

Efforts to Improve Pregnant Woman's Ability to Detect Pregnancy High Risk through "SMS Gateway" Program

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Abstract: *Complication during pregnancy have caused 530.000 women's death across the globe. Presumably, 10 to 20 million women suffered from physical, mental disorder and even disability, parts of which were due to pregnancy complication, late action and health service delivery. The research aims to identify the influence of SMS Gateway program upon pregnant women's ability in detecting pregnancy high risk. The research design was quasi experimental with one group pre post test design approach. The research population was 182 pregnant women taken from Sukorame Public Health Centre in the city of Kediri. Sampling technic applied consecutive sampling. The data analysis was carried out through Wilcoxon sing ranks test. The research result indicated the ability of pregnant women in detecting pregnancy high risk prior to SMS Gateway program execution such as those with good ability 60.8%, and post SMS Gateway program execution the numbers of pregnant women with good ability improved (71.2%). From the result of Wilcoxon sing ranks test value $p < 0.000$ was obtained, which means the difference was shown of pregnant women's ability to detect pregnancy high risk pre and post SMS Gateway program execution. Thus, the use of SMS Gateway can improve the ability of pregnant women in detecting their pregnancy high risk.*

Keywords: *SMS Gateway Program, Detection of Pregnancy High Risk*

I. Introduction

According to World Health Organization (WHO) approximately one-third of the number of pregnant women's death rate came from Southeast Asia in which presumably 98% of total death rate took place in Indonesia, Bangladesh, India, Nepal dan Myanmar^[1,2]. Unfortunately, the decrease of pregnant maternal mortality rate (MMR) was relatively slowing down. Indonesia noted 20.000 women's death rate per year which means 2 women are dying each hour^[3]. Based on the data of Indonesian Health Demography Survey (SDKI) in 2012 AKI indicated high rate as 359 per 100.000 living birth (KH). Moreover, infant mortality rate (IMR) also indicated high rate as 32 per 1000 KH^[4].

Whereas, in the province of East Java, for the past five years (2007-2011) MMR indicated the tendency of increase as in 2009 it was noted as 90.70 per 100.000 of living birth, in 2010 it was 101,40 per living birth while in 2011 it was 104,3 per 100.000 of living birth. The data from department of Health in the city of Kediri indicated the number of women's death rate in 2013 was approximately 34 while in 2014 it was 17 people, out of 26,906 labors a year, while in 2015, from January to February, 5 women's death was obtained. The number of baby's death rate in 2013 was 227 while in 2014 was 203^[5].

Knowledge enhancement is such an important domain to shape pregnant women's/prospective mothers' behavior. With sufficient knowledge of complication during pregnancy, prospective mothers will likely keep, defend, avoid or even diminish the risks of complication^[6]. The gaps of social-economy status and poor level of education can cause the limitation of prospective mothers' realization and comprehension to take care and keep the pregnancy that labor will likely be undergone at home. This will eventually lead to the possibility of lowest cost reduction five times higher than making the most use of health facilities^[7]. As a matter of fact, the problem indicates more complex situations as most pregnant women with pregnancy high risk generally reside in remote areas completely trust traditional midwives to go into labor even though health service is publicly available in each village. Nevertheless, labor is normally conducted with the assistance of midwives with the percentage of 38,05% and with the help of close relatives of 1,69%^[8,9].

This is to detect early complication and eventually receive favourable treatment and can reduce number of mothers' and baby's death rate. Basic a non technical cause also plays a pivotal role to prospective mothers' death rate such as geographically untouchable location; swamp, broken roads, way too far from medical assistance, located in remote areas. These made promotional attempts for better health treatment for prospective mothers and babies even seems so difficult.

Strategies for developing medical media promotion in disease prevention management has been long conducted. However, information provision especially for pregnant women has not much to be carried out the focus on medical promotion rely on medical education through newspapers, radios, televisions, leaflets, newsletter, magazines, posters, brochures^[10] though still in limited implementation. Thus, prospective mothers' knowledge enhancement through direct as well as indirect medical education is desperately needed. Even

though many paramedics have provided prospective mothers with counseling service during ANC (Antenatal Care) check-up, the efforts have not yet reached groups of pregnant women with low level comprehension of medical treatment. The limited number of paramedics with considerable knowledge of information technology and education (KIE) is also one of the handicaps^[11]. Mass alternative strategies as potential promotional media to provide people of untouchable areas with medical information to eventually learn and comprehend medical condition during pregnancy and labour and to motivate delivery which will likely influence and motivate themselves to identify symptoms of complication and nutrition deficiency gizi at early stage such as through the use of cellular phones.

