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UTILIZATION OF THE ANDROID APPLICATION SI-RAJA BUMIL (ESTIMATED FETAL WEIGHT OF PREGNANT WOMEN) IN MONITORING FETAL GROWTH IN MIDWIFE AT INDEPENDENT PREMISES IN TANJUNGPINANG CITY

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ABSTRACT
Estimated fetal weight is useful for tracking fetal growth in the womb, allowing for the early detection of aberrant fetal growth. With the advancement of technology, Android users can be used as a channel for health education information. The objective of this study was to look at how utilizing the Android application Si-RAJA Bumil (Estimated Fetal Weight of Pregnant Women) affects pregnant women's understanding of fetal growth monitoring. This study applied a quasi-experimental design with two groups pre-testing and post-testing. Samples of 60 pregnant women were collected using the Simple Random Sampling approach and divided into two groups: the intervention group and the control group. The Midwife Independent Practice in Tanjungpinang City collected data in September 2023. Wilcoxon and Mann-Whitney tests were used to analyze data. The knowledge value of pregnant women differs significantly between groups who do not utilize the Si-RAJA Bumil android application and groups that do, with a p-value of 0.003. Pregnant mothers are expected to be able to monitor their foetus' growth and development using technological media such as the Si-RAJA Bumil application

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1. INTRODUCTION

Pregnancy is the fertilization or union of spermatozoa and ovum, followed by nidation or implantation [1]. One of the usual activities in antenatal care is measuring the Fundus Uteri Height (TFU) to determine the Estimated Fetal Weight (TBJ) [2]. Estimated fetal weight (TBJ) is significant during pregnancy because intrauterine fetal growth is not continuous and is associated with a higher risk of difficulties during labor for both the mother and the infant. During pregnancy, the fetus's growth and development are expected to accelerate in order to avoid growth and development abnormalities and be delivered with a normal body weight [3].

Every pregnant lady should have a thorough awareness and knowledge of everything involved in her pregnancy. The intended outcome is a healthy pregnancy with safe conditions and an acceptable emotional state for both the mother and the fetus [3]. Health staff have supplied various information about fetal development, but it has failed to pique pregnant women's interest in participating in their fetus' care. This depends on her curiosity, thirst for knowledge, and readiness to learn [4]. Knowledge and ANC examinations have an impact on the baby's birth weight.

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Pregnant women's knowledge of estimating their fetal weight will influence fetal self-monitoring during pregnancy. This is because pregnant women who are well-informed would pay attention to fetal development issues such as healthy diet, gestational age, how frequently to check throughout pregnancy, pregnancy risk indicators, and normal fetal development [5].

The advancement of communication information technology in this century shows that there are several communication mediums available in the community, including health workers. Along with these technological advancements, Android can be used as a platform for health education content. Several studies have found that using mobile application-based technologies and the internet can help people improve their knowledge and nutrition awareness behavior [6].

Many health-related smartphone applications have been widely created, including those for diagnosis, disease therapy, and health education [7]. Previously, a Fetal Weight Estimation Android Application (Si-RAJA) was built to assist midwives and students in assessing the TBJ of pregnant women during Antenatal Care (ANC) examinations. Users can view the TBJ measurement findings and compare them to normal TBJ by entering data for the Uterine Fundus Height (TFU) and the lower section of the fetus. There is also a health education section that can be utilized as counseling material for patients.

This study focused on the evolution of the Si-RAJA android application into the Si-RAJA Bumil (Estimated Fetal Weight of Pregnant Women) android application, which pregnant women can use to track their fetal growth. The Si-RAJA Bumil application is intended to tell pregnant mothers about the estimated weight of their fetus. The app includes a fetal weight estimation counter, a weight gain counter, upper arm circumference, haemoglobin level status, and pregnancy-related health education. The app also includes a baby size function that displays fetal length and weight, as well as fetal development based on gestation age.

