

# Mobile Health Application In Implementation of Maternity Nursing Care: Literature Review

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## Abstract

Indonesia is a developing country with relatively high maternal mortality number. One of the influencing factors for that condition is health services at antenatal, intranatal and postnatal period has not been optimized yet. The optimization effort has been done in several countries through health service based on utilization of mobile phone technology called mobile health. The literature study aimed to present information from previous studies about implementation and benefits of mobile health in the maternity nursing care. The literature sources divided into three country categories including Western, non Western and Indonesia and consist of 30 online literatures. The implementation of mobile health in maternity nursing care showed positive impact in knowledge, motivation, and health behavior of the mother. Indonesia as developing country which can be strategic country in utilizing mobile health because of mostly Indonesian is mobile phone users. Nurse in corporation with cross sectors is supposed to develop mobile health in many strategic topics specifically in the effort of reducing the Maternal Mortality Rate (MMR) in Indonesia.

**Keywords :** Information technology, maternity, mobile-health, nursing care.

## Studi Literatur tentang Implementasi Aplikasi “*Mobile Health*” di Pelayanan Keperawatan Maternitas

### Abstrak

Indonesia adalah salah satu negara berkembang dengan Angka Kematian Ibu (AKI) yang relatif tinggi. Salah satu faktor yang mempengaruhi tingginya AKI di Indonesia adalah belum optimalnya pelayanan kesehatan pada masa kehamilan, bersalin, dan postpartum. Upaya untuk meningkatkan pelayanan kesehatan di beberapa negara dilakukan dengan menggunakan teknologi berbasis telepon genggam atau disebut dengan “*mobile health*”. Study literatur ini bertujuan untuk menginformasikan penelitian-penelitian yang sudah dilakukan berkaitan dengan aplikasi dan keuntungan “*mobile health*” dalam keperawatan maternitas. 30 penelitian berasal dari media online, dibagi menjadi tiga kategori yaitu artikel dari negara Barat, negara non-Barat, dan Indonesia. Implementasi penggunaan “*mobile health*” pada pelayanan keperawatan maternitas menunjukkan dampak yang positif terhadap pengetahuan, motivasi, dan perilaku kesehatan ibu. Indonesia sebagai negara berkembang sangat strategis untuk pengembangan “*mobile health*” dikarenakan sebagian besar penduduk Indonesia adalah pengguna telepon genggam. Perawat dapat bekerjasama dengan sektor lain untuk mengembangkan program “*mobile health*” dengan berbagai topik khususnya berkaitan dengan upaya untuk menurunkan AKI di Indonesia.

**Kata kunci:** Teknologi informasi, maternitas, *mobile health*, pelayanan keperawatan.

## **Introduction**

Indonesia is a developed country with high number of pregnant mothers noted in 2015, whose amount of pregnant women were about 5.290.235. That fact was accompanied by conditions of Maternal Mortality Rate (MMR) in Indonesia is still high. MMR in Indonesia is one of the highest in Southeast Asia, reaching 220/100.000 living birth (Pusat Data dan Informasi, 2016). Based on the Sustainable Development Goals 2030 program, target set for the reduction of MMR is about 102/100.000 deaths in 2015, but the government's target to reduce the MMR is still needed to be improved because the achievement is only 36%. One of the inhibiting factors in efforts to reduce MMR is the service's quality of antenatal, intranatal and postnatal has not been optimized yet (Walton, 2015).

Mobile health is developed in many nursing fields related to many goals. Research conducted by Hariyati et al. (2011) show that there is a need of an integrated nursing management information system (NMIS) to enhance better coordination and collaboration between the Puskesmas, hospital and other related sector to provide better health care services (R. T. S. Hariyati, Delimayanti, & Widyatuti, 2011). Not only for management system but also can be used as education media for discharge planning and as nursing care documentation resulted on enhancement of documentation quality and time efficiency (R. T. S. Hariyati, Afifah, & Handiyani, 2010; R. T. S. H. Hariyati, Yani, Eryando, Hasibuan, & Milanti, 2016). A qualitative study on nurses focus group discussion show that they expect good development of telehealth or mobile health to support both patient and nurse (R. T. S. Hariyati & Sahar, 2012).

Improving quality of health services as an effort to reduce MMR is still continues. One action is by using the development of information technology and communication that is mobile health technology. Mobile health is a the use of mobile phone and internet based communications including verbal, voice and picture messaging in the process of giving health service (Balakrishnan, Gopichandran, Chaturvedi, & Chatterjee, 2016; Datta, Ranganathan, &

Sivakumar, 2014; Ledford, Rose, Cafferty, & Hodge, 2016). Mobile health has been used in several developed and developing countries including Indonesia. The utilization of mobile health is increasing by now.

