



Innovation Article

Pregnancy class center application as an alternative effort for antenatal class during the COVID-19 pandemic

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A B S T R A C T

Background: The outbreak of Coronavirus Disease 2019 (COVID-19) has been designated by WHO as a pandemic, causing health services to be significantly disrupted and delayed globally, especially the implementation of the antenatal class. The participation of pregnant women in antenatal classes in Semarang City is only around 25% of the total number of the public health center in the Semarang city area during the COVID-19 pandemic in 2021. There is need a for media innovation in the antenatal class during the pandemic so that antenatal class can still be carried out safely during the COVID-19 pandemic.

Purpose: To produce an antenatal class application that can facilitate pregnant women to attend antenatal classes virtually during the COVID-19 pandemic and test the implementation effect of the application on the knowledge, attitudes, and behavior of pregnant women.

Methods: This study uses the Research and Development (R&D) method, divided into five stages (Data Collection, Product Design, Design Validation, Design Revision, and Product Trial).

Results: An application has been created named PiCCa (Pregnancy Class Center); the test result is feasible to use with a result of 82% and can be used as antenatal class media with a result of 4.32 ($p=0.000$). The implementation of the PiCCa application can increase knowledge from 12.8 to 18.13 ($p=0.000$), attitude from 65.36 to 92.3 ($p=0.000$), and behavior of pregnant women from 19.53 to 32.2 ($p=0.000$).

Conclusion: The PiCCa application is feasible and can be used as an online media for antenatal classes during the COVID-19 pandemic, and its application has a significant effect on increasing the knowledge, attitudes, and behavior of pregnant women.

INTRODUCTION

The coronavirus disease 2019 outbreak that infected many countries in the world has been declared by the World Health Organization (WHO) as a global pandemic and a public health emergency, causing significant disruption to health services and even partially delaying health service activities globally.¹ In Indonesia, one of the impacts of the COVID-19 pandemic on health service activities is the delay in holding face-to-face antenatal classes.^{1,2} This is indicated by the participation rate of pregnant women in the antenatal class in Semarang City in 2021, which is only around 25% of all the number of Public Health Centers in the Semarang city area; the lowest rate is in the Tlogosari

Kulon Health Center, where the participation rate for pregnant women is only 3.6%, at the Kedungmundu Health Center only 13% and at the Tlogosari Wetan Health Center is 22% of pregnant women attend antenatal class.³

The antenatal class is a program launched by the government to overcome the Maternal Mortality Rate (MMR) in Indonesia, which plays a role in increasing knowledge and changing the attitudes and skills of pregnant women. However, this activity was delayed during the COVID-19 pandemic.^{2,4-6} Implementing face-to-face antenatal classes during the COVID-19 pandemic could not be fully implemented because an effort to suppress the increasingly widespread COVID-19 virus through the government's policy, not crowds and gather in large numbers population so

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that public health centers are not allowed to carry out face-to-face antenatal class.^{2,7} So that it is hoped that there will be efforts to focus on services centered on pregnant women during the COVID-19 pandemic to fulfill the information needs that pregnant women need, such as solutions to their problems, support, readiness, and solutions to the uncertainty of health services that mothers feel during the COVID-19 pandemic.⁸

Antenatal classes are essential because pregnant women still need health education related to their pregnancy to go well.^{2,9-12} As one of the programs that the government has been pursuing for a long time to reduce the Maternal Mortality Rate (MMR), the antenatal class program is expected to be able to increase the knowledge, insight, and skills of mothers more broadly so that it can support the creation of welfare for mothers and children.¹³⁻¹⁵ The postponement of antenatal classes during the pandemic will undoubtedly affect the health degree and quality of maternal and fetal health.²

The application of virtual antenatal class models, such as web-based or applications as a form of renewable technology, is an opportunity that can be utilized to consult with health workers, share information and social support, and as a means to improve skills. Utilizing technology can expand coverage and has become one of the WHO recommendations as a breakthrough to solve health challenges and improve access to health care. In the current COVID-19 pandemic, the virtual antenatal class model can also support the social distancing policy due to online classes so that pregnant women do not have to be gathered in the same room as the conventional antenatal class model.^{10,16}

Previous research examining the antenatal class model, carried out virtually, such as on WhatsApp, line, google forms, google meet, and video conference zoom platforms, has been carried out and is effective in increasing mothers' knowledge and can be an alternative effort during a pandemic. However, in its implementation, the media used still has limitations, including an unstable internet network during broadcasts, and needs to be more comprehensive and integrated into each class implementation session.^{2,10,17,18} There is currently no available media application for the antenatal class program. There is a need to design a media for antenatal classes based on information technology integrated into an application to be an alternative effort in implementing virtual antenatal classes. This study aims to produce an application for antenatal classes to facilitate pregnant women taking virtual antenatal classes during the COVID-19 pandemic.