The opportunity of the use of cellular phones (mHealth) as the strategy of medical promotion is suggested to improve the people's levels of health. The technology is able to facilitate the information release closely reach healthy individuals yet disorganize in contacting health service. Based on the data collected by Indonesian cellular Telecommunication Association (ATSI) up to the end of 2011, the penetration and the use of cellular phones in Indonesia reached 250 millions or 110% of Indonesian populations^[12]. The program optimization becomes important with reference to the data of Human Resources board of research and development of Ministry of Information such as the proportion of people who possess cellular phones improve more from 2004 as 14,79% became 82,41% in 2009^[7]. High flexibility and accessibility of support of importance of cellular phones use improved the level of people's health, especially pregnant women. This model has provided positive effects such as SMS reminder to cure for TB patients, malaria and HIV and motivation for young people to stop smoking^[13,14]. Yet, only a few effects towards the health of pregnant women. According to a research in hinting that medical promotion with short message delivery and with toddlers' mothers target improved effective polio vaccination to remind of the immunization schedule^[15]. The research aims to identify the benefits of SMS technology as medical promotion media, especially on the knowledge of pregnant women about pregnant women's ability in detecting pregnancy high risk.

SMS Gateway is a platform providing mechanism for UEA to deliver and receive short message from a device in the form of mobile phone through SMS Gateway's shortcode (e.g 9221)^[16]. SMS Gateway enables UEA to communicate with local SMSC (Telkomsel, Indosat, etc) or platform SMS to deliver and receive messages in the easiest way as SMS Gateway will implement the whole process and connection with Telco. SMS Gateway also provides UEA with easy and standardized interface.

For those particular needs SMS Gateway is relatively flexible as it is created with only one personal computer or even Notebook. The most needed device are a computer, a mobile phone with three data cables (cable connected to mobile with PC) or Infra Red can be used and software as SMS Gateway. To be able to use InfraRed a mobile phone with the same facilities are also needed yet not recommended for the need of SMS gateway as communication via Infra Red is not that appropriate (easily cut down when slided)^[17]. SMS Gateway application can be used for hospitals, clinics, or midwife independent practice (BPM) which enables hospitals and / or BPM in maintaining the numbers of patients.

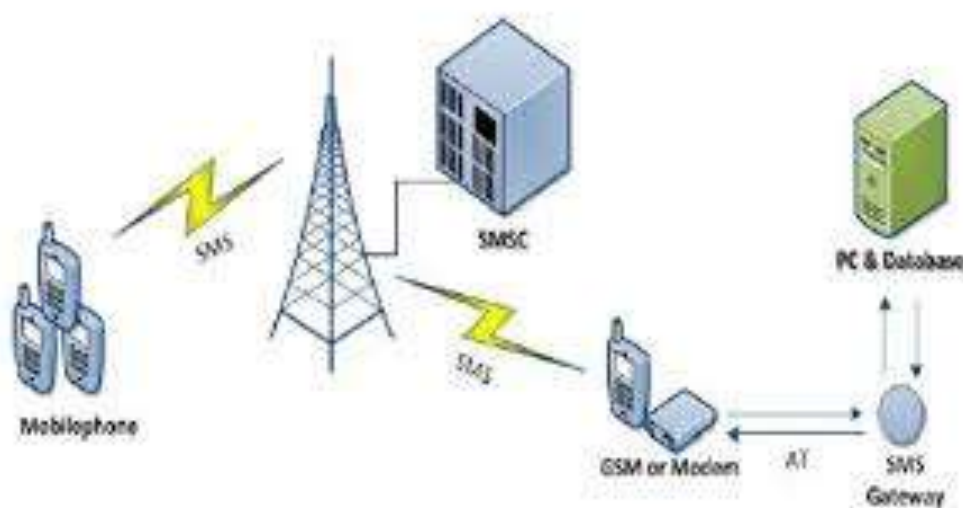


Figure (1) working system of SMS Gateway

General Objective

To identify the influence of SMS Gateway program upon pregnant women's ability in detecting pregnancy high risk.

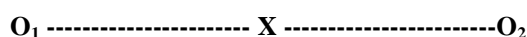
Specific Objectives

1. to identify pregnant women's ability in detecting pregnancy high risk before to SMS gateway implementation.
2. to identify pregnant women's ability in detecting pregnancy high risk after SMS gateway implementation.
3. Analyzing influence of SMS gateway program towards women's ability in detecting pregnancy high risk.

