



# Effectiveness of the My ADA Application on ANC Visiting Behaviour of Pregnant Women in the Cities of Bengkulu and Cilandak, South Jakarta

Yuniarti<sup>1</sup>, Elvi Destariyani<sup>2</sup>, Erlin Puspita<sup>3</sup>, Nurhayati<sup>4</sup>

<sup>1,2</sup>Politeknik Kesehatan Kementerian Kesehatan Bengkulu

<sup>3,4</sup>Politeknik Kesehatan Kementerian Kesehatan I Jakarta

Email corespondensi : [destariyani@poltekkesbengkulu.ac.id](mailto:destariyani@poltekkesbengkulu.ac.id)

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## Abstract

*Antenatal care (ANC) is a medical service that expectant mothers get from qualified personnel. In the current era of digitization, apps are extremely required since they may make things simpler. ANC results are often entered in the KIA book, but recording is still done by hand, and pregnant women frequently forget to bring the KIA book. The purpose of this study is to evaluate the application's efficacy. My ADA on the ANC visitation patterns of expectant mothers in South Jakarta's Bengkulu and Cilandak cities. This kind of quantitative study employs a control group design in a quasi-experimental setting. The study will be conducted in Cilandak, South Jakarta, and PMB Bengkulu City. In 2023, there were 6,279 pregnant women in the PMB neighborhood of Bengkulu City, Cilandak, South Jakarta; 106 of them were selected using the purposive sampling approach. Pregnant women's average knowledge of ANC increased in the intervention group using the My ADA application compared to the control group using the KIA book. The intervention group's knowledge increased with a p-value of  $0.000 < 0.05$ , indicating that the My ADA application had an impact on pregnant women's knowledge, while the intervention group's p-value of  $0.000 < 0.05$  indicated that the KIA book had an impact on pregnant women's knowledge of ANC in South Jakarta. The Mann-Whitney test results showed that Mean P-Value = 0.000, there is a difference in the average knowledge score between the My ADA application group and the KIA book group, so it can be concluded that the My ADA Application is more effective in increasing pregnant women's knowledge about ANC compared to KIA book.*

**Keyword:** Application, Attitude, Knowledge, Pregnant

## INTRODUCTION

Pregnancy is a critical phase that requires special attention, both from pregnant women and health workers. One important effort to maintain the health of mothers and babies is Antenatal Care (ANC), which is a series of health services designed to monitor the health condition of pregnant women and fetuses and prevent complications during pregnancy. However, the level of ANC visits in various regions is still not optimal.

Service coverage for K4 pregnant women in Indonesia in 2020 decreased compared to 2020, from 88.54% to 84.6%, indicating that Ante Natal Care (ANC) services are still relatively low. Nationally, it is still below the Minimum Service Standards (SPM) target, which is 95%. (Taji & Hendrati, 2023).

Bengkulu Province in 2019 the coverage of K4 visits for pregnant women was 87% and in 2020 it decreased by 86.6% and in Bengkulu City in 2020 the coverage of K1 visits was

7,399 (79.2%), K4 coverage decreased by 6,267 (84.06%). (Dinas Kesehatan propinsi Bengkulu, 2021). Factors such as lack of access to information, low awareness of pregnant women, and limited health personnel are the main obstacles. To overcome this challenge, technological innovations such as applications such as My ADA have been introduced as one of the digital solutions.

Application My ADA is designed to facilitate pregnant women in obtaining health information, arranging ANC visit schedules, and providing reminder notifications regarding pregnancy checks. Apart from that, this application also provides interactive features for remote consultations with health workers. Several studies show that technology-based interventions have great potential to increase pregnant women's compliance with ANC visits. For example, a survey by Nurhayati et al. (2021) revealed that digital health applications were able to improve the health behavior of pregnant women, including the frequency of ANC visits.

