



## Requirement Analysis of mHealth Design in Antenatal Services at Community Health Centers in Jakarta: A Qualitative Study

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### ABSTRACT

**Background:** The increased coverage of antenatal care has not matched the reduction in maternal mortality. One reason is that the antenatal care received by pregnant women is not up to standard. Following technological developments, WHO has presented a digital health intervention framework to improve the quality of antenatal care.

**Purpose:** This Study aimed to analyze the need for mHealth development for pregnant women and health workers to provide quality ANC services.

**Methods:** This study uses qualitative research methods, in the form of 2 Focus Group Discussions, namely for groups of service officers and pregnant women. Then 2 in-depth interviews for MCH management officers at the Health Centers and the Health Office, as well as a study of documents on recording and reporting. Data analysis was carried out thematically. The research location is in Cengkareng District, West Jakarta.

**Results:** The main theme found was the opportunity to use mHealth in ANC services at the Health centers. pregnant women need faster service, service officers need convenience in administrative tasks. The need to remove obstacles in the form of low levels of information technology literacy, limited mobile phone memory, and lack of funds for maintaining the use of information technology. The most desirable feature of mHealth is that it can simplify the administrative tasks of service personnel and can automatically display health promotions according to the needs of pregnant women.

**Conclusion:** there is a need to develop mHealth for pregnant women and ANC service workers equipped with features that can improve the quality of ANC services.

**Keywords:** *mHealth; quality of care; qualitative research; analysis of requirement; Focus Groups*

## BACKGROUND

The Indonesian economy is experiencing good development, where currently Indonesia's economic growth has reached the average for countries in Southeast Asia. This is different from the level of health, especially the Maternal Mortality Rate (MMR) in Indonesia has not shown a significant decline. Currently, the MMR is at 305 per 100,000 live births. This figure is still far from the SDGs target of 70 per 100,000 live births. This figure is much higher than other countries in Southeast Asia, namely Malaysia, Thailand, Vietnam, and Myanmar (World Health Organisation, 2016). Indonesia's strategy to reduce the MMR is contained in the 2020-2024 Mid-Term Development Plan, with 183/100,000 live births in 2024 (World Health Organization, 2015).

Efforts to prevent maternal death are carried out through antenatal care services. The coverage of antenatal visits for pregnant women and deliveries by health personnel is currently above the national target. These are ANC1 98% and ANC4 77% (WHO, 2010). Unfortunately, this increase in the coverage of services for pregnant women does not seem to reduce the MMR significantly. This could be due to the low quality of the services provided. The government through the Ministry of Health has set 10T antenatal care standards, namely: Weighing and measuring height, measuring blood pressure, assessing nutritional status, measuring uterine fundal height, determining fetal percentage and fetal heart rate, TT screening for immunization status, giving Iron supplements, laboratory examinations, case management, interviews and counselling. However, only 18.8% of midwives carried out 9T antenatal care properly and correctly (Kungwimba et al., 2013).

Improving the utilization and quality of antenatal services recommended by WHO is through the Digital Health Intervention (World Health Organization, 2019). mHealth is a form of technology application in health services (Kazi, 2014). The use of mHealth that can connect workers and pregnant women allows a woman twice to choose to give birth with trained health workers and in health facilities compared to those who do not use mHealth (Thompson et al., 2019; World Health Organization, 2016). Enables timely, non-paper retrieval of data, thereby potentially strengthening health systems (Balakrishnan et al., 2016).

mHealth is possible to be applied in Indonesia. According to the Ministry of Communication and Information Technology, internet usage in Indonesia is very high. Cheap internet tariffs encourage it, and a large number of smartphone users reaches 167 million people or 89% of Indonesia's total (Huang et al., 2019). Developing an application or mHealth should be based on an analysis of the context and user (Becker et al., 2014; Meedyda et al., 2021). Explore user needs and wants based on their role in mHealth so that mHealth can be useful.

## OBJECTIVE

The purpose of this research is to explore the obstacles in the process of antenatal care and the need for mHealth development as an effort to improve the quality of antenatal services.

## METHODS

### *Research design*

This research is descriptive research with a qualitative approach. This approach was chosen to explore obstacles in the process of antenatal care, which consisted of service providers, namely midwives/doctors as service implementers, as well as the health office as the manager of antenatal care, and pregnant women as service recipients. Next, identify the need to develop mHealth in improving the quality of antenatal care.

The location of this research was carried out in Cengkareng District, West Jakarta, in February 2021. The research protocol has gone through an ethical review process issued by the ethics committee of the Faculty of Public Health, University of Indonesia.