II. Research Method

Design

The research design was implemented through quasi eksperimental with the design of one group pre post test design. The research Instruments was in the form of questionnaire of pre-test and post test on women's ability in detecting pregnancy high risk. Intervention program used SMS gateway automatically designed to deliver short messages (SMS) daily in one month to all respondents. The research design as shown in the following figure (2):



Notes:

O₁ : Test of women's ability in detecting pregnancy high risk before to SMS gateway implementation.

X : "SMS gateway program" treatment

O₂ : Test of women's ability in detecting pregnancy high risk after SMS gateway implementation.

Figure (2): Research Design

Population and Sample

Research population was taken from 182 pregnant women in the area of Sukorame Public Health Centre, city of Kediri, East Java, the Republic of Indonesia. Whereas, the samples consisted of parts of population which can be used as research subject through sampling ^[18]. To identify the value of sample in the research it was counted using Slovin pattern, and from the result of the counting around 125 orang were obtained. The criteria of sample inclusion in the research was indicated as follows; (1) pregnant women being checked up in Sukorame public health centre, (2) pregnant women possessing mobile phones.

Sampling Technique

Sampling technique used was consecutive sampling that is sample research by determining subject which fulfill the research criteria and taken part in the research for a certain period of time, that the number of patients was met ^[19].

Research Variable

1. Independent variable; SMS Gateway Program (X): known as a platform providing mechanism to EUA to deliver and receive SMS from mobile (HP, PDA phone, etc) through SMS Gateway's shortcode.
2. Dependent variable; Pregnant women's ability in detecting pregnancy high risk during Trimester III (Y): known as pregnant women's level of knowledge to conduct early detection during pregnancy.

Research Hypothesis

H₁ : "SMS Gateway" Program influences pregnant women's level of knowledge in conducting early detection towards pregnancy high risk.

Data Analysis

To identify influence of "SMS Gateway" program upon pregnant women's level of knowledge in conducting early detection towards pregnancy high risk during pregnancy, the data analysis used Wilcoxon Signed Rank test ^[19].

Research of Ethic

1. The research obtained recommendation known as "Ethical Clearance" from Research Ethical Commission of Health, Health Polytechnic of Health Malang, with register number: 217/KEPK-POLKESMA/2016.
2. Informed Consent has been conducted to all respondents
3. Respondents' data was strictly confidential.

III. Result

Table (1) Respondents' Characteristic of pregnant women in Sukarame Public Health Centre of Kediri

No.	Respondents' Age	x	%
1	< 20 years	0	0,0%
2	20 – 35 years	88	70,4%
3	> 35 years	37	29,6%
No.	Education	x	%
1	SD	2	1,6%
2	SLTP	42	66,6%
3	SLTA	66	52,8%
4	SI	15	12,0%
No.	Age of Pregnancy	x	%
1	Trimester I	18	14,4%
2	Trimester II	56	44,8%
3	Trimester III	51	40,8%

Based on table (1) almost all respondents at age of 20-35 (70.4 %), and most of them with educational background of SMA (52.8%), while respondents' age of pregnancy distribution almost half of it is in the position of trimester II as 56 (44,8%) respondents and trimester III as 51 (40,8%) respondents.

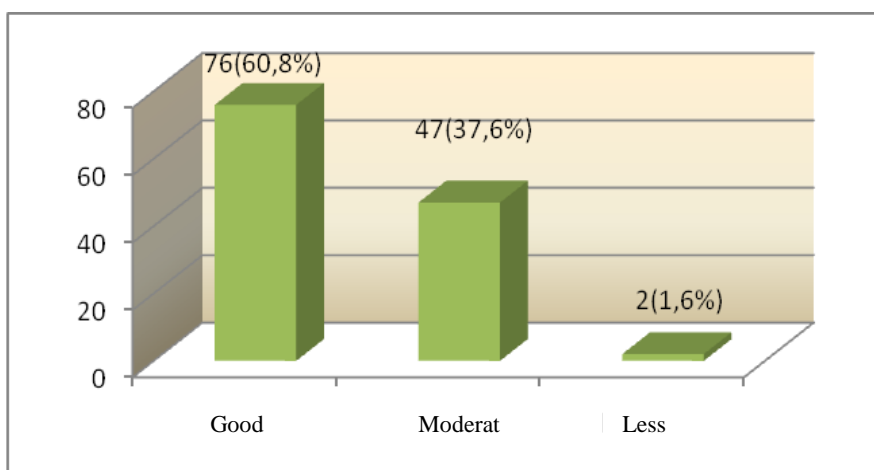


Figure (3) Diagram of pregnant women's ability in detecting pregnancy high risk before to SMS Gateway program implementation