The KIA book is used in the application to track the mother's and the fetus's progress during pregnancy in the KIA book there is a record of the development of the mother and fetus at each visit which in practice is not optimal because it has various weaknesses, one of which is that the recording is still manual, carried out by midwives, during ANC checks it is often forgot to bring the KIA book and was not practical. So innovation in Android-based information and communication technology programs is needed providing online-based monitoring of antenatal care.(Kurnain, Zirmansyah, & Nurfadilah, 2022)

Based on research, it is stated that applications are one of the effective methods today because everyone uses them smartphones, applications are really needed by pregnant women in monitoring pregnancy. (Pouriayevali, Ehteshami, Kohan, & Saghaeiannejad-Isfahani, 2022). "My ADA" is an ANC app designed for expectant mothers based on earlier studies. Four features of the Android-based My ADA application—functional appropriateness, usability, dependability, and performance efficiency—were determined by the research findings. The My ADA application's development yielded findings that were deemed very appropriate for usage and might be suggested for ANC exams in expectant mothers. ( dkk Yuniarti, 2023)

Various studies on the effect of counseling about antenatal care on increasing ANC visits show significant results, but the media used is still print media, namely books, which do not get maximum results (Raru et al., 2022). The findings of the study demonstrated a connection between ANC visits and knowledge. The more information that can influence or increase knowledge, knowledge will create awareness which will ultimately lead to behavior according to the knowledge they have. (Eppang, 2020), (Yenita, Yanti, Febriani, & Mulyadi,

2022)

Good knowledge about pregnancy causes mothers to be motivated to maintain their pregnancy, obeying the advice of the prenatal examiner, so that the mother can go through her pregnancy well and produce a healthy baby. (Marshall et al., 2022). The health education provided is an activity to convey messages, provide confidence that can make people aware, know and understand, even willing and will carry out recommendations given regarding health. (Udoudom, Igiri, George, & Aruku, 2023). In light of this, the authors are eager to investigate the impact of MY ADA application.

However, the effectiveness of this application requires further analysis, especially in the local context of Indonesia. It is important to evaluate whether the application is like My ADA and can overcome geographic, social, and economic barriers that often act as barriers for pregnant women to access ANC services.

Based on research, it is stated that applications are one of the effective methods today because everyone uses them smartphones, applications are really needed by pregnant women in monitoring pregnancy. (Pouriayevali, Ehteshami, Kohan, & Saghaeiannejad-Isfahani, 2022). Previous research has created an ANC application for pregnant women, namely "My ADA". Four features of the Android-based My ADA application—functional appropriateness, usability, dependability, and performance efficiency—were determined by the research findings. The My ADA application's development yielded findings that were deemed very appropriate for usage and might be suggested for ANC exams in expectant mothers. ( dkk Yuniarti, 2023)

Various studies on the effect of counseling about antenatal care on increasing ANC visits show significant results, but the media used is still print media, namely books, which do not get maximum results. (Raru et al., 2022). The study's findings demonstrated a connection between ANC visits and knowledge. The more information that can influence or increase knowledge, knowledge will create awareness which will ultimately lead to behavior according to the knowledge they have. (Eppang, 2020), (Yenita, Yanti, Febriani, & Mulyadi, 2022)

A mother who has good understanding about pregnancy is more inclined to stick with it and follow the prenatal examiner's advise in order to have a healthy pregnancy and a healthy baby (Marshall et al., 2022). The health education provided is an activity to convey messages, provide confidence that can make people aware, know and understand, even willing and will carry out recommendations given regarding health. (Udoudom, Igiri, George, & Aruku, 2023). Accordingly, the authors are eager to investigate the impact of MY ADA application.

The purpose of this study is to examine how well the My ADA app works to alter pregnant women's ANC visitation patterns in Bengkulu City. Research is anticipated to improve and enhance the quality of mother and child health care in the area by determining how successful this application is. This study's primary goal is to assess behavior changes by looking at application usage, user satisfaction, and implementation challenges.

## METHODS

Before starting the intervention, we collected baseline data from both groups (intervention and control), including age, education level, and parity (number of children). Statistical analysis was conducted using the chi-square test for education level and parity variables, and a t-test for the age variable. This ensured that both groups were balanced before the intervention. The results showed a p-value  $> 0.05$ , indicating no significant differences between the intervention and control groups.