### *Data collection*

The data collection technique used in this qualitative research is to conduct FGD and in-depth interviews with key informants and document reviews. Key informants were the MCH head office Manager and the MCH Coordinator for the Health Centers. The health workers of antenatal service and pregnant women. Informants were selected intentionally based on the entity and its relationship to mHealth antenatal care. It was collecting data using FGD Guidelines and in-depth interviews. Informants of pregnant women consisted of primigravida and multigravida with pregnancy trimesters 1, 2, and 3. Informant service providers consist of doctors and midwives who have served for a long time at sub-district health centers, village health centers, and Midwife Independent Practices (PMB), which have served for more than five years. Meanwhile, the MCH Coordinator at the health center and the MCH manager from the Health office have had a working period of more than ten years.

The documents reviewed are all related to the service process, including the recording and reporting of antenatal care. Before data collection, informed consent was carried out on all informants.

Table 1. Types of Informants and Methods of data collection

No	Informant	How to collect data		
		FGDs	In-depth interview	Document study
1	Pregnant women	√		√
2	ANC officer (midwife and doctor)	√		√
3	Health Center MCH Coordinator		√	√
4	MCH manager at the health office		√	√

Due to the Covid-19 pandemic, FGDs and in-depth interviews were conducted online using the Zoom Meeting and Google Meet applications.

### *Data analysis*

Thematic data analysis was performed (Braun & Clarke, 2006). Verbatim transcripts were carried out on all results of FGDs and in-depth interviews. The transcripts of the FGD results and in-depth interviews were analyzed to get an overview and summary of the information obtained according to the research objectives. The results of

the FGDs and interviews were reread in more detail by the researchers. Each important paragraph is marked with a code to determine the theme. Then it is discussed with the research team to get a consensus on the proposed theme. The analysis process is supported by writing memos and recording the Zoom meeting and google meet results. The study's validity was enhanced by emphasizing the participants' freedom to express their opinions and the moderator's open and non-directive attitude during the FGD. FGD transcripts and interviews were triangulated to reduce bias.

## RESULTS

### *Barriers and needs in the process of antenatal care*

The participants of pregnant women in this study varied; Pregnant women consist of primiparas and multiparas in the first, second, and third trimesters of pregnancy with an age range of 20-30 years. Meanwhile, MCH service provider participants consisted of 1 doctor and 6 midwives. Midwives' workplaces include sub-district health centers, village health centers, and independent midwife practices with a working period of 10 - 35 years.

In implementing antenatal services at the health centers, there were several obstacles related to room conditions and the limited number of officers during the Covid-19 pandemic. Another problem with service officers at the health centers and the Midwife's Independent Practice (PMB) is that many types of reporting must be done, which is very time-consuming for officers. This dramatically affects the service process for pregnant women, namely the limited number of visits and time for counseling. Some of the obstacles in the process of antenatal care as listed in Table 2.

Table 2. Barriers to antenatal care at Health centers and PMB

Theme	Quotation of respondent's statement
SOP is stored as a document, there is no checking of standard implementation during service	K, FGD1: "We have all the SOPs, ma'am, we have implemented them according to the SOPs, the SOPs are stored in the archives" F, FGD1: "In PMB has an SOP, it has been given by PD IBI for all PMB"
Some types of antenatal care checks are not available at PMB and need to be referred to the health centers	F, FGD1: "Actually, midwives at PMB do 10T, for tests that don't exist, such as laboratory tests, ultrasound, we refer pregnant women to the health centers, but sometimes there are those who don't want to"
Waiting time for long check	I, FGD 2: "The wait and the queue are long. The inspection only takes a moment."
Limited waiting room	K, FGD1: "Currently, the service for pregnant women is good. Only the waiting room is limited during the pandemic"
The number of officers is sometimes less	R, FGD 1: "The number of workers is appropriate, ma'am, but sometimes with sudden situations we get disturbed, for