This literature review aimed to provide information from previous studies about utilization of mobile health as one of intervention for maternity nursing practice in Indonesia. Maternity nursing field in this literature study included the utilization of mobile health in nursing care in antenatal, intranatal and postnatal period. Improvement of health service's quality may reduce the number of MMR in Indonesia. The literature sources divided into three country categories including Western, non Western and Indonesia and consist of 30 online literatures. The literature review is organised under three headings. These are mobile health utilization in antenatal, intranatal, and postnatal.

## **Research Method**

The method of writing this article used literature searching through database online Science Direct, Pro Quest, CINAHL, Pubmed and Scopus. The literatures then limited from year 2012 to 2017 with keyword: information technology, mobile-health, maternity, nursing care. About 30 online literatures were obtained in this literature study. Booleans such as AND and OR were used as necessary. Articles from various international journals provided information about utilization of mobile health in maternity nursing care form Western, non Western and Indonesia.

Eighteen studies from Western countries including USA, England and Canada investigated about impact for utilization of mobile health in maternity nursing practice on antenatal, intranatal and postnatal. Almost all of the study show that mobile health application help mother and father to enhance health status on her pregnancy especially for working mom (Chaves et al., 2017; Premji, 2014; Jennings et al., 2016; Obasola, Mabawonku, & Lagunju, 2015; Felicie et al., 2016; Ledford et al., 2016; McNabb et al., 2015; Waring et al., 2014; Spiby et al., 2014, Asiodu et al., 2015; Rhyne & Borawski, 2014; Guerra-reyes et al., 2017; Smith) . Inline with

previous study from Western countries, the 7 studies from non-Western countries including Africa, India, Bangladesh, Australia found that mobile health can give positive impact for pregnant mom Balakrishnan et al., 2016; Forti, Stapleton, & Kildea, 2013; Huq, Azmi, Quaiyum, & Hossain, 2014; Khatun et al., 2015; Lupton & Pedersen, 2016; Khatun et al., 2017). In Indonesia, several studies have been conducted about this topic and its show that utilization of mobile health as health promotion media still in progress (Santoso, 2017; Probandari, Arcita, Kothijah, & Pamungkasari, 2017; R. T. S. Hariyati, Delimayanti, & Widyatuti, 2011; R. T. S. Hariyati, Afifah, & Handiyani, 2010; R. T. S. Hariyati, Yani, Eryando, Hasibuan, & Milanti, 2016)

### **Mobile Health Utilization in Maternity Nursing Care in Antenatal Period**

Previous study about the utilization of mobile health as information media on antenatal nursing care had been conducted. Some application for pregnant women are developed which provide information about nutrition, activity, and health information during pregnancy. Research conducted by Waring et al. (2014) develops a mobile health application about information needed through pregnancy and studied the respond of pregnant mother in the use of mobile health to help them in accomplishing ideal weight through pregnancy. The research was done to 64 pregnant mothers. The result showed that about 84% respondents used mobile health in accessing information about pregnancy. About 86% respondents stated happy feeling and were interested in helping them to reach their ideal weight through pregnancy. Mobile health helped the respondents in managing limited time related to the work schedule, transportation problems and time to rear their other kids.

There was a similar research from mobile health system developed by Chaves et al. (2017) which is named Mommy. This system not only covers application from cellular phone of pregnant mothers, but also used by maternity nurses that do the antenatal care (Chaves, Cifuentes, & Macedo, 2017). The

application in pregnant mothers' cellular phone will compile data from the pregnant mother including the necessary of learning from pregnant mother, then sending the data to the central system, next the central system will send message tips or information required for the pregnant mothers. Besides, the information will be documented in the report of health worker and will be shown in the website (Chaves et al., 2017).

The implementation of mobile health in the practice of antenatal nursing care was also developed by Ledford et al. (2016). This study showed positive results in mother's self-management and willingness to learn from 10 weeks to 32 weeks of gestation and pregnancy (Ledford et al., 2016). The online survey conducted by Lupton & Pedersen (2016) on the use of mobile health by pregnant women showed that the application was very helpful for pregnant women, especially in obtaining information about pregnancy, monitoring fetal development and understanding of pregnant women about experienced physical and psychological adaptation (Lupton & Pedersen, 2016).