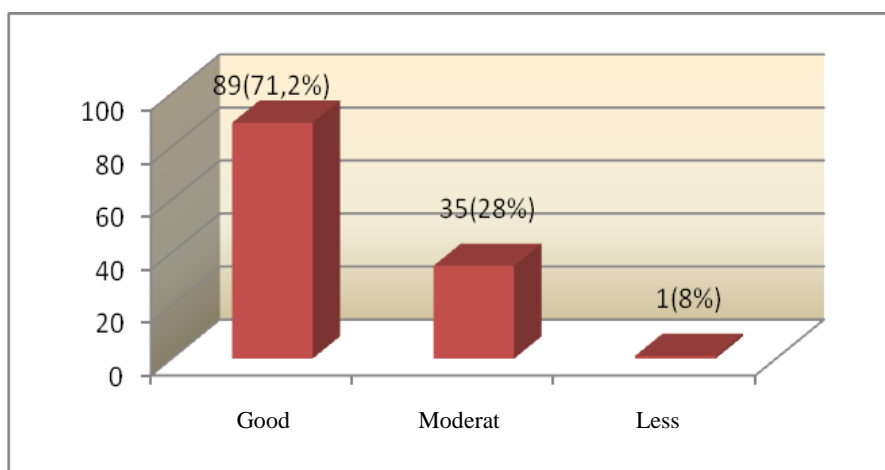


Figure (4) Diagram of pregnant women's ability in detecting pregnancy high risk after SMS Gateway program implementation

Based on figure (3) it was obtained that pregnant women's ability in detecting pregnancy high risk prior to SMS Gateway program implementation is good at the most part as 76 respondents (60,8%). While based on figure (4) it was obtained that pregnant women's ability in detecting pregnancy high risk prior to SMS Gateway program implementation is good at the most part as 89 respondents (71,2%).

Table (2) Result of Statistical Test of Wilcoxon Signed Rank Test

	PREGNANT WOMEN'S ABILITY POST SMS GATEWAY PROGRAM - PREGNANT WOMEN'S ABILITY PRIOR TO SMS GATEWAY PROGRAM
Z	-3.742 ^a
Asymp. Sig. (2-tailed)	.000

a. Based on negative ranks.

Based on the result of wilcoxon sign ranks test, it was obtained that significant value 0.000 and Z skor -3,742. Since *p* was smaller than alpha 0.05 so H0 was rejected. The difference of pregnant women's ability in detecting pregnancy high risk prior to and post SMS Gateway program implementation.

IV. Discussion

Pregnant women's Ability in detecting pregnancy high risk prior to SMS Gateway program implementation.

Based on figure (3) it was obtained that Pregnant women's Ability n detecting pregnancy high risk prior to SMS Gateway program implementation was good at the most part as (60,8%), and (1,6%) with less knowledge. Knowledge improvement is the most important domain towards prospective mothers' shape of behavior. If prospective mothers possess enough knowledge of complication during pregnancy, they will likely kepp, prevent, avoid or even overcome prospective complication^[5]. The gap between social-economy status and poor level of education caused the limitation of prospective mothers' realization and comprehension to take care and keep their pregnancy so that delivery treatment is most carried out at home. This can influence the attempts of reducing the lowest cost level which even becomes five times bigger than thse of making the most use of medical facilities^[7]. The problem becomes more complicated as most pregnant women with highest risk mostly reside in remote areas and mostly make the most use of traditional midwives for delivery though most medical facilities are already provided in most villages,. Delivery treatment with the help of traditional midwives reached 38,05% and 1,69% with the help close relatives^[8,9]. Furthermore, limited numbers of paramedics with information technology and education (KIE) ability also appears as another handicaps^[11]. Thus, mass alterative strategy needs to be taken as promotional media to spread information on health to people especially those who reside in remote areas with limited knowledge of pregnancy, delivery, complication symptoms during pregnancy, nutritional deficiency so that they can conduct eraly detection on problems ahead with the use of cellular phones.

