunting prevention efforts.

DISCUSSION

In Indonesia, the use of Android phones has been rapidly increasing. By 2016, 78% of the population owned Android phones, and this number was expected to reach 100% in urban areas and 52% in rural areas by 2019. The preference for short messaging services (SMS) has shifted to internet-based messaging apps such as WhatsApp, Line, and Telegram. Additionally, more specialized apps with enhanced functionalities are being developed. Mobile app development was preferred due to its ability to offer more features compared to SMS, which has limited capabilities. While SMS remains useful for documenting aggregate data, such as clinical case numbers and treatment statistics at the village level, it is constrained by character limits for communication (Puspitasari & Ishii, 2016).

From the results in Table 2, it was found that the Nganak Kodek application significantly increased maternal knowledge, as shown by the Wilcoxon test with a p-value of 0.001. Nganak Kodek is an Android-based mobile application designed to increase adolescents' knowledge about birth preparedness and breastfeeding. This application is available on Android devices. In today's world, communication tools such as smartphones and computers have become integral to daily life. Smartphone services can be utilized to facilitate clients' access to health information. Health education delivered through smartphone platforms can enhance preventive healthcare (Alvarez-Perea et al., 2021). This development offers significant advantages for healthcare providers, as the broad accessibility of the internet enables more people to access health-related information. One study highlighted that mobile devices, especially smartphones, have become widespread. Another study emphasized that the advancement of smartphone technology, along with the growth of 5G mobile networks, is expected to play a pivotal role in the healthcare sector (Crico et al., 2018).

Among the many helpful aspects of the Nganak Kodek app is the ability for expectant mothers to read and watch videos about breastfeeding techniques, health preparation, and related topics. By simply browsing through the application, midwives supervising the initiative no longer need to visit each pregnant woman's home individually. According to one study, the advancement of information and communication technologies has altered the delivery of healthcare, and numerous services are now accessible through mobile devices and computers (Mustafina et al., 2025). Additionally, the Nganak Kodek application includes a chat feature that allows users to communicate directly with midwives during pregnancy.



Picture 1. Nganak Kodek application menu

Midwives can use the chat feature to address concerns and provide explanations related to issues experienced by pregnant women (Buchanan et al., 2023) his feature can also serve as a reminder for pregnant women who have not yet completed the childbirth planning and complication prevention program. The Nganak Kodek application assists midwives in their duties by enabling direct communication with pregnant women. Through this interactive feature, midwives can provide real-time advice, answer questions, and continuously monitor maternal conditions. The chat system also functions as a reminder for pregnant women who have not completed the childbirth planning and complication

prevention program, as midwives can send automated or manual notifications through the platform. In practice, midwives log into the application to review each client's progress, send follow-up messages, and update educational materials as needed. Pregnant women, in turn, can access the application via their smartphones to read educational content, record health information, and consult midwives directly through the chat feature. One study highlights that with web-based applications and the internet, health promotion officers can offer personalized feedback through tailored messages (Rinawan et al., 2021).

Additionally, there is a feature containing educational material on the childbirth planning and complication prevention program. Pregnant women, their husbands, and families can access and study this material at any time. The content is written in simple language for easy understanding, and its design is engaging to keep users interested. One study suggests that social media is an effective tool for teaching and learning (Al-Hajri et al., 2021). Another study noted that mobile information should be easily accessible and written in plain language (Wan et al., 2025). The childbirth planning and complication prevention program is facilitated by midwives in rural areas to enhance the involvement of husbands, families, and communities in planning for safe deliveries, preparing for potential complications, and considering postpartum family planning. Stickers are used as a target notification tool to improve coverage and the quality of maternal and newborn health services (Zou et al., 2023).

CONCLUSION AND SUGGESTION

The Mobile WebApp intervention was found to be effective in improving knowledge regarding the prevention of stunting among pregnant adolescents. This study highlights the potential of mobile health applications in supporting adolescent mothers and promoting better maternal and child health outcomes.

Based on the findings of this study, the following recommendations are made: Increase the Use of Mobile Applications: The effective mobile-based application should be introduced and expanded to other areas with high rates of adolescent pregnancies to improve pregnant adolescents' knowledge of the importance of stunting prevention. Further Research: It is recommended to conduct further research with a larger sample size and a longer duration to evaluate the long-term impact of using this application on maternal and child health behaviors, particularly in stunting prevention.

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