2. METHODS

This study applied a quasi-experimental design with two groups pre-testing and post-testing. The data were taken on September 2023. The population in this study consisted of pregnant women who visited Independent Midwife Practices (PMB) in Tanjungpinang City for ANC. The sample included 60 pregnant women who were separated into two groups: the intervention group and the corresponding control group. Sampling with the Simple Random Sampling approach. In this study, the dependent variable was pregnant women's knowledge, while the independent variable was their use of the Si-RAJA Bumil Android Application. In addition, the variable of reported benefits felt by pregnant women in using the Si-RAJA Bumil Application was evaluated.

This study used a questionnaire to collect data on respondent characteristics, knowledge questions, and remarks about perceived advantages. Each pregnant woman in both groups received a knowledge questionnaire (pre-test). Then, pregnant women in the control group received health information from their KIA Book (Maternal and Child Health). Pregnant women in the intervention group received an instruction booklet on how to use the application. The researcher assisted with the installation and showed how to utilize the application. Pregnant women's use of the program was followed for three weeks, after which their knowledge was tested again (post-test) in both groups. After 3 weeks of using the Si-RAJA Bumil application, the perceived benefits of using the application by pregnant women in the intervention group were also measured.

The collected data were analyzed using the Wilcoxon test to determine the difference in knowledge of pregnant women in each group. The mean difference in knowledge between groups was tested using the Mann Whitney test with the degree of significance for each test being 95%. This study has obtained ethical eligibility number EC.240/KEPK/STKBS/VIII/2023 from the Health Research Ethics Committee of the Bani Saleh College of Health Sciences.

3. FINDING AND DISCUSSION

3.1 Result

a. Characteristics of the Respondents

Table 1. Characteristics of Pregnant Women in Midwife Independent Practice, Tanjungpinang City

Characteristics	Frequency (n=60)	%
Age		
<20 years old, >40 years old	5	8.33
20-40 years old	55	91.67
Education		
Low	11	18.33
High	49	81.67

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Parity		
Primigravida	21	35
Multigravida	32	53.33
Grandemultipara	7	11.67

Table 1 shows the respondents' characteristics in terms of age, education, and parity. The majority of pregnant women, 55 (791.67%), were between the ages of 20 and 40, and 49 (81.67%) had a high level of education. The majority of replies, 32 in total (53.33%), were multigravida.

b. Perceived Benefits

Table 2. Perceived Benefits of Pregnant Women on the Use of the Pregnant Women's Fetal Weight Estimation Application (Si-RAJA Bumil)

	Mean	Median	SD	Range
Perceived Benefits	86.67	85	9.43	72.50-100

According to table 2, the typical pregnant women values the benefits of detecting her fetal development with the Android Application Estimated Fetal Weight of Pregnant Women (Si-RAJA Bumil) at 86.6 with a standard deviation of 9.43.

c. Analysis of Differential Test of Knowledge of Pregnant Women in the Group

Table 3. Analysis of Differential Test of Knowledge of Pregnant Women in the Group

	Control		Intervention	
	Pre Test	Post Test	Pre Test	Post Test
Mean (SD)	72.33 (13.05)	72.67 (14.61)	73.67 (9.99)	83.33 (9.94)
Median	80	80	80	90
Range	40-90	40-90	50-90	60-100
P value	0.655*		0.000*	

* Wilcoxon

Table 3 shows that the control group's mean pre-test score was 72.33 with a standard deviation of 13.05, and the mean post-test score was 72.67 with a standard deviation of 14.61 and a mean increase of 0.34. The mean pre-test score in the intervention group (using the Si-RAJA Bumil Application) was 73.67, with a standard deviation of 9.99. The mean post-test score rose to 83.33, with a standard deviation of 9.94 and an average increase of 9.66.

