RESEARCH ARTICLE

The Impact of Android-based Pregnancy Education and Care on Enhancing Maternal Health Behavior

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ABSTRACT Pregnancy begins with the meeting of egg and sperm cells so that fertilization occurs, followed by implantation until the birth of the fetus. The coronavirus pandemic has led to various limitations, shortages of personal protective equipment (PPE), fear of being overwhelmed with COVID-19 cases. The maternal mortality rate increased in 2021 during the Covid-19 pandemic to reach 234.7 per 100,000 live births. The lowest MMR was in Surabaya, which was 42.33 per 100,000 live births. This study used a quantitative approach with a Quasi-Experimental design using a One-group pretest-posttest design with a sample of 51 respondents and 1 intervention group. The technique for taking samples using Purposive Sampling. The research instrument used a questionnaire sheet to determine the behavior of pregnant women. This research was conducted in February - April 2023. The analytical method used univariate and bivariate analysis using the Wilcoxon test. The results showed that there was a significant increase in behavior with the result that the p value on knowledge = 0.005 p < α (0.05), attitude = 0.008 p < α (0.05), action = 0.019 p < α (0.05). The results of the study showed the effect of using Android-based educational and treatment applications to increase behavior in pregnant women. So it is advisable for pregnant women to use Android-based pregnancy education and care applications to increase knowledge, attitudes, and actions about pregnancy.

INDEX TERMS application; pregnant women; behavior

I.   INTRODUCTION

Pregnancy begins with the process of meeting egg cells and sperm cells so that fertilization occurs, followed by implantation until the birth of the fetus [1]. The length of pregnancy is calculated from the first day of the last menstruation, but actually fertilization occurs about 2 weeks after the last menstruation. So that the post-conceptional age of the fetus is two weeks less than the calculation since the last menstruation, which is 266 days or 38 weeks. Pregnancy is divided into 3 trimesters, namely the first trimester of gestational age 0-12 weeks, the second trimester of gestational age 12+1-28 weeks and the third trimester of gestational age 28+1-40 weeks.

The coronavirus pandemic has caused various limitations and shortages personal protective equipment (PPE), fear of being overwhelmed by COVID-19 cases, recommendations to cancel all non-emergency procedures, and indications that limiting visitors can help reduce unnecessary exposure. In this context, pregnant women still need examinations, delivery and postnatal care [2] [3]. If there is no pregnancy visit, there are also no identified danger signs during pregnancy, the mother and baby are at risk of bleeding during pregnancy if this ANC (Antenatal Care) visit is not carried out [4] [5]. The maternal mortality rate in East Java will increase in 2021Covid-19 pandemic where pregnancy check-up visits are limited. So that the assessment of high-risk pregnant women is inaccurate, causing maternal death in different cases (confirmation of the corona virus), some urban areas do not carry out ANC less than once per trimester due to the corona virus pandemic. In 2019, the East Java Region Maternal Mortality Rate reached 89.81 per 100,000 live births. In 2020, it reached 98.39 per 100,000 live births [6]. In 2021, East Java's MMR will reach 234.7 per 100,000 live births. Meanwhile, the figure for the MMR per Regency/City in

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East Java in 2021 is that the lowest MMR is in the city of Surabaya, namely 42.33 per 100.000 live births [7]. During pregnancy, several efforts to maintain and increase maternal antenatal visits require extra attention so that the health condition of pregnant women is safely maintained by trying to carry out integrated antenatal visits in normal pregnancies at least 6x during pregnancy with details 2x in Trimesters 1, 1x in Trimesters 2 , and 3x in Trimesters 3. In this case, pregnant women are expected to always maintain their health by consuming a balanced nutritious diet, maintaining personal hygiene and continuing to do physical activity. Physical activity can be in the form of exercise for pregnant women/yoga/Pilates/stretching muscles and body independently at home so that mothers stay fit and healthy. Pregnant women still consume Blood Supplement Tablets according to the dosage given by health workers [8][9][10]. The balance of technology is currently very fast, especially in the field of technology. One of them is the application, which provides advanced features such as electronic letters, internet, and the ability to read electronic books (e-books). Almost all smartphones currently have an Android operating system. these applications can be in the form of games, social media, photo editors, video editors to applications that can provide informative information related to maternal and child health [11].

