

Evaluation of the Implementation of a Pregnancy Examination Application as an Effort to Prevent Maternal Mortality in Dairi Regency

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Abstract: *Background:* The application of web-based applications to support antenatal care (ANC) services and pregnancy monitoring, both by pregnant women and health workers (midwives, doctors, health centers) and can even be used by pregnant women to write complaints during pregnancy. This application was created to help monitor maternal and fetal health, provide education, and facilitate access to health services. Benefits increase health awareness of pregnant women, reduce the number of delays in pregnancy examinations, support maternal and child health programs in the community, increase the coverage of standard 14 T examinations. Antenatal care can help provide relatively economical medical services and reduce inequalities for health screenings, due to the convenience and cost-effectiveness, especially in developing countries or large and mountainous regions. However, its use with the ability to use applications is often less than satisfactory. Therefore, it is important to ensure the user's ability to fill out a pregnancy screening application. Purpose To evaluate the application of pregnancy checks to prevent maternal mortality in Dairi Regency. This research is a quasi-experimental research to find out the behavior of midwives in the application of pregnancy examination and how the behavior of midwives before and after the application of the pregnancy examination application in Dairi district. The sample was 42 midwives using one group pre and post-test. The analysis used was univariate, bivariate. Bivariate analysis uses a statistical test of the T test where the behavior of midwives before and after the application of the pregnancy test application will be compared. Pregnancy test applications that can be accessed <https://cekbumil.com>. The result is that midwife's behavior has increased in the implementation of pregnancy applications in Dairi Regency

Keywords: Evaluation of the application of pregnancy, maternal death

1. Introduction

Approximately 500,000–1,000,000 women die each year worldwide as a result of pregnancy-related complications, with the majority of these deaths occurring in developing countries. According to the World Health Organization (WHO, 2019), about 55% of maternal deaths occur in Asia, 40% in Africa, and only 1% in developed countries. In the United States, the maternal mortality ratio is around 7.7 deaths per 100,000 live births over the past 17 years. Most of these deaths could be prevented through timely interventions. The maternal mortality rate (MMR) for American women remains higher across all age groups and for every cause of maternal death. A significant proportion of American women also do not undergo antenatal check-ups in the early stages of pregnancy (1).

The results of the 2020 study by Sitorus, S et al. Of the 150 midwives studied, 108 people (72.0%) had implemented a referral system in accordance with the implementation of antenatal care. The average pre-treatment knowledge score was 8.19 in the case group and 8.25 in the control group, the average attitude value was 8.17 in the case group and 8.24 in the control group and the average action value was 8.87 in the case group and 8.89 in the control group. After the training on the implementation of antenatal care, it was known that there was an increase in the knowledge, attitudes and actions of

midwives in implementing antenatal care. Knowledge ($p = 0.000$), attitude ($p = 0.000$) and actions ($p = 0.000$) in the implementation of antenatal care had an effect on the implementation of the referral system to prevent maternal death in Dairi Regency (2).

One of the factors that contribute to the high maternal mortality rate is the low coverage and quality of pregnancy examinations. Quality antenatal care (ANC) has an important role in early detection of complications, risk prevention, and timely referral to reduce maternal morbidity and mortality (3) (4). However, limited access to health services, lack of health workers, and difficult geographical conditions in rural areas are significant obstacles, including in Dairi Regency (5).

Antenatal visits for monitoring and supervision of maternal and child welfare should be at least four times during pregnancy within time, namely up to the first trimester pregnancy (<14 weeks) one visit, and second trimester pregnancy (14-28 weeks) one visit, and third trimester pregnancy (28-36 weeks and after the 36th week) two visits. Nationally, the target for antenatal care visits is 90%. Assessment of the implementation of health services for pregnant women can be done by looking at the coverage of K1 and K4 (6).

The use of information technology in the health sector, especially digital-based pregnancy examination applications, is one of the innovative solutions to answer these challenges (7). This application can help pregnant women conduct self-examinations, obtain valid information, and conduct remote consultations with health workers. Several studies have shown that the application of maternal and child health applications can increase knowledge, adherence of pregnant women to the examination schedule, and facilitate the early detection of pregnancy complications (8)

The website for examining pregnant women offered in this study is applied through hardware such as Personal Computers (PCs), laptops or notebooks and smartphones. Among hardware, researchers chose smartphones as a forum for pregnant women examination websites on the grounds that smartphones are used by many people, are easy to carry around, do not take up space, are effective and efficient in their use, and are cheap and practical (9) (10). A smartphone, for some people, is a phone that works using all the operating system software that provides a standard and fundamental relationship for application developers. In addition, smartphones are designed and work through an operating system, where users can freely add applications, add functions or change as the user wants like a computer in the palm of your hand, including operating a website (11) (12).