Pregnant women's ability in detecting pregnancy high risk post SMS Gateway Program implementation

Based on figure (4) it is obtained that pregnant women's ability in detecting pregnancy high risk post SMS Gateway Program implementation was good at the most part as 89 respondents (71,2%). Strategy of developing medical promotional media in the magagement of disease avoidance has been long donducted. However, information provision especially to pregnant women has not much carried out. the focus of medical promotion only on nespapers, radios, televisions, leaflets, newsletters, magazines, posters, brochres and others^[10] and yet these medias have not worked properly. As a matter of fact, the improvement of prospective mothers' knowledge through direct as well as indirect medical education needs to be conducted. Even though the supports of paramedics has been provided through counselling service during ANC (Antenatal Care) check-up, it has not yet reached groups of prospective mothers with poor realization and comprehension on helath service. Prospective mothers with poor health condition will provide opportunity of death and acute morbidity. The main cause of these particular problems is normally the late or efficiency of treatment suchas inefficiency in finding proper care, inefficiency in reaching health service and inefficiency in obtaining proper treatment and health facilities. One of effective strategies to reduce prospective mothers' death rate is by providing them with sufficient knowledge of their own health condition during the pregnancy and delivery plus the possibility of upcoming complication might likely the delivery. Most prospective supporters' roles such as policy makers, service providers, medical facilities, public, families, pregnant women themselves also need to be into consideration to reduce MMR and IMR. The role of government as the policy maker to reduce prospective mothers' and babies' death rate has long been conducted, yet still in the form of curative and rehabilitative actions such as PONEK and PONED programs, while programs focusing on preventive and promotive actions has been conducted improperly. Preventive and promotive actions also need to be taken to prepare women for pregnancy, delivery, bleeding post delivery so that prospective mothers and babies will likely have a better health condition. The attempts to improve prospective mothers' and babies' health can be conducted by improving their knowledge, delivery and bleeding post delivery through one of cellular technologies provided in the technology of Global System for Communication (GSM) such as Short MessageService (SMS). This method is quite reasonable to conduct as most people are using mobile phone in Indonesia and even in the world.

The Influence of SMS gateway program upon pregnant women's ability in detecting pregnancy high risk.

With Wilcoxon sing ranks test value of significance of 0.00 was obtained and smaller than alpha 0.05 that H0 was rejected. As a matter of fact, the difference of prospective mothers' ability in detecting pregnancy high risk between prior to and post SMS Gateway program implementation was obviously indicated.

The use of mobile phones in the world indicated significant improvement each year. In 2001 alone 1 billion customers were considered to be reached and at the end of 2008 around 4 billion customers spread out all over the world, 3.3 billions of mobile phoneusers all over the world reside in developing countries^[20]. Mobile technology is effective to use widely all over the world, the use spread out rapidly, not only for interpersonal communication, but also as important aspects of means of communication for any industries such as monetary, education, and marketing. Mobile technology is also used to improve health and to prevent one from disease^[20]. Short Message Service (SMS) is the technology of cellular phones in the form of short text message dused in communication transited among cell phones with lower bandwidth than regular phne call which is normally limited to 160 characters^[19].

Short Message Service (SMS) is considered to have good potency to influence one's behavioral change as it is efficient, low cost, and ability to spread medical information to people of remote areas with limited access to health service in relation to poor antenatal treatment, maternal and perinatal death. SMS can pose as beneficial strategy for countries of low and middle income to improve prospective mothers' knowledge to conduct antenatal and postnatal treatment as conducted in America where short message especially for pregnancy is sent to members to provide them with educational material during pregnancy^[17]. The benefits of medical promotional media through SMS base comes more interesting, easier, more unique, simpler and is to facilitate health information provision more closely to reach healthy individuals yet undiscipline to contact health service.

Mobile phone technology in the form of SMS can support medical system to be more inclusive which enables paramedics to provide rapid information, medical diagnose or epidemis in remote and isolated areas even though health service have not yet been provided properly^[10]. SMS appears more practical, more efficient, stronger signals and with minimum failure compared to regular telephone call^[17]. The increase of text message through SMS was hoped to indicate direct intervention which can be conducted pregnant women to prepare delivery and post delivery and identify clues and signals of pregnancy and delivery danger potentially improve maternal mortality and neonatal so that three phases of inefficiency can optimally reduced.

V. Conclusion

The difference is obviously indicated that pregnant women's ability in detecting pregnancy high risk between before to and after SMS Gateway program implementation which means that the use of SMS Gateway indicated significant influence towards pregnant women's ability in detecting pregnancy high risk.

VI. Recommendation

Based on the research conclusion, some recommendations need to be taken into actions to make the most use of practical benefits and for further research.

1. For the Department of Health Kediri

From the research result, it is hoped that this program will be continued to be a program imemented to all pregnant women so that early detection of emergency during pregnancy will be quickly identified and overcome for a better condition of the patients.

2. For Educational Institution

The importance of the research result on SMS Gateway program to be implemented at service for pregnant women to be conducted by university students.

3. For further reserach

The research result is hoped to encourage further research with more respondents with another variables such as the family members' in detecting pregnancy high risk for pregnant women.

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