Based on the conditions described above, in this final project a thousand pregnancy education applications and pregnancy care for pregnant women based on Android will be created. It is believed that this application can be useful and assist pregnant women in overcoming all the problems described above by using data innovation and correlation.

II. METHODS

The type of research used in this research is quantitative research using Quasi-Experimental Methods. The Quas Experimental Method is a study that places experimental units into experimental and control groups which is carried out non-randomly (non-random assignment). There are 4 large groups in this quasi-experimental design, one of which is a design without a control group or a design without pre-treatment measurements [12].

The research design used was a one-group pre-treatment and post-treatment design (One-group pretest-posttest design). There are groups that are selected, then given a pre-test to determine the initial situation, then given a post-test after being given the intervention which aims to identify the effect of providing the intervention [5] [13].

The population in this study were 308 pregnant women at the Krembangan Selatan Health Center in Surabaya for the 2022-2023 period. Sampling in this study that met the inclusion and exclusion criteria were 51 pregnant women. The inclusion criteria in this study were: 1) Having a KIA book, 2) Understanding of operating a device with the Android operating system, 3) Willing to be a respondent. While the exclusion criteria in this study were: 1) Respondents who did not have an Android cellphone, 2)

Respondents who were not present when the research was conducted, 3) Respondents had moved domiciles, 4) Respondents who gave birth during the study. The analytical method uses univariate and bivariate analysis using the Wilcoxon signed rank test. The limitation in this research is that when disseminating the application it still uses barcodes which require an internet network, and the barcode is only valid for 10 minutes to ±3 respondents and after the 10 minutes are finished to continue the intervention, the researcher must update the barcode as before so that it can be given to the next respondent.

III. RESULT

Based on the TABLE 1, it can be seen that most pregnant women are 20-35 years old (90.2%). The highest number of educations taken by pregnant women is secondary school (78.4%) and many pregnant women do not employ (72.5%). It can be seen the most pregnancies are in the third trimester (45.1) and the most are in primipara parity (54.9%). According to TABLE 2, for the category of respondent's level of knowledge, there is a change in each level of knowledge. In good knowledge there was an increase of 13.7%.

TABLE 1
Characteristics of pregnant women

Characteristics	Frequency (f)	Percentage (%)
Age (years)		
<20	1	2.0
20-35	46	90.2
>35	4	7.8
Education		
High	4	7.8
Secondary	40	78.4
Basic	7	13.7
Did not school	0	0
Employment status		
Employed	14	27.5
Not employed	37	72.5
Parity		
Primipara	28	54.9
Multipara	23	45.1
Grandemultipara	0	0
Gestational age		
Trimester I	9	17.6
Trimester II	19	37.3
Trimester III	23	45.1

TABLE 2
Frequency Distribution of Respondents Knowledge Level

Knowledge Level	Before		After	
	Freq. (f)	Perc. (%)	Freq. (f)	Perc.(%)
Less	4	7.8	0	0
Enough	5	9.8	2	3.9
Good	42	82.4	49	96.1

From the results oof the Wilcoxon Signed Ranks Test, the p value = 0.005 (there was an effect of using Android-based pregnancy education and care applications to improve

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knowledge in pregnant women) (TABLE 3). According to TABLE 4, for the category of respondent's level of attitude, there is a change in each level of attitude. In good attitude there was an increase of 19.6%. From the results oof the Wilcoxon Signed Ranks Test, the p value = 0.008 (there was an effect of using Android-based pregnancy education and care applications to improve attitudes in pregnant women). According to table 6, for the category of respondent's level of practice, there is a change in each level of practice. In good practice there was an increase of 15.7% (TABLE 5).

TABLE 3
Effect of Respondents Knowledge (n=51)

	Value Min-Max	Median	Mean	Std. Deviation	p
Before	2-10	9	8.59	1.780	0.005
After	6-10	10	9.61	0.874	

*) Wilcoxon Signed Ranks Test

TABLE 4
Frequency Distribution of Respondents Attitude Level

Attitude Level	Before		After	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Less	1	2.0	0	0
Enough	11	21.6	2	3.9
Good	39	76.5	49	96.1

TABLE 5
Effect of Respondents Attitude (n=51)

	Value Min-Max	Median	Mean	Std. Deviation	p
Before	23-35	26	26.78	2.671	0.008
After	23-32	29	28.39	2.376	