Research related to the application of mobile health in maternity nursing care in Indonesia has been done by Santoso et al. (2017) who examined the android application "Suami Siaga Plus" as an application that contains information about childbirth. This information is given to pregnant women and their husbands. This study showed that the combination of counseling methods and mobile health utilization in the form of "Suami Siaga Plus" application shows a significant increase in knowledge about danger signs in pregnancy compared to couples who only gained knowledge through counseling. This application also help the couple to prevent the three "late" things which are late in decision making, late in arrivals to the referral place, and late of getting handled which leads to an increase of Maternal Mortality Rate (MMR) (Santoso et al., 2017).

Hereinafter, the mobile health application develop specifically for pregnant women is m4Change. The results shows that the use of this application improves the quality of antenatal care in various aspects of service. These results were consistent with respondents' satisfaction which showed a

statistically significant increase after using m4Change (Mcnabb et al., 2015).

Furthermore, the observation of Lund et al. (2012) developed mobile health in antenatal care through short messaging services (SMS). The service also provide an opportunity for two-way communication between pregnant women and health personnel as well as antenatal visit schedule. SMS is sent from pregnancy up to six weeks after childbirth. SMS is sended twice a month during gestation less than 36 weeks. After more than 36 weeks' gestation, the SMS is give twice a week. The language used in health information that is sent through text messages or SMS is a language that is easy to understand and is the local language of the respondent's area. This study shows an increase in antenatal visits related to mobile health usage in the form of health messaging and consultation via short messages services (SMS) (Lund et al., 2012).

### **Mobile Health Utilization in Maternity Nursing Care in the Intranatal Period**

In maternity nursing care especially in the childbirth period, several applications include in mobile health development have been developed. Research conducted by Ayiasi et al. (2016) develop intranatal services by sending health information via telephone with verbal information in the form of consultations. This telephone consultation was conducted between health workers and respondents regarding pregnancy knowledge, delivery preparation, umbilical cord care and breastfeeding practices. The results of this study shows that the utilization of mobile health improve maternal knowledge related to delivery, cord care and neonatal care (Ayiasi, Kolsteren, Batwala, Criel, & Orach, 2016).

Research conducted by Entsieh et al. (2015) developed a Mobile Midwife app that send short messages containing health information on a regular basis. The language used in delivering information is local language of the local area. The results of this study shows an increase in the trust of pregnant women on the Midwife Mobile application because it has provided counseling

that contains information related to nutrition in pregnancy. In addition, this application consist of information on the importance of health professionals during pregnancy and childbirth. This is strengthen by suggestions displayed on Mobile Midwife app related to obstetric services (Entsieh et al., 2015).

The next study focused on the perception, the willingness of nurse midwife on telephone methods performed in the latent phase of one childbirth. The telephone contact between the maternity nurse and the respondent aimed to improve maternal comfort during childbirth, especially the latent phase of the first stage where, in that phase, the pain is greatly felt by the mother in childbirth. The results of this study indicate that these efforts are effective in assessing the progression of childbirth so that the mother's time to go to the hospital is adequate when it has entered the active phase at one stage of childbirth (Spiby et al., 2014).

### **Mobile Health Utilization in Maternity Nursing Care in the Postnatal Period.**

The utilization of mobile health in the postnatal period can improve the care quality of mother and motivate her to routinely check her situation to the nearest health service facility (Shiferaw, Spigt, Tekie, & Abdullah, 2016). Based on research conducted by Asiodu et al. (2015), mostly postpartum mothers search for information on breastfeeding techniques and infant development through applications in their smartphones. This study shows family support for postpartum mothers by using the application to search for such information. At least one of the apps they downloaded and it became a reference in the treatment of neonates. Some examples of such applications are Baby Center's, My Pregnancy and My Baby Today, Baby Gaga and I'm Expecting (Asiodu et al., 2015).

That results are in accordance with the research conducted by Guerra-reyes et al. (2017) which states that there is a gap between the information required by mothers related to the health information in the postpartum period. The postpartum mother expressed her need for health information on mental and reproductive health. However, the development of mobile health as a learning



tool commonly used by mothers is still limited in providing information related to it. Therefore, mobile health development is needed according to the mother's learning needs (Guerra-reyes et al., 2017).

The topic of mental health on postpartum mothers has been studied by Rhyne & Borawski (2014). The utilization of mobile health was improved by sending messages through Short Messages Services (SMS) to respondents experiencing postpartum depression. SMS is a health message and motivational sentences as an additional therapy for mothers with postpartum depression. In this study, respondents had the opportunity to make phone calls with the health team if necessary (Rhyne & Borawski, 2014).