METHOD

This research method is Research and Development (R&D). The research is divided into stages; stage I data

collection, stage II product design, stage III design validation, stage IV design revision, and stage V product trial.¹⁹

Phase I Data Collection

The data collection stage aims to collect information regarding any problems in the field so that researchers can develop an innovation to overcome existing problems. Data collection began with gathering information through interviews with authorities related to the antenatal class program, such as the Maternal and Child Health sector at the Semarang City Health Office and facilitator midwives for antenatal class.

Phase II Product Design

The next stage is product design by innovating to design an android-based application for the antenatal class as an alternative effort in conducting virtual antenatal class, which was integrated with one application where previously the activity was postponed due to the COVID-19 pandemic. In this stage, the researcher asked for advice from authorities related to the antenatal class program, the Maternal and Child Health sector at the Semarang City Health Office, and the facilitator midwives for antenatal class regarding the substance of the material to be included in the application program for the antenatal class that would be designed. Experts provide suggestions for adjusting the substance of the material in the application with the existing material in the antenatal class guidelines issued by the Ministry of Health of the Republic of Indonesia.

Phase III Design Validation

This stage is to conduct a validation test to experts to test the feasibility of the application made before being used by pregnant women. Experts then validate the application that has been made to assess the feasibility of the application based on expert validation. Three experts validate Information Technology (IT), pregnancy exercise experts, and facilitator midwives for antenatal class. The validation process is carried out by giving a questionnaire to experts containing indicators of modifications to the model assessment and learning media that researchers develop and adjust by referring to the material in the application so that it can represent the material in the application.^{20,21}

Phase IV Design Revision

After carrying out the expert validation process, the experts provide input and suggestions and the shortcomings of the products made; then, the researchers revise the design before the product is used in the product testing phase.

Phase V Product Trial

At this stage, firstly, the product effectiveness test in terms of indicators of ease and usefulness of the application

based on application users using the Technology Acceptance Model questionnaire. After getting good results in the product effectiveness test, a product trial was carried out on a larger sample to see the effect of the application on changes in knowledge, attitudes, and behavior of pregnant women using a true experimental pretest and posttest randomized control group design. The research was conducted at Tlogosari Kulon Health Center, Semarang City, in April-June 2022. As many as 60 pregnant women were sampled in this study. The inclusion criteria included pregnant women, primigravida, and multigravida, gestational age of 20-32 weeks, have an Android-based smartphone device and can operate and access smartphones, are willing to use the application, and are willing to be respondents. The criteria exclusions included pregnant women with a high risk of pregnancy, visual impairments, and hearing impairments. The sample was divided into two groups by proportional stratified random sampling: the intervention and control groups. The intervention group was given antenatal classes using an application, while the control group was given antenatal classes via the WhatsApp group in four meetings over four weeks. The measured variable is knowledge, attitudes, and behavior—data analysis by the Wilcoxon and Mann-Whitney tests.

RESULTS

Data Collection Results

Based on a literature review and interviews, there were obstacles during the COVID-19 pandemic, one of which was the implementation of face-to-face antenatal classes that abolished the pandemic to break the chain of the spread of the COVID-19 virus. Therefore, the PiC-Ca application is designed so that antenatal classes can still be carried out during a pandemic by conducting online or virtual antenatal classes. The material is given thoroughly following the antenatal class guidelines, which include pregnancy, pregnancy care, childbirth, postpartum care, newborn care, myths, sexually transmitted diseases, danger signs, birth certificates, and physical activity and exercise during pregnancy. These materials were given in four class sessions.