The control group's knowledge analysis utilizing the Wilcoxon test yielded a p-value of 0.655 ($p<0.05$), indicating no significant difference in pre-test and post-test knowledge values in the absence of the Si-RAJA Bumil Android application. The knowledge analysis in the intervention group yielded a p-value of 0.000 ($p<0.05$). So, based on this test, it can be determined that there is a considerable difference in knowledge before and after using the Si-RAJA Bumil Android Application.

d. Analysis of Differential Test of Knowledge of Pregnant Women Between Groups

Table 4. Analysis of Differential Test on Knowledge of Pregnant Women Between Groups

	Pre Test		Post Test	
	Control	Intervention	Control	Intervention
Mean (SD)	72.33 (13.05)	73.67 (9.99)	72.67 (14.61)	83.33 (9.94)
Median	80	80	80	90
Range	40-90	50-90	40-90	60-100
P value	0.867**		0.003**	

** Mann Whitney

The results of the pre-test analysis of knowledge between the control group and the intervention group showed a p-value of 0.867 ($p<0.05$) which means that there was no significant difference in the pre-test value of knowledge between the control group and the intervention group. The post-test examination of

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knowledge between the control and intervention groups using the Mann Whitney test showed a p-value of 0.003 ($p<0.05$). As a result of this test, it is possible to conclude that there is a substantial difference in post-test knowledge values between groups that do not use the Si-RAJA Bumil android application and groups that do.

3.2 Discussion

Antenatal Care (ANC) is a method of providing care during pregnancy and preparing for a comfortable birth with the goal of ensuring that both the mother and the baby are born healthy [8]. ANC care during pregnancy is provided to monitor the mother's pregnancy and fetus's health, as well as to physically and psychologically prepare the mother for birthing [9].

Knowing and tracking fetal growth is a vital process for both pregnant mothers and medical professionals. Monitoring prenatal development will make it easier to notice any aberrant fetal signs, allowing for prompt medical intervention. Fetal development is tracked, including the prediction of fetal weight and age [10]. Calculating the height of the fundus uteri as a health metric for fetal development is a simple procedure. The method for forecasting fetal weight by measuring the height of the fundus uteri has been thoroughly tested [11]. Several factors affect the utilization of the Pregnant Women Fetal Weight Estimation Application (Si-RAJA Bumil), including:

a. Characteristic of the Respondents

Pregnancy smartphone apps are the most widely utilized by pregnant women. The findings of this study showed that the majority of respondents were between the ages of 20 and 40. This data is in a line with that reported by Robinson et al. (2014) in a mobile analytics analysis, which found that 47% of all health app users use pregnancy applications [12], indicating that younger individuals are more comfortable with app usage.

In this research, it was also found that the majority of respondents were highly educated. A person's knowledge is affected by his or her level of schooling. Higher education will make it simpler to get more and diverse knowledge, allowing students to develop themselves, particularly in terms of seeking health information and improving their health. Education influences a person's knowledge, as well as his or her lifestyle choices [13]. This is in a line with research by Akowuah et al. (2018), which showed that a pregnant woman's level of education impacts her use of antenatal health services. The literature study also found that pregnant women's education level influences their use of prenatal care [14]. The higher the education, the easier it is to receive information in an effort to improve health.

In this study, it was found that the majority of respondents had multigravida parity. Pregnant women with more than one parity will seek health care because they have had risks in prior pregnancies and believe they need to have regular pregnancy examinations. Mothers with their first pregnancy will be motivated to get ANC checks because it is a novel experience [15]. However, the findings of this study differ from those given by Fleming et al. (2014) in a qualitative investigation, which found that primiparas utilize more applications to monitor pregnancy development. They typically feel apprehensive about pregnancy owing to unprecedented experiences and can feel soothed by using smartphone apps to overcome their concerns about giving birth. This can help them understand that their concerns about being pregnant and having their first child are normal. This shows that smartphone apps could be useful tools for young pregnant women [16].

b. Perceived Benefits of the Pregnant Women's Fetal Weight Estimation Application (Si-RAJA Bumil)

According to the Health Belief Model Theory, health behavior occurs only when a person recognizes that it benefits him/her [17]. According to the Health Belief Model Theory, perceived benefits encourage pregnant women to check their womb and determine the estimated weight of the fetus.