A closed-ended knowledge questionnaire (using a Likert scale) was utilized to evaluate mothers' knowledge levels about ANC visits, the benefits of *My ADA*, and pregnancy-related information. Attitude assessment was conducted through a Likert-based questionnaire that covered perceptions of ANC, comfort in using the application, and attitudes toward changes in pregnancy-related behaviors. A user satisfaction survey regarding the application covered aspects such as accessibility, interface design, and perceived benefits.

**Questionnaire Validity:** Content validity was assessed by a panel of maternal and child health experts. Reliability testing was conducted using Cronbach's Alpha, with an index  $\geq 0.7$  considered satisfactory. A pilot test was performed on a small sample of the target population to ensure reliability. Both groups received the same explanation about the importance of ANC and equal attention from healthcare professionals. The only difference was that the intervention group utilized *My ADA*. Data was consistently recorded by the same team for both groups.

This type of quantitative research uses a quasi-experimental design with control group design. The research will be conducted at PMB Bengkulu City and Cilandak, South Jakarta. All pregnant women in the PMB area of Bengkulu City, Cilandak, South Jakarta in 2023 numbered 6,279, a sample of 106, namely the Antenatalcare Application group, 53 people and the KIA book group, 53 people. Sampling was taken purposive sampling technique. Before giving the treatment the research distributed pre-test questionnaires about antenatal care. Before providing treatment, the researcher distributed a pre-test questionnaire about antenatal care and continued with the intervention using the MY application for the intervention group and the KIA book for the control group, followed by the implementation of the post test questionnaire. Data were analyzed using paired sample T-test and Mann-Whitney. This study

approved by the ethics committee of Poltekkes Kemenkes Bengkulu, Indonesia (Number KEPK. BKL/033 /02/2024).