Product Design Results

The application that has been made is named the PiCCa (Pregnancy Class Center) application which has several main features. First, users can log in by entering their username and password (Figure 1), and then the features in the application will appear (Figure 2). Feature 1 (Figure 3) is a menu for the antenatal class material feature, which contains educational materials given in 4 meetings. Feature 2 (Figure 4) is a menu for recording information about

the health of pregnant women, namely the menu for the results of pregnancy tests such as weight, blood pressure, uterine fundal height, and fetal heart rate. Furthermore, feature 3 is the question feature of a midwife, which is a discussion or question-and-answer feature between the midwife as a facilitator for the antenatal class and pregnant women as participants in the antenatal class (Figure 5). Then feature 4 is the pregnancy exercise feature, in which there is a menu of material about physical exercise for pregnant women, a screening menu before pregnant women do pregnancy exercises independently, and a pregnancy exercise video menu that can only be opened if pregnant women have been declared eligible to take part in pregnancy exercises on the screening menu (Figure 6). Then, feature 5 is the attendance feature; in this feature, the system will automatically check if the participant has finished watching the presentation of the antenatal class material and pregnancy exercise, and the system will be crossed if the participant has not watched the presentation material and pregnancy exercise (Figure 7). In feature 6, COVID-19 self-detection, pregnant women can find out about their condition related to COVID-19 and the steps that must be taken from the results obtained by independent detection (Figure 8).

Validation and Revision Design

Based on the validation results tested on tree experts, the average feasibility score was 82%, with a very feasible category. The experts also gave some input for improving the application design, including adjusting the colors and icons that represent that the application is intended in the scope of midwifery or pregnant women; in the video section, a brief description or description of the name of the movement is added, the property and the environment where the pregnancy exercise is adjusted to the standards implementation of pregnancy exercise, as well as adjusting the substance of the educational material for pregnant women with class guidelines for pregnant women published by the Ministry of Health of the Republic of Indonesia.

Product Trial Results

Based on the results of the application effectiveness test using the Technology Acceptance Model questionnaire, an average of 4.32 was obtained, which means this application has an effectiveness value with an excellent category in terms of convenience and usefulness for users. In addition, the results of product trials on changes in knowledge, attitudes, and behavior of pregnant women found that the intervention group increased higher than the control group ($p < 0.05$) (Table 1).