According to the finding of the study, the majority of pregnant women benefited from detecting their fetal development using the Android application Estimated Fetal Weight of Pregnant Women (Si-RAJA Bumil). When pregnant women believe that knowing the weight of the fetus and monitoring the growth and development of the baby they are carrying will benefit them, they will be more likely to use the Pregnant Women's Fetal Weight Estimation Application (Si-RAJA Bumil). The significance of perceiving the benefits of using the application in pregnant women aims to obtain information about pregnancy and is useful in locating information during pregnancy, which has the potential to motivate changes in health behavior during pregnancy [18].

According to Hapsari et al. (2023), perceived convenience, usefulness, and information quality all have a positive and significant effect on user interest in telemedicine applications. Perceived usefulness influences interest in use. If users believe that using technology will improve their job performance, they will be more interested in using it [19]. The concept of perceived benefits states that people behave healthily because they believe that what they do will benefit them, particularly in terms of lowering their risk of developing a disease [20].

c. The Effect of the Pregnant Women's Estimated Fetal Weight Application (Si-RAJA Bumil) to the Knowledge of Pregnant Women

Knowledge is the result of someone sensing a specific object. Knowledge is a tool for shaping a person's actions (overt behavior). Many mothers still lack knowledge about early childhood development, particularly while the fetus is still in the womb [21].

The findings showed no significant difference in the value of knowledge between the pre-test and post-test in the group that did not use the Si-RAJA Bumil Android Application. The results of knowledge analysis in the intervention group revealed a significant difference in knowledge before and after using the Si-RAJA Bumil Android Application. It is possible to conclude that there is a significant knowledge gap between groups that do not use the Si-RAJA Bumil android application and those that do.

Pregnant women's knowledge of foetal growth is essential for effective stimulation. One of the reasons for low maternal knowledge during pregnancy is a lack of counselling, information, and education (IEC) [22]. The rapid development of technology and information has an impact on health education, one of which is the use of learning media such as smartphones that can be carried and used anywhere and anytime [23].

Although device applications for pregnant women have been developed, they only serve as guides for pregnant women by displaying articles about fetal development. Pregnant women-related applications on the Android Play store, for example, present pregnancy articles and information. In addition to being an auxiliary media for calculating TBJ, the Si-RAJA Bumil application uses android-based smartphone technology to promote health. The Si-RAJA Bumil application includes a menu for How to Increase TBJ, Upper Arm Circumference, Weight Gain, Hb Levels, and Baby Size, which contains health information that pregnant women need to keep their fetus healthy. Smartphone applications are a useful and cost-effective way to disseminate health benefit information to the public. As a health promotion medium, smartphone apps have the advantage of being able to provide a variety of features such as engaging visual, video, and audio design capabilities, unlimited text capabilities, access with or without a mobile or internet connection, content that can be shared via social media, and progress tracking anywhere and at any time [24].

Smartphone applications are effectively used as a medium for conveying information, thereby increasing maternal knowledge [25]. According to Puspitasari and Indrianingrum (2021), the m-health application has a greater impact on pregnant women's knowledge of the danger signs of third trimester pregnancy than the KIA book [26]. Wulandari et al. (2018) found that pregnant women's knowledge increased by 68% after using the application to monitor the growth and development of their foetus [27].

4. CONCLUSION

The study concludes that the average pregnant woman benefits from detecting her fetal development with the Android application Estimated Fetal Weight of Pregnant Women (Si-RAJA Bumil) of 86.6. The value of pregnant women's knowledge about fetal growth varies significantly between groups that do not use the Si-RAJA Bumil android application and groups that do. Pregnant women are expected to be able to monitor their foetus' growth and development using technological media such as the Si-RAJA Bumil application.

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