*) Wilcoxon Signed Ranks Test

TABLE 6
Frequency Distribution of Respondents Practice Level

Practice Level	Before		After	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Less	2	3.9	0	0
Enough	8	15.7	2	3.9
Good	41	80.4	49	96.1

TABLE 7
Effect of Respondents Practice (n=51)

	Value Minimum-Maximum	Median	Mean	Std. Deviation	p
Before	3-7	7	6.39	0.961	0.019
After	5-7	7	6.82	0.478	

*) Wilcoxon Signed Ranks Test

From the results oof the Wilcoxon Signed Ranks Test, the p value = 0.019 (there was an effect of using Android-based

pregnancy education and care applications to improve practice in pregnant women) (TABLE 6 and TABLE 7).

VI. DISCUSSION

A. Effects of Using Android-Based Pregnancy Education and Care Applications to Increase Knowledge of Pregnant Women

Based on the results of the study, there was a change in the respondents' knowledge for the better after being given the pregnancy application media intervention. After the data analysis test was carried out, the results obtained at the significance level, that the results of this study affected the respondents' knowledge after using Android-based pregnancy education and care applications.

Knowledge, according to Notoatmodjo in Naomi (2019), is the result of "knowing" that occurs after people sense a certain object. Sensing through the five senses, namely: the sense of sight, the sense of hearing, the sense of smell, the sense of taste and the sense of touch. Eyes and ears are a large part of human knowledge [14]. The level of knowledge in the knowledge domain has 6 levels, namely knowing, understanding, application/applying, analysis, synthesis and evaluation. Factors that influence knowledge are internal factors and external factors. Internal factors include education, work, and age. While external factors include environmental factors and socio-cultural factors [14].

The results of research conducted by Santillan et al, state that the development and application of knowledge-based knowledge about mothers and children has significantly increased our capacity to conduct research related to pregnancy and health surveillance [15]. The results of research by Amwonya, Kigosa and Kizza, state that the higher a woman is sent to school, the greater the chance for maternal health updates. Therefore, as an effort to improve professional utilization of maternal health services, there is a need to focus on women's education [16].

The results of this study indicate that a person's knowledge is influenced by several things, one of which is the age factor. Someone who is of productive age has good knowledge skills. So, at this age has an influence on the level of knowledge. A person's age can also affect one's comprehension and mindset. Whereas you get older, the level of thinking will be more mature and more mature. Besides that, there are educational factors, education also plays an important role in knowledge and perception of something. Education has the authority to influence a person's lifestyle, and determine goals and achieve these goals. Someone will start the learning process through education, and will try to update the knowledge that needs to be learned and will manage or use something that is considered appropriate for him, including knowledge of pregnancy. The higher the education, the higher the knowledge a person will have. Based on the theory and data that have been obtained by researchers there is harmony, because the older you are, the

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more mature and more mature your level of thinking will be. And with higher education, the higher one's knowledge will be. So, it can be concluded that there is a significant influence between the respondents' knowledge of Android-based pregnancy education and care applications.

B. EFFECTS OF USING ANDROID-BASED PREGNANCY EDUCATION AND CARE APPLICATIONS TO INCREASE ATTITUDE OF PREGNANT WOMEN

Based on the results of the study, there was a change in the attitude of the respondents for the better after being given the pregnancy application media intervention. After the data analysis test was carried out, the results obtained at the significance level, that the results of this study influenced the attitudes of respondents after using Android-based pregnancy education and care applications. Attitude is a person's closed reaction to an object or stimulus that involves factors from the opinions and emotions concerned. Attitudes cannot be seen directly but can be interpreted through behavior. Humans have 3 main components of attitude, namely beliefs, ideas and concepts of an object, emotional life/people's evaluation of objects, and the tendency to act. The level of attitude to determine a complete attitude, namely accepting, responding, appreciating, and being responsible [14].