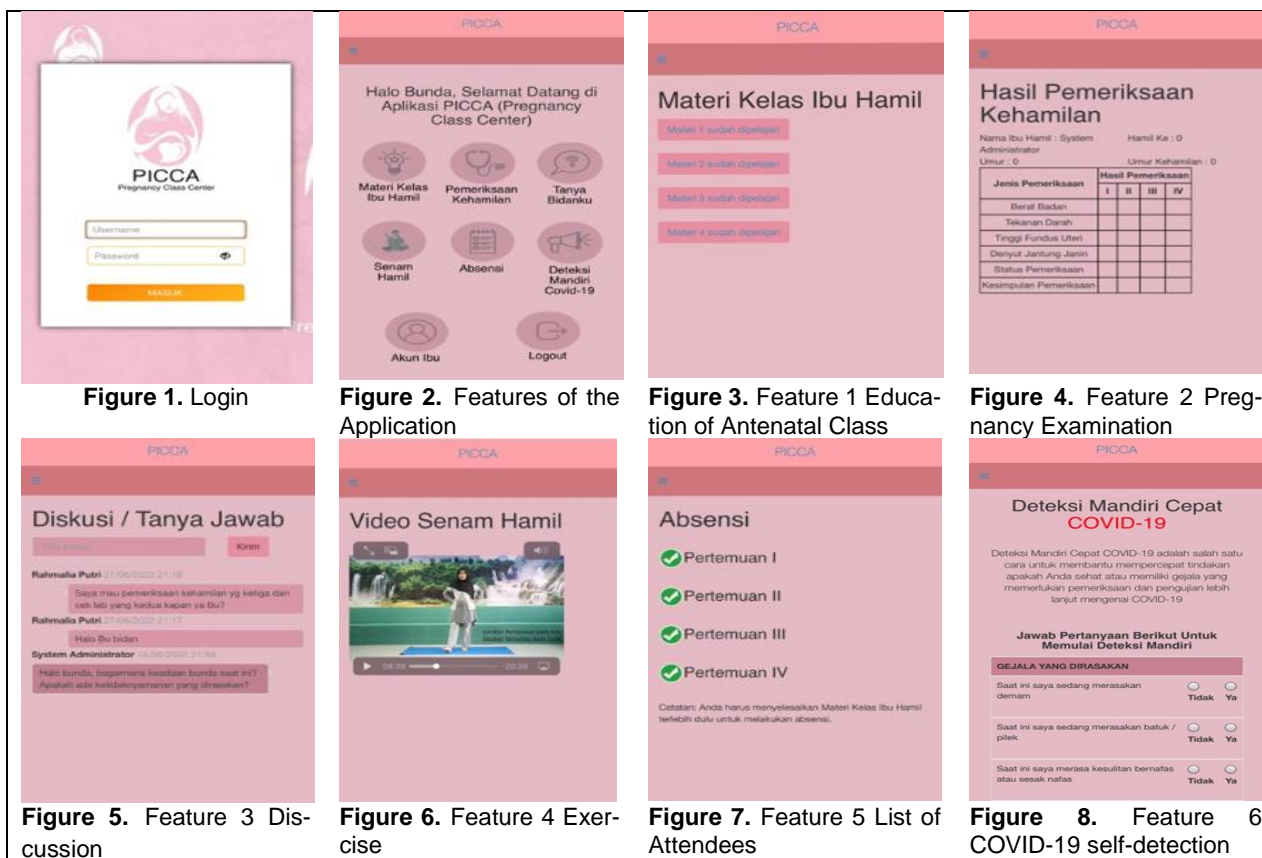


Figure 1. Login

Figure 2. Features of the Application

Figure 3. Feature 1 Education of Antenatal Class

Figure 4. Feature 2 Pregnancy Examination

Figure 5. Feature 3 Discussion

Figure 6. Feature 4 Exercise

Figure 7. Feature 5 List of Attendees

Figure 8. Feature 6 COVID-19 self-detection

Table 2. Knowledge, Attitude, and Behavior Differences in the Intervention and Control Group (n=60)

| Variable | | Intervention Group | Control Group | p-value** |
|-----------|----------|--------------------|---------------|-----------|
| Knowledge | Pre | 12.8 ± 3.263 | 11.8 ± 2.940 | 0.154** |
| | Post | 18.13 ± 3.036 | 14.23 ± 2.896 | 0.000** |
| | p-value* | 0.000* | 0.000* | |
| | Δ Mean | 5.33 ± 1.241 | 2.43 ± 1.452 | 0.000** |
| Attitude | Pre | 65.36 ± 9.353 | 68.93 ± 10.53 | 0.149** |
| | Post | 92.13 ± 5.888 | 83.4 ± 13.239 | 0.003** |
| | p-value* | 0.000* | 0.000* | |
| | Δ Mean | 26.77 ± 5.024 | 14.47 ± 7.580 | 0.000** |
| Behavior | Pre | 19.53 ± 4.199 | 19.1 ± 3.959 | 0.655** |
| | Post | 32.2 ± 3.284 | 24.6 ± 3.558 | 0.000** |
| | p-value* | 0.000* | 0.000* | |
| | Δ Mean | 12.77 ± 1.517 | 5.5 ± 1.040 | 0.000** |

*Wilcoxon Test; **Mann-Whitney Test

DISCUSSION

The PiCCa application is an android-based antenatal class application; this application is equipped with educational material features in antenatal classes presented in four meetings and face-to-face antenatal classes. These features are selected based on advice from authorities related to the antenatal class program, the Maternal and Child Health sector at the Semarang City Health Office, gymnastic pregnancy experts, and facilitator midwives for antenatal class regarding the features and substance of the material included in the application program for the antenatal class. These features were made based on the sugges-

tions given by the experts to adjust, like face-to-face antenatal class and the substance requirements of the material in the antenatal class application to conform to the material in the antenatal class guidelines issued by the Ministry of Health of the Republic of Indonesia.²²

Users can log in by entering their username and password, and the features in the application will appear, including the antenatal class material feature, which contains educational materials given in 4 meetings. The next feature is the pregnancy exercise feature, in which there is a menu of material about physical exercise for pregnant women, a screening menu before pregnant women do pregnancy exercises independently, and a pregnancy exercise video

menu that can only be opened if pregnant women have been declared eligible to take part in pregnancy exercises on the screening menu. The next feature is the question feature of a midwife, which is a discussion or question-and-answer feature between the midwife as a facilitator for the antenatal class and pregnant women as participants in the antenatal class. Next is the attendance feature; in this feature, the system will automatically check if the participant has finished watching the antenatal class material and pregnancy exercise presentation. The system will be crossed if the participant has not watched the presentation material and pregnancy exercise. In the application, there is also a menu for recording information about the health of pregnant women, namely the menu for the results of pregnancy tests such as weight, blood pressure, uterine fundal height, and fetal heart rate.²² And the last menu is account menu for pregnant women consisting of the name of the pregnant woman, username, password, phone number, email, age, how many pregnant, gestational age, the first day of last menstruation, an estimated day of birth.