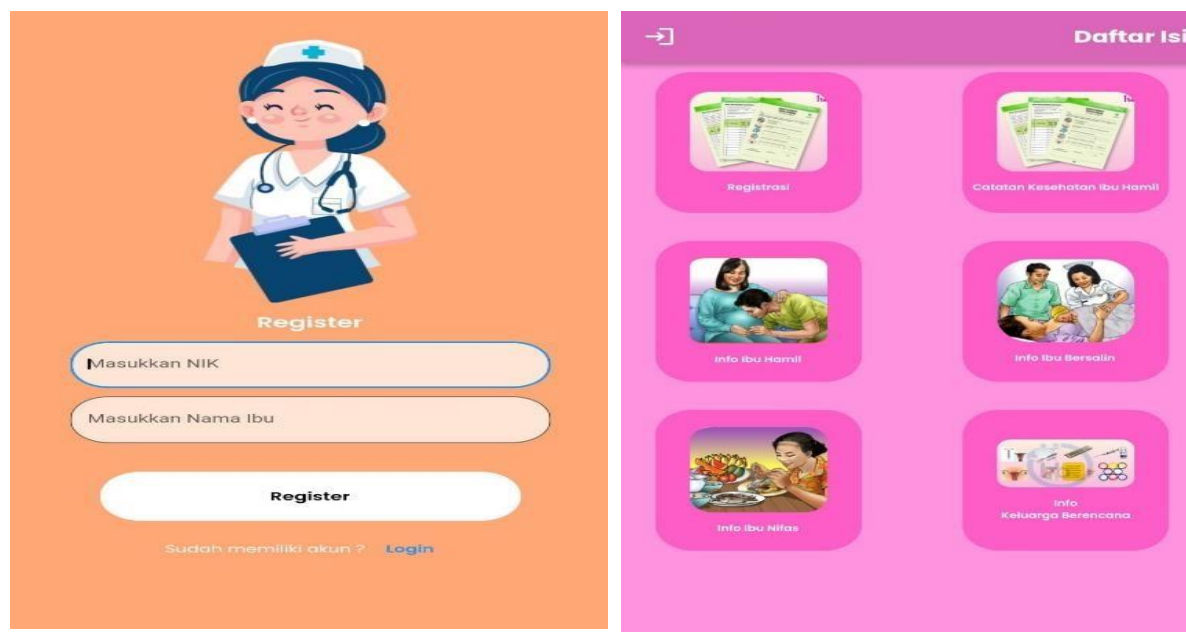


Figure 1. MY ADA Application

## RESULTS

**Table 1. Average Knowledge and attitudes of Pregnant Women about ANC Characteristics of Respondents (n=106)**

Variabel	N	Mean	$\Delta\bar{x}$	Min	Max	SD
<b>Knowledge</b>						
MY ADA Application Group						
- Before	53	58,94	26,15	40	86	11,936
- After	53	85,09		50	100	11,553
ANC Book Group						
- Before	53	50,98	5,3	30	67	9,166
- After	53	56,28		34	70	7,774
<b>Attitude</b>						
MY ADA Application Group						
- Before	53	64,21	25,75	40	88	13,427
- After	53	89,96		75	100	8,658
ANC Book Group						
- Before	53	53,15	7,0	32	69	8,767
- After	53	60,15		39	75	8,372

Based on the results, it shows that respondents in the intervention group had an average knowledge score before the intervention was (58.94), a minimum score of 40 and a maximum score of 86, using a standard deviation of 11.936, after the intervention the average increased to (85.09), a minimum score of 50 and the score maximum 100 with a standard deviation of 11.553, obtained a mean difference of (26.15).

In the control group the average knowledge score before the intervention was (50.98) a

minimum score of 30 and a maximum score of 67, with a standard deviation of 9.166 after the intervention the average increased to (56.28) a minimum score of 34 and a maximum score of 70 using a standard deviation of 7.774, obtained a mean difference of (5.3).

Based on the results, it shows that respondents in the intervention group had an average attitude score before the intervention was (64.21), a minimum score of 40 and a maximum score of 88, with a standard deviation of 13.427, after the intervention the average increased to (89.96), a minimum score of 75 and a maximum score of 100 using a standard deviation of 8.658 obtained a mean difference of (25.75).

In the control group the average attitude score before the intervention was (53.15) a minimum score of 32 and a maximum score of 69, with a standard deviation of 8.767 after the intervention the average increased to (60.15) a minimum score of 39 and a maximum score of 75 using a standard deviation of 8.372, obtained a mean difference of (7.0). More details are presented in Table 2:

**Table 2. Tests of Normality**

	Kolmogorov-Smirnova		
	Statistic	df	Sig.
<b>Knowledge</b>			
Pretest MY ADA Appliacion Group	,106	53	,199
Posttest MY ADA Appliacion Group	,098	53	,200*
Pretest ANC Book Group	,159	53	,002
Posttest ANC Book Group	,194	53	,000
<b>Attitude</b>			
Pretest MY ADA Appliacion Group	,107	53	,194
Posttest MY ADA Appliacion Group	,198	53	,000
Pretest ANC Book Group	,154	53	,003
Posttest ANC Book Group	,158	53	,002

From the results of the normality test, it was found that the only data that was normally distributed was the pretest and posttest knowledge data of the intervention group and the pretest attitude of the intervention group, so the test used to see the effect of knowledge in the case group used the dependent t-test, while for other data the Wilcoxon test was used, then to see the effectiveness of the application using the Mann test Whitney.

**Table 3. The Effectiveness of the My ADA Application on pregnant women's knowledge about ANC**

Variabel	N	Mean	$\Delta\bar{x}$	SD	P Value
<b>Knowledge</b>					
- Before	53	58,94	26,15	11,936	0,000
- After	53	85,09		11,553	

Based on table 3 The dependent t-test findings indicated that the My ADA application had an impact on pregnant women's understanding of ANC in Bengkulu City, with a p-value of  $0.000 < 0.05$  for the intervention group.

**Table 4. The Effectiveness of the My ADA Application on pregnant women's attitude about ANC**

Variable	N	Mean Rank	P Value
<b>Intervention Group</b>			
- Negative Ranks	0	0,00	0,000
- Positive Ranks	53	27,00	
- Ties	0		

The Wilcoxon test findings indicated that the intervention group's attitude was p-value= $0.000 < 0.05$ , indicating that the My ADA application had an impact on pregnant women's views on ANC in Bengkulu City.