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	example during this covid vaccination, it becomes a bit of a hassle too"
Less/short counseling time	T, FGD 2: "You don't know much about what preparations for delivery are, the midwife if she checks for a while, it doesn't explain much" F, FGD1: "Counseling during examinations is a bit difficult because it takes a long time, so I usually make special arrangements with pregnant women" K, FGD1: At the health centers, we usually feel that there is a lack of health education, we have classes, both for pregnant women and for fathers, so it is an education for fathers and mothers..."
Knowledge of pregnant women about the signs and symptoms of pregnancy risk is lacking	R, FGD 1: "The knowledge of pregnant women is still lacking, the MCH book is sometimes not read" K, FGD 1: we need a reminder system for pregnant women themselves. For example, danger signs, whether the system is via cellphone, you could say the MCH book is online, so pregnant women can know what their health status is like..." V, FGD 2: "I don't know ma'am about the danger signs, at least I told other women, they said that there was bleeding"
KIA book not read	R, FGD1: "Most pregnant women don't read MCH books" S, FGD2: "I read Ms. KIA's books but not all of them" D, FGD2: "I like reading about baby care, ma'am"
Various types of reports by officers (administrative duties)	L, FGD1: "We have to make SOAP every visit, we have to report all MCH activities to the health centers" N, FGD 1: "For pregnant women, there is a notebook for pregnant women with rest, for writing on status, also for cohorts, later there will be a special report for pregnant women with rest" F, FGD12: "This SOAP according to the documentation must be head to toe, so if this is possible, an application can be made, so we just have to fill it in, so the midwife just uses a laptop, no need a lot of paper"
The report received by the health office is not detailed	"Couldn't supervise the health centers properly because the health centers report data was not detailed" (IDI 2)
There are no costs for application procurement and maintenance	An IDI 2: "So far, several health centers have run applications, they use their fees, there is no budget from the Health Office yet"
Limited device memory	S, FGD 2: "If we use the application, we have to download it first, my cellphone can't work, ma'am, the memory is full"
Lack of digital literacy	F, FGD 1: "Not all of my friends in midwives are up to date, even though they have good cellphones, they are not used, many are ignorant, it's difficult to complete the data" L, FGD1: "Some friends are still unfamiliar and lazy to use the application"

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Q, FGD2: “I don't understand, ma'am, that's the way it is (the application), I've never used it”

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### ***Repair needs of mHealth-supported services***

Based on the analysis of the results of FGDs and in-depth interviews, it was found that there is a need in the process of antenatal care for officers and pregnant women.

Table 3. The need for improvement of the antenatal care process

<b>Obstacles to the process of antenatal care</b>	<b>Repair needs with mHealth</b>
Long waiting time for inspection	Setting the registration process, the data input process is faster
Limited waiting room	Arrival and return visit arrangements for pregnant women
Number of types of reports by officers (administrative duties)	Automation of reporting and administrative tasks
The number of officers is sometimes less	Arrangement of return visit schedule, online consultation/teleconsultation
Less/short counseling time	Opportunity for counseling/consultation outside the examination schedule, teleconsultation
Lack of knowledge of pregnant women about the dangerous signs of pregnancy	Improving health promotion beyond direct contact with officers, especially prenatal care, danger signs, preparation for delivery, and baby care.
SOP is stored as a document, with No checking of standard implementation	Make the SOP a guideline/protap at every examination of pregnant women
Some types of antenatal checks are not available at PMB, pregnant women need to be referred to the Health centers	Collaboration/referral link between PMB and health centers
The report received by the health office is not detailed	The existence of a report program/application that contains all the data needed for monitoring and evaluation of the Health Office
Pregnant women don't read MCH Books	Making KIA books easy to carry, attractively packaged, and easy to access anytime and anywhere
There are no costs for application procurement and maintenance	Advocacy for budget procurement, application design with economical procurement, and maintenance costs

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Limited device memory	Provides applications that do not need to be downloaded and can be accessed from various types of gadgets
Lack of digital literacy	Introduction of digital applications/products with various conveniences and benefits

The opportunity to use mHealth in antenatal services is possible because every officer already has a smartphone, and the health centers also have PCs and internet networks. So far, the service process at the health centers has used SIKDA and social media such as WhatsApp in helping the service process. Likewise, pregnant women generally have a smartphone; at least one smartphone in the family. During the FGD of pregnant women, it was found that 1 pregnant woman had used 1 pregnancy application, namely the "Teman bumil" application.

### ***Required mHealth features***

Based on the analysis of the situation of antenatal care and the needs of officers and pregnant women for better and quality antenatal services, several features of mHealth were obtained which are expected to support antenatal services. The required mHealth features are shown in Table 4.

Table 4. mHealth features needed by service workers, pregnant women, MCH Coordinator of Health centers, and MCH managers at the Health Office

Features of mHealth	Service officer Midwife/Doctor	Pregnant women	Health Center MCH Coordinator	Health Office MCH Manager
Health promotion	√	√	√	√
Reduce administrative tasks	√		√	
Supervision of SOP implementation	√		√	√
Reminder	√	√		
Ease of referring	√			
Ease of reporting on time	√		√	√
Mother's health record	√	√		
Evaluation and monitoring				√
Clinical decision aids	√			

## **DISCUSSION**

Qualitative studies on health needs analysis in antenatal care have been carried out on various entities, namely pregnant women, MCH service workers, and MCH service managers at the Puskesmas and the health office. There were variations in the participants in this study based on gravida and gestational age. This is considered to represent all the characteristics of pregnant women. Likewise, the participants who provided MCH services consisted of doctors and midwives from various service providers who had worked for more than five years. This makes the research results can be used as material for the evaluation and development of further antenatal services, especially in the utilization of mHealth in antenatal services.