The research of Liu et al (2021), investigated the experience and satisfaction of women who had received midwife-led birth care. This study contributes knowledge to understanding experiences and perspectives and the results can be used for improvements in the quality of care subsequently to respond adequately to women's needs. To achieve this, greater effort should be put into midwifery education, training, regulation and environmental empowerment [17]. Research Rodríguez-Burbano, Galván-Canchila and de Diego-Cordero, this knowledge has allowed them to positively recognize certain topics such as the choice of contraceptive methods and abortion, differential and protected care and treatment of women when they are vulnerable and violated. The results of Herval et al's, research on health education are still needed, including that a higher number of patients should develop in rural populations, who present different characteristics from urban areas [18]. The results of Herval et al's (2019) research on health education are still needed, including that a higher number of patients should develop in rural populations, who present different characteristics from urban areas. Thus, there are various kinds of health education methodologies, and policy makers can use them according to the desired results [19].

The results of this study indicate that attitude is closely related to knowledge and experience, if someone has good knowledge then they will have a positive attitude. And vice versa, someone who has less knowledge will have a negative attitude. But this is not a benchmark because some people who have good/high knowledge do not necessarily have good attitudes and behavior towards a situation. Someone who has

experience in an incident or event and it happens repeatedly, it will gradually affect the formation of one's attitude. Based on the theory and data that have been obtained by researchers there is harmony, it can be concluded that there is a significant influence between the attitudes of respondents towards Android-based pregnancy education and care applications.

C. EFFECTS OF USING ANDROID-BASED PREGNANCY EDUCATION AND CARE APPLICATIONS TO INCREASE PRACTICE OF PREGNANT WOMEN

Based on the results of the study, it was found that changes in the respondents' actions became better after being given the pregnancy application media intervention. After the data analysis test was carried out, the results obtained at the significance level, that the results of this study influenced the respondents' actions after using Android-based pregnancy education and care applications.

Health practice/action is a process that is expected to be carried out or practiced about what is known or addressed which has been assessed well before someone knows the object or health stimulus. To measure and observe someone's actions or behavior can be done directly or indirectly. Practice has several levels, namely perception, guided response, mechanism, adoption. In health practice, there are 3 indicators, namely practices/actions related to disease, practices/actions to maintain and improve health, and practices/actions in environmental health [14].

The results of the research by Naqvi et al, show that currently the level of knowledge of pregnant women about COVID-19 is growing, implementing effective containment measures is necessary. To help achieve this, increased knowledge and practice among pregnant women is needed [9]. The results of the research study Maniam et al, show that there is a relationship between overall practice and age, years of experience, and knowledge. Continuing medical education plays an important role as a catalyst in enhancing and enforcing knowledge among primary care physicians as part of efforts to solidify their practice. Therefore, it is suggested to increase knowledge and awareness in health care to educate through collaboration as part of antenatal care [20]. The results of the research study Maniam et al (2022) show that there is a relationship between overall practice and age, years of experience, and knowledge. Continuing medical education plays an important role as a catalyst in enhancing and enforcing knowledge among primary care physicians as part of efforts to solidify their practice. Therefore, it is suggested to increase knowledge and awareness in health care to educate through collaboration as part of antenatal care [21].

The results of this study indicate that action is related to knowledge, education, work and the environment. The author makes indirect observations by asking questions addressed to pregnant women during their pregnancy, as well as making direct observations by observing/observing mothers when they visit. Respondents who have a good education so that

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they have good knowledge will have the ability to understand, practice and carry out their roles. As well as most of the respondents who did not work had more free time to open the Android-based pregnancy education and care application that had been provided. It is known that most of the respondents have good actions. Another enabling factor influencing the good behavior of the respondents in this study was the availability of health services so that the respondents could reach out to have their pregnancies checked. The environment also has a role in determining one's actions. A good environment will support a person to have good actions, and vice versa if a person's environment is less supportive then taking action will be hampered.

In the practice questionnaire, there were statements that some respondents still made forced pregnancy visits, did not consume FE tablets regularly, and had not yet carried out integrated laboratory tests. After being given an intervention through an android-based pregnancy education and care application that I gave, the behavior of pregnant women changed for the better. Where initially they were forced to make pregnancy visits, they became diligent in consuming FE tablets, and they wanted to carry out integrated laboratory tests for the health of the mother and fetus. Based on the theory and data that the researchers have obtained, there is harmony, so it can be concluded that there is a significant influence between the respondents' practice on Android-based pregnancy education and care applications.

VII. CONCLUSION

The use of Android-based educational and pregnancy care applications influences the behavior of pregnant women for the better. With an Android-based educational and pregnancy care application, it can reduce maternal and child mortality due to Covid-19

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