**Table 5. Effect of Maternal and Child Health (KIA) books on pregnant women's knowledge and attitudes about ANC in the Control Group**

Variable	N	Mean Rank	P Value
<b>Knowledge</b>			
- Negative Ranks	6	11,58	0,000
- Positive Ranks	37	23,69	
- Ties	10		
<b>Attitude</b>			
- Negative Ranks	4	9,75	0,000
- Positive Ranks	42	24,81	
- Ties	7		

Based on table 5, the results of the Wilcoxon test showed that knowledge in the control group was p-value= $0.000 < 0.05$ , meaning there was an influence of the Maternal and Child Health (KIA) book on pregnant women's knowledge about ANC in South Jakarta.

The attitude variable in the control group with a p-value =  $0.000 < 0.05$  means that there is an influence of the Maternal and Child Health (KIA) book on the attitudes of pregnant women about ANC in South Jakarta.

**Table 6. Effectiveness of the My ADA Application on pregnant women's knowledge and attitudes about ANC**

Variabel	Mean	Beda Mean	Mean Rank	P-Value
<b>Knowledge</b>				
- MY ADA Appliacion Group	85,09	28,81	78,41	0.000
- ANC Book Group	56,28		28,59	
<b>Attitude</b>				
MY ADA Appliacion Group	89,96	29,81	79,99	0.000
ANC Book Group	60,15		27,01	

According to the Mann-Whitney test findings, the Maternal and Child Health (KIA)

book group's mean knowledge was 56.28 and the My ADA group's mean knowledge was 85.09, with a mean difference of 28.81 and P-Value =  $0.000 < 0.05$ . This indicates that the Maternal and Child Health (KIA) book group and the My ADA application group had different average knowledge scores. (60.15) with a Mean Difference of 29.81 and P-Value =  $0.000 < 0.05$ , indicating that the average attitude score of the Maternal Health and Health book group and the My ADA application group differs.

Children (KIA), it can be concluded that the My ADA Application is more effective in increasing the knowledge and attitudes of pregnant women about ANC compared to the Maternal and Child Health (KIA) book.

## DISCUSSION

Application effectiveness *My ADA* towards the knowledge and attitudes of pregnant women about Antenatal Care (ANC) showed significant results. This application has been proven to be able to increase pregnant women's understanding of the importance of regular pregnancy checks, provide easily accessible educational information, and encourage positive attitude changes towards the implementation of ANC. With interactive features, relevant content and high accessibility, *My ADA* not only helps overcome limited information, but also builds pregnant women's awareness of their responsibility for pregnancy health. Overall, this application can be relied on as a digital innovation in supporting maternal and child health programs, and has the potential to become a model for developing similar applications in other health fields. However, for sustainability and wider impact, support from health workers, feature improvements and increased outreach to the community are needed.

Based on the research results, it was found that there was an increase in the average score of knowledge and attitudes of pregnant women about ANC in the intervention group using the My ADA Application and in the control group using the Maternal and Child Health (KIA) book. This is in line with the My ADA application guidebook that the My ADA application is an effort to improve knowledge, attitudes of pregnant women and documentation of Antenatal Care (ANC) visits. This is also in line with the objectives of the Maternal and Child Health (KIA) book, namely to increase mothers' knowledge, attitudes and understanding regarding maternal and child health so that mothers can detect maternal and child health early (Risatamaya et al., 2023).

Efforts to increase information that can be made include the use of Maternal and Child Health (KIA) books by mothers. Information related to maternal and child health has become easier for mothers to access through interactions between mothers and health workers, other



health information media, thereby increasing mothers' understanding and knowledge of maternal and child health information (Herfanda & Subiyatun, 2021).

Knowledge is a very important domain for the formation of one's actions. Knowledge is the result of knowing and this occurs after people sense a particular object. Knowledge or cognitive is a very important domain for the formation of a person's actions (overt behavior) (Zebua et al., 2023). Pregnant women's attitudes are the main predictor of daily behavior (actions), but sometimes attitudes do not become actions. Considering all the positive and negative impacts of an action also determines whether a person's attitude becomes a real action or not (Magfirawati, 2024).