The purpose of the study is to find out the changes in midwife's behavior (knowledge, attitudes and skills) in pregnancy examinations before and after midwife's behavior in reporting the results of pregnancy examinations to the Samsider July pregnancy examination application. Analyzing changes in midwife's behavior (knowledge, attitudes and skills) after the implementation of the digital smart education model of Samsider Juli pregnancy checkup.

2. Method

This study uses quantitative approaches. This research was carried out in Dairi Regency. The research time is January to November 2023. The types of data in this study are primary data and secondary data. The method used is a trial of the Samsider July pregnancy test application to prevent the death of pregnant women in Dairi Regency with a *quasi experiment*. to collect data both primary data, secondary and tertiary data in this study.

3. Result

3.1 Evaluation of the Application of the Digital Smart Education Model for Samsider July Pregnancy Checks to Prevent Maternal Mortality in Dairi Regency

1) Pre-test

The application of the digital smart education model of the Samsider July pregnancy examination begins with a pre-test to find out the behavior of midwives (knowledge, attitudes and skills) to prevent maternal mortality in Dairi district. The pre-test is carried out by distributing a questionnaire containing statements about the behavior of midwives in an effort to prevent maternal mortality by entering the results of

the pregnancy examination into the Samsider July pregnancy examination application. The results are as described below.

a) Knowledge

Table 1: Frequency Distribution of Midwives' Knowledge before the Implementation of the Pregnancy Check-up Application in Dairi Regency

No	Knowledge	Frequency	Percentage (%)
1	Good	13	31,0
2	Poor	29	69,0
Total		42	100,0

Based on table 1, the results showed that the majority of midwives' knowledge about the application of pregnancy examination applications before being given instructions or socialization was not good, which was 69.0%. The lack of knowledge of midwives is evident from the web sharing in their way that there is no one to register but how to fill in the examination results to the application. Midwives tend to be less knowledgeable and less motivated to sign up and log in to the application.

b) Attitude

Tabel 2: Frequency Distribution of Midwives' Attitude before the Implementation of the Pregnancy Check-up Application in Dairi Regency

No	Knowledge	Frequency	Percentage (%)
1	Good	10	23,8
2	Poor	32	76,2
Total		42	100,0

Based on table 2, The results of the study showed that the majority of midwives' attitudes regarding the implementation of the pregnancy test application before socialization were not good, namely 76.3%.

c) Skills

Table 3: Frequency Distribution of Midwives' Skills before the Implementation of the Pregnancy Check-up Application in Dairi Regency

No	Knowledge	Frequency	Percentage (%)
1	Good	11	26,2
2	Poor	31	73,8
Total		42	100,0

Based on table 3, the results of the study showed that the majority of midwives' skills before the implementation of the pregnancy examination application were poor, which was 73.8%.

2) Post Test

To find out the behavior of midwives after the implementation of the pregnancy examination application, death prevention efforts by using the pregnancy examination application can be found out after providing instructions or socialization.

a) **Knowledge****Table 4:** Frequency Distribution of Midwives' Knowledge after the Implementation of the Pregnancy Check-up Application in Dairi Regency

No	Knowledge	Frequency	Percentage (%)
1	Good	30	71,4
2	Poor	12	28,6
Total		42	100,0

Based on table 4, the results of the study showed that the knowledge of midwives after the evaluation of the implementation of the pregnancy examination application was 71.4% good.

b) **Attitude****Table 5:** Frequency Distribution of Midwives' Attitude after the Implementation of the Pregnancy Check-up Application in Dairi Regency

No	Knowledge	Frequency	Percentage (%)
1	Good	27	64,3
2	Poor	15	35,7
Total		42	100,0

Based on table 7, the results of the study using the paired t test showed that there was a difference in the knowledge of midwives before the application of the pregnancy test application, namely the mean value of 30.15 and after the implementation of the pregnancy test to 31.35. Midwife's knowledge has increased after the application of the pregnancy examination application with a mean difference of 1.20238 and a p value of 0.002. This means that statistically there is a statistically significant difference ($p < 0.05$) between knowledge before and after the application of the pregnancy test application.

The results of the study also showed that there was a difference in the attitude of midwives before the implementation of the pregnancy examination application, namely the mean value of 18.00 and after the implementation of the pregnancy examination to 67.9167. Midwife's attitude has improved after the implementation of the pregnancy examination application with a mean difference of 3.54762 and a p value of 0.035. This means that statistically there is a statistically significant difference ($p < 0.05$) between attitudes before and after the implementation of the pregnancy test application.