In Indonesia, midwives are the officers who provide the most antenatal care, both at sub-district health centers, village health centers, and midwives' independent practices. The selection of midwives as a place of service by most pregnant women is due to several

reasons, including hereditary beliefs, gender, and financial factors. To maintain this trust, midwives also need to innovate in providing services.

Some of the barriers to antenatal care found were also found in other studies. For example, limited inspection time and waiting rooms are closely related to facilities and infrastructure (Mugo et al., 2018; Phommachanh et al., 2019). The length of time pregnant women wait their turn for examinations is related to the number of pregnant women who come for examinations and the number of service personnel available at that time. The quarantine that caused the officers to be absent resulted in an excessive workload and limited time available for each pregnant woman (Rahman, A.E., Perkins, J., Islam, S., 2018; Rahmani & Brekke, 2013). Furthermore, at the time of counseling, there was not much time available, so some important things related to pregnancy care and preparation for delivery were not discussed, so the application of service standards was not met. The study results found that the implementation of counseling was only 23% (Grimes et al., 2014).

Health promotion is crucial in antenatal services to improve the health of pregnant women (Dayyani et al., 2021). Lack of time for counseling affects the knowledge of pregnant women, especially in this study it was also found that pregnant women also rarely read MCH books, in terms of MCH books containing much information about pregnancy and preparation for childbirth. Hence, it is not surprising that the study results showed that only 26% of pregnant women have good knowledge (Creanga et al., 2016; Nan et al., 2020).

Due to the lack of knowledge of pregnant women due to lack of counseling time and the infrequent reading of MCH books, mHealth can partially overcome obstacles in antenatal care, including increasing knowledge of pregnant women. mHealth is effective as a health promotion media (Amanak et al., 2019; Masoi & Kibusi, 2019).

Implementation of standards in service is essential in maintaining service quality. The application of this standard is influenced by several things, including the existence of SOPs and the supervision of their implementation (Gibson et al., 2012; Grimes et al., 2014; Zhang, 2020). In this case, mHealth can also be relied on to be a monitoring tool for implementing service standards by providing guidelines for the examination of pregnant women and notices on the application of service standards. Utilizing mHealth will improve officer performance (Braun & Clarke, 2016).

To achieve high-quality antenatal care, apart from relying on the capabilities of the officers, the active involvement of pregnant women and their families is also required. For this reason, supporting facilities are needed by utilizing existing communication technology. With mHealth, pregnant women and their families can play an active role, where they participate in conveying data about their health and pregnancy and actively seek information about pregnancy and childbirth care (Freeman et al., 2010). The features of mHealth that facilitate this are health promotion and digital health records.

Since the Covid-19 pandemic, the care system for pregnant women needs to be a concern so that maternal health care continues to run well. The risk of transmission of Covid-19 makes pregnant women worry about visiting health services. It was found that there was a decrease in physical visits of pregnant women to health facilities (UNICEF & WHO, 2020). To continuously monitor the condition of pregnant women, a teleconsultation feature is required. The referral link feature is needed to simplify and



speed up service access. some of these features are very helpful for midwives' work, especially for independent practice midwives who have incomplete examination supporting equipment, such as laboratory equipment.

Although we have tried our best, this study has limitations. The limitations of this research are related to the area where the research was conducted, which only covers one area in Jakarta, so it does not represent several other regions in Indonesia with different geographical conditions and human resources.

## CONCLUSION

The situation for antenatal care so far has experienced problems in implementing service standards, including long queues and waiting times at the health centers, insufficient staff time to provide counseling, midwives' administrative burden, incomplete equipment in some midwives, and lack of utilization of MCH books by pregnant women. These obstacles in prenatal check-ups can be overcome by using mHealth. In addition, antenatal care workers and pregnant women also want mHealth support in antenatal care.

The mHealth features needed in antenatal care are health promotion, digital health records, reminders, teleconsultation, clinical decision-making tools, real-time reports, referral links, and mapping of pregnant women. Before implementing mHealth in antenatal care, it is necessary to prepare infrastructure and efforts to increase digital literacy for officers and the community.

## ACKNOWLEDGEMENTS

The authors would like to thank the West Jakarta Health Office, pregnant women, and the MCH service staff for all their support and participation in this study.

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