According to research by Yuniarti et al. (2023), media is needed as a tool to increase pregnant women's knowledge and attitudes about ANC, especially Android-based media. One such tool is the My ADA Application, which is highly appropriate to be used as an alternative to increasing knowledge and ANC visits (Yuniarti et al., 2023).

The study's findings demonstrated that pregnant women's knowledge and attitudes regarding ANC were significantly impacted by the My ADA Application and the Maternal and Child Health Book (KIA) as seen from the significant value smaller than  $\alpha = 0.05$  at the 95% assumption level, in line with Wardiyati's 2023 research that There is a relationship between the use of Maternal and Child Health (KIA) books and the level of knowledge and attitudes of pregnant women. The results of the Kendal's Tau test obtained a P value of 0.000 (Wardiyati & Rifiqoch, 2023). In Savitri et al.'s 2022 research, there was an effect of intervention through an Android-based application (Bidan-Ku) and the Maternal and Child Health Book (KIA) on knowledge, attitudes and practices after controlling for the variables age, parity, education and family income. The Bidan-Ku app affects how prepared expectant mothers are to give birth (Savitri et al., 2023). Similar to this, research (Mulidah et al., 2023) demonstrates that respondents' knowledge and attitudes change in the significant category, with a significance value  $< \alpha (0.05)$ . This suggests that pregnant women's knowledge and attitudes before and after receiving good treatment differ statistically in the intervention group using smartphone-based media because it is more convenient, easier to access, and nearly everyone now owns this device.

Research conducted by Magfirawati (2024) found a relationship between the knowledge and attitudes of pregnant women about the danger signs of pregnancy and the use of the Maternal and Child Health (KIA) book at the Wiradesa Health Center, Pekalongan Regency in 2023. With the Maternal and Child Health (KIA) Book Health workers can intensively monitor pregnant women, apart from that for the health of pregnant women and

preparation for childbirth, as well as to fulfill the right to survival, growth and development and protection of children. This identifies that Pregnant women's attitudes are the main predictor of daily behavior (actions), but sometimes attitudes do not become actions. Considering all the positive and negative impacts of an action also determines a person's attitude whether it becomes a real action or not (Maghfirawati, 2024). This is in accordance with previous findings that Android-based smartphone technology is a health promotion medium that can be developed because it has a wide reach and increases access to health-related information. The advantages of using smartphone technology are that it is currently widely used at all levels of society (Savitri et al., 2023). The results of the Mann-Whitney test showed that the mean knowledge of the My ADA group was (85.09) and the mean knowledge of the Maternal and Child Health (KIA) book group was (56.28) with a mean difference of 28.81 and  $P\text{-Value} = 0.000 < 0.05$ , It was found that the Mean attitude of the My ADA group was (89.96) and the Mean attitude of the Maternal and Child Health (KIA) book group was (60.15) with a Mean Difference of 29.81 and  $P\text{-Value} = 0.000 < 0.05$ , it can be concluded that the My ADA application is more effective in increasing the knowledge and attitudes of pregnant women about ANC compared to the Maternal and Child Health (KIA) book, this is in line with research by Nahdia et al 2024 that the quality of interaction shows the biggest gap, with 57.22 for the experimental group and 29.78 for the control, the "PUIS LITA" website proved to be more effective than the Maternal and Child Health (KIA) Book in all WebQual 4.0 dimensions, indicating its potential as a resource valuable digital tool for increasing knowledge of baby and toddler care (Fahmi, 2024).

The researcher hypothesizes that this is because people's interest in reading is still poor, which is consistent with UNESCO data showing that Indonesia ranks second from the bottom in the world for literacy, indicating extremely low reading interest. UNESCO statistics shows that just 0.001% of Indonesians are interested in reading, which means that only one person out of every 1000 reads regularly.

Literacy according to UNESCO does not only refer to the ability to read and write, but also includes digital literacy and health literacy, which are relevant in the context of the My ADA application. Digital literacy refers to an individual's ability to use information technology effectively, while health literacy relates to the ability to obtain, understand, and use health information to make informed decisions. The My ADA application is designed to provide health information for pregnant women, especially about ANC, through features such as: Providing evidence-based health information, user-friendly interactions to support users' digital literacy, reminders and practical guides to increase awareness pregnant women about the

importance of ANC.