Feasibility testing is carried out by experts related to the substance contained in the application. Experts who provide the assessment include an IT expert who will assess the quality in terms of application software and pregnant gymnastics expert will provide assessments regarding the feasibility of the substances in the pregnant exercise menu on the application as well as a facilitator midwife for the antenatal class who provide assessments on educational materials provided in the application. The results obtained from the three experts were 82%, which means that the PiCCa application obtained a feasibility result in the very feasible category. The experts also provided several inputs for improving the application design, including adjusting the colors and icons that represent that the application is intended within the scope of midwifery or pregnant women. In the video section, a brief description or description of the name of the movement, properties, and environment of the gymnastics is added to the standards for implementing pregnancy exercise, as well as adjusting the substance of the educational material for pregnant women classes with the antenatal class guidelines issued by the Ministry of Health of the Republic of Indonesia.²²

Researchers conducted an effectiveness assessment regarding the ease and usefulness of the application for users. After assessing the product's effectiveness to pregnant women, the results with an excellent category. Based on the results of the respondents' experiences when using this application, regarding the ease of using and learning the application, indicating that the application is easy to use and very beneficial. Material can be watched anytime and anywhere without being limited by space and time and does not require a large internet network such as video conference can make it easier and provide benefits for pregnant women. Furthermore, the application testing results on knowledge, attitude and behavior changes

showed that the intervention group experienced a higher increase than the control group. The influence of smartphones or web technology can provide benefits for treatment, behavior modification, and knowledge. Furthermore, with regard to individual actions or behavior, it is closely related to the knowledge and attitudes of the individual. One's perception or knowledge of something will cause a response that can be seen in his behavior. A person's behavior in general will change according to the understanding or knowledge they have.²³

Smartphones are increasingly growing; in the world of health, the use of smartphones is commonly known as telehealth.²⁴ Telehealth uses virtual access technology in its implementation. It is one of the recommendations from WHO as a breakthrough in health care because in its application it uses a smartphone that can be accessed at anytime and anywhere as desired. Previous research has shown that telehealth can expand and improve access to health services and activities. Telehealth services are done through video communication, remote consultation, telephone video, remote monitoring, provider-to-provider communication, applications, and web-based platforms. Their use is very widely used and valuable during the COVID-19 pandemic.^{24,25} Health education provided online can affect the knowledge and behavior of pregnant women.²⁶ Technology-based telehealth can improve a person's knowledge and attitude. Individual actions are formed after knowledge and attitudes change. In addition, its use which can be accessed anywhere and anytime, can make it easier to obtain information needed by the individual. Using media with a complete and comprehensive education in one application can facilitate information delivery to users and influence user behavior.²³

Previous studies on antenatal classes conducted virtually had been carried out and proven effective for mothers' knowledge and could be an alternative effort in the pandemic period. However, the implementation of the media used includes platforms such as WhatsApp, Line, Google Form, Google Meet, and Video Conference Zoom, which has unstable internet network limitations that need to be more comprehensive and integrate every class implementation session.^{2,10} Existence of this research is to find a solution or alternative way by producing a renewable innovation by innovating to create an antenatal class mobile application that has comprehensively integrated all class sessions in one application. The existence of this application can be a form of renewable innovation as an alternative media that can be used in a virtual antenatal class. The application as an alternative solution or effort to the implementation of antenatal classes during the COVID-19 pandemic so that previously delayed antenatal classes can still be carried out because they can provide practical solutions regarding matters related to ease of virtual antenatal class access during the COVID-19 pandemic and can be a source of health information for pregnant women.

CONCLUSIONS AND RECOMMENDATION

A virtual antenatal class application has been created called the PiCCa (Pregnancy Class Center) application which is feasible and effective to be used as a virtual antenatal class and has been tested to be able to increase the knowledge, attitudes, and behavior of pregnant women, as well as expected to be taken into consideration for implementing the PiCCa application as an alternative solution for carrying out antenatal class, especially during the COVID-19 pandemic.

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