## **Discussion**

The use of mobile health as one of the effective solutions recommended by the WHO in the healthcare process continues to grow (Balakrishnan et al., 2016; Forti, Stapleton, & Kildea, 2013; Huq, Azmi, Quaiyum, & Hossain, 2014; Santoso et al., 2017). The process of health care includes the exchange of information, communication and consultation using smart phones owned by the majority of the population in various countries (Ayiasi et al., 2016; Khatun et al., 2015; Vital Wave Consulting, 2010). Indonesia is one of the developing countries with a relatively high number of people using mobile phones or smart phones (Santoso et al., 2017). It supports the improvement of health services based on mobile phone services.

The development of mobile health in the field of maternity nursing includes antenatal, intranatal and postnatal (Bang et al., 2010; Datta et al., 2014). In each of them, mobile health is developed in various methods. The method can be delivering a short message that contains health information according to the needs of the mother, counseling through telephone calls, detecting signs of danger and assisting in decision making process. The target of mobile health users is also varied, namely the individual mother, family, and health personnel itself (Ayiasi et al., 2016;

Vital Wave Consulting, 2010).

Various studies have been conducted to determine the benefits of mobile health development in health services, especially nursing maternity. These benefits include increasing mother's motivation to seek adequate information related to her condition, improving mother's motivation to access health care facilities, improving mother's knowledge and improving mother and family health behavior (Balakrishnan et al., 2016; Chaves et al., 2017; Duclos et al., 2017; Rhyne & Borawski, 2014; Smith, Gold, Td, Sumpter, & Free, 2015; Spelten & Hutton, 2017). It shows the effectiveness of mobile health in providing health education to larger community quickly, cheaply and effectively by utilizing technological advances. These benefits can indirectly have a positive effect on the long-term impact of decreasing Maternal Mortality Rate (MMR) (Santoso et al., 2017).

Mother's healthy behavior during pregnancy, childbirth and postpartum is influenced by many factors including values in the family. Mobile health comes with the provision of health information with a broad target not only for mothers but also for family engagement (Obasola, Mabawonku, & Lagunju, 2015). One example of mobile health application in Indonesia is "Suami Siaga Plus" developed by Santoso et.al., (2017). This application focuses on the involvement of husbands during maternal pregnancy (Khatun et al., 2017; Santoso et al., 2017). The husband knows the schedule of antenatal visits according to maternal age of pregnancy. In addition, through the application, the husband knows the development of fetus, signs of childbirth, other signs of danger and the signs if there is interference in the postpartum period. The results of this study indicate that the ability of the husband has increased especially in preparation of childbirth and at the time when there are complications (Santoso et al., 2017).

Based on the literature review related to the benefits of mobile health development and on observing the characteristics of Indonesian citizens close to mobile phone usage, the development of mobile health in various aspects of nursing service is very possible to do. Some strategic moves that

can be done in developing the application of mobile health are by increasing the number of cooperation between health care and university in creating mobile health on certain topics. In addition, there needs to be an increase in infrastructure in the development of mobile health. Furthermore, the preparation of mobile health should start from a simple concept, utilize available resources and is later developed more widely. The development of mobile health is not separated from the government's support on the procurement of mobile health regulation and incentives. After the development of mobile health is completed, it is necessary to evaluate and to monitor continuously (Asiodu et al., 2015; Santoso et al., 2017; Vital Wave Consulting, 2010).

## Conclusion

The utilization of mobile health in various aspects of maternity nursing care has been done in several developed and developing countries including Indonesia. Numerous studies have demonstrated the positive effects of mobile health use on knowledge, motivation and healthy behavior in pregnant women, in maternal mothers and in postpartum mothers. In addition, the utilization of mobile health also improve the quality of services care nursing in the antenatal, intranatal and postnatal periods. The improvement of the quality of nursing care services will affect and support the efforts in reducing Maternal Mortality Rate (MMR).

The development of mobile health in Indonesia as one of the media utilized in nursing care is still not optimally developed. Referring to the development of mobile health in some other developing countries, mobile health has involved many components and is a strategic move in nursing interventions at the basic health service level. Therefore, it is expected that nurses will work together with other sectors to develop mobile health in the practice of maternity nursing care during the antenatal, intranatal and postnatal periods as an effort to decrease maternal mortality rate (MMR) in Indonesia.

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