The app is more effective when pregnant women have a good level of digital and health literacy, which allows them to understand and apply the information provided. Literacy as defined by UNESCO can be a prerequisite for the success of the My ADA application in increasing pregnant women's knowledge: Health literacy helps mothers understand the benefits of ANC, while digital literacy allows them to make optimal use of the application's features. Changing attitudes: Information that is well understood through the application can influence mothers' attitudes pregnant women, encouraging them to be more active in planning and implementing ANC visits, Implications and Improvements.

The study's findings indicate that, when considering convenience ( $p=0.000$ ), speed ( $p=0.006$ ), security ( $p=0.005$ ), and data accuracy ( $p=0.000$ ), there is a difference in the efficacy of early pregnancy risk factor detection between the Maternal and Child Health (KIA) book and the Monsca application ( $p\text{-value} < p=0.05$ ). Therefore, without discounting the value of the Maternal and Child Health (MCH) book as a tool to support MCH services, it can be said that the Smart Continuity of Care application is more effective for early detection of pregnancy risk factors. In terms of effectiveness, it reveals that many midwives still believe that the Maternal and Child Health book (KIA) is difficult to use in midwifery care, takes a long time to complete, is unsafe to store patient data, and is inaccurate when it comes to early pregnancy risk factor detection when compared to the Monsca application (Ismayana, Nontji W, 2020).

Mobile technology is becoming more and more commonplace worldwide, and it is also being used more and more in training and education. Mobile technology has been shown to have a wide range of educational applications. The use of digital apps and technology in midwifery education has various advantages. However, access to education may be hampered by a lack of technical tools and infrastructure. Furthermore, a digital gap may result from each student's unique high-tech diversity and technical capabilities (Tekeş, H., Uluşen, 2023).

This research is supported by research (Sudirman, 2017) stating the opinion that applications are an effective method nowadays because everyone uses smartphones, applications are really needed by pregnant women in monitoring pregnancy, pregnant women do not need to carry a Maternal and Child Health (KIA) book, simply with an Android, maternal and fetal development data can be monitored and viewed via the My ADA application.

The My ADA application is an effort to increase pregnant women's knowledge and documentation of Antenatal Care (ANC) visits. This is to adapt to people's lifestyles where cellphones are a necessity and almost all people, including pregnant women, use cellphones to carry out their activities. ANC examination of pregnant women during pregnancy to prevent

complications and prepare for a healthy birth (Yuniarti, Susilo Damarini, Elvi Destariyani, n.d.)

The My ADA application can be used by mothers to make it easier to document ANC examinations and make it easier for mothers to get information on the progress of their pregnancy. Additionally, several segments of the app provide need-to-know information during pregnancy, labor, postpartum, and newborn care. The hope is that this can increase knowledge and improve maternal health and baby growth and development for readers so that there are no more worries during pregnancy, childbirth and postpartum, with the My ADA application you can evaluate information on the condition of the mother and fetus, information on pregnancy and childbirth. , postpartum and family planning, mothers can read information about pregnancy and family planning at any time (Yuniarti et al., 2023).

The limitations of this research are that research is often conducted on small samples which may not represent the wider population of pregnant women. Knowledge and attitudes are also influenced by other factors such as education, family support, or access to information from other media, which is difficult to control in research. Most research emphasizes quantitative data without delving in depth into the application user experience.

Suggestions for further researchers can develop research variables: Research the long-term effects of using the application on changes in behavior, not just knowledge and attitudes, such as compliance in carrying out ANC according to schedule.

## CONCLUSIONS

There was an increase in the average knowledge of pregnant women about ANC in the intervention group using the My ADA application and in the control group using the KIA book, there was an influence of the My ADA Application and the KIA Book in increasing mothers' knowledge pregnant women about ANC, the My ADA application is more effective in increasing pregnant women's knowledge about ANC than the KIA book.

Future research could examine how user demographics, such as age, education level, or socioeconomic status, influence the effectiveness of the My ADA application. Accessibility factors, such as internet connectivity or digital literacy, can also be analyzed.

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