The results of the study also showed that there was a difference in the skills of midwives before the implementation of the pregnancy examination application,

Based on table 5, the results of the study showed that the attitude of midwives after the evaluation of the pregnancy examination application was mostly good, which was 64.3%.

c) **Skills****Table 6:** Frequency Distribution of Midwives' Skills after the Implementation of the Pregnancy Check-up Application in Dairi Regency

No	Knowledge	Frequency	Percentage (%)
1	Good	24	57,1
2	Poor	18	42,9
Total		42	100,0

Based on table 6, the results of the study showed that the majority of midwives' skills after the implementation of the pregnancy examination application were good, which was 57.1%. The improvement of midwives' skills is evident from the midwives' skills in using the app.

Furthermore, the difference between before and after the evaluation of the increase in knowledge, attitudes and skills of midwives in the use of the Samsider Juli application to prevent maternal death. The result is as described below.

Table 7: Distribution of Differences in Midwives' Knowledge, Attitude, and Skills Before and After the Evaluation of the Samsider Juli Pregnancy Check-up Application

Variable		Evaluation of the Pregnancy test application			
		Mean	SD	Mean Diff	P Value
Knowledge	Before	30,15	2,377	-1,20238	0,002
	After	31,3571	3,08765		
Attitude	Before	64,37	12,134	-3,54762	0,035
	After	67,9167	11,29901		
Skills	Before	18,00	2,390	-1,15476	0,006
	After	19,1548	3,38492		

which was a mean value of 17.56 and after it became 19.1548. Midwife's skills have improved after the implementation of the pregnancy examination application with a mean difference of 1.15476 and a p value of 0.006. This means that statistically there is a statistically significant difference ($p < 0.05$) between the midwife's skills before and after the application of the pregnancy test application.

Behavioral Changes in Midwives After the Implementation of the Pregnancy Check-Up Application for Maternal Death Prevention Efforts in Dairi Regency

The behavior of midwives in this study was limited to knowledge, attitudes and skills in efforts to prevent maternal mortality with the application of pregnancy checks before and after the implementation of the Samsider Juli Pregnancy Examination Application for the prevention of maternal death.

4.1 Midwife's Knowledge

Before socialization, the majority of midwives had poor knowledge (69%). After the use of the app, knowledge increased to 71.4% of the good category. This improvement shows that interventions in the form of training and application application are able to expand midwives' understanding of the importance of recording and monitoring pregnancy examinations. This is in line with previous

research that stated that the use of health digital applications can increase health literacy of medical personnel and the community(13)(14). Midwives are also lacking in filling out and going to the pregnancy screening application related to reporting pregnancy test results by entering the application by writing down the results found and entering the features in the pregnancy test application(15). Prior to the implementation of the Pregnancy Screening Application for the prevention of maternal mortality(16).

It can be seen that after being given socialization and application entry techniques, midwives increase their knowledge. Based on the paired t-test, there was a difference in midwife's knowledge before and after the implementation of the Pregnancy Examination Application for the prevention of maternal mortality, which was a mean value of 30.15. Midwife's knowledge has increased with a mean difference of 1.20238 and a p value of 0.002. Statistically, there was a significant difference ($p < 0.05$) between the knowledge before and after the implementation of the Pregnancy Test Application for maternal mortality prevention.

4.2 Midwife's Attitude

Before the implementation of the application, the majority of midwives' attitudes were not good (76.2%), but after that the good attitude increased to 64.3%. This change shows a positive acceptance of new technologies, although there are still some that require further assistance. Other studies support that health workers' attitudes will be more positive if digital interventions are accompanied by adequate socialization and training(17)(18). It can be seen that after the application, the midwife's attitude has become better. Based on the paired t test, there was a difference in the attitude of midwives before and after the evaluation of the application application, namely a mean value of 18.00. The attitude of midwives has increased with a mean difference of 3.54762 and a p value of 0.035. Statistically, there was a significant difference ($p < 0.05$) between attitudes before and after the implementation of the pregnancy test application.

4.3 Midwife's Skill

Before the implementation of the application, most midwives were in the underserved category (73.8%). After the intervention, good skills increased to 57.1%. This means that this application is effective in improving the practical ability of midwives, especially in entering data and utilizing the application as a monitoring tool. This is in line with the research of Nugroho et al. (2020) which states that application-based training can significantly improve the skills of health workers(19)(20).

After the implementation of the pregnancy examination application, which was previously the majority of poor (73.8%) changed to a good majority (57.1%). It can be seen that after being given socialization about the use of the pregnancy test application, the Midwife's skills have improved. Based on the paired t test, there was a difference in midwife's skills before and after implementation, namely a mean value of 17.56. Midwife's skills have improved with a mean difference of 1.15476 and a p value of 0.006. Statistically, there was a significant difference ($p < 0.05$)

between skills before and after the application of the pregnancy test application.

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