

The Application of Program Monitoring the Health of the Baby Through the SMS-Based Immunization Activities

Made Kamisutara, I Putu Artaya, Tubagus Purworusmiardi, and Agus Sukoco

Departemen of Computer Science, Departemen of Management,
University Narotama Surabaya

made.kamisutara@narotama.ac.id, putu.artaya@narotama.ac.id,
tubagus.purworusmiardi@narotama.ac.id, agus.sukoco@narotama.ac.id

IGA Sri Deviyanti

Departemen of Management Industries, University WR. Supratman Surabaya

srideviyanti@gmail.com

Abdul Talib Bon

Department of Production and Operations, University Tun Hussein Onn Malaysia, Malaysia

talibon@gmail.com

Abstract

The application of information technology in the health sector is increasingly experiencing intensive development because improvements are needed for the medical world through the application of technologies and programs that are appropriate for the benefit of therapy, care and process monitoring. In this research, the team will carry out the design process of monitoring infant health using SMS-based information technology. The purpose of this study is to provide a solution so that babies born can undergo the immunization process properly using a special application and is equipped with a design such that it is easy to use, operated based on an SMS gateway. So that mothers and babies are born always get accurate information about immunization activity until the baby's age limit is exactly 59 weeks and without errors. SMS gateway based applications can be implemented in health centers or hospital services. This application has a range of up to several cities in the vicinity which are close to health care centers or hospitals that are responsible for providing the fastest service.

Keywords

Immunization of infants, infant health, SMS gateway

1. Introduction

The development of smartphones now have very mushrooming community, ranging from small children up to adults often have activity with smarphone. At the end of 2016 is estimated to be approximately 85 million smartphone users in Indonesia. While the total penetration growth reached 41.26 percent. The activity of people on any smartphone range of games up to business. According to research Google along with TNS Australia found, 75 percent of owners of smartphones in Indonesia makes that device as the main, including telecommunications equipment to access the internet (Abdallah et al 2020). The process of the development of the world of digital technology has affected many areas of. One of the central areas experience penetration of digitization technology is in the area of health. One of the influences that add to the health field is medium with a large number of emerging health applications that can be easily accessed via a smartphone or tablet device. For example, in developed countries the current process of medical examination the ear or hearing children have can be done using your smartphone (Ailes et al 2015). Through the device doctor can diagnose the infection and prepare the proper treatment for his patients. Growing number of mobile applications in the health field will certainly ease the course of patient care.

One of the aspects in the eHealth Technology emphasized the use of the mobile device (mobile) for health services. With the use of mobile devices, such as Smartphones, medical services can reach better on areas, communities, and health practitioners who previously restricted (Alkema et al 2015). Infant and child health

(MCH) in ground water has always been a strange problem that the situation never improved. Improving the quality of health services for these children and babies is believed to require conditions of political, legal and social culture that is conducive (Sukarni, 2012). Based on Demographic and Health Survey Indonesia (SDKI) year 2015 infant mortality in Indonesia are still at number 312 per 100,000 live births. Despite numerous attempts of repair as well as handling has been done, but still needed to realize a wide support of yesteryear. KIA'S program aims to improve the degree of health health especially infants and children optimally. One of the essential elements to support these goals is the availability of data and information that is useful in planning, implementation, monitoring, and assessment of health service (Astuti, 2011). The majority of infant and child health Programme in health institutions are not yet supported by adequate information systems both in the recording, processing, and analysis as well as the interpretation and reporting (Preston, 2007).

2. Literature Review

Of the 8 goals of development are generally set by the Millennium Summit of the UNITED NATIONS in the year 2008, which was adopted from the United Nations Millennium Declaration. As many as 193 UN Member States and 23 international organizations have agreed to achieve the MDGs by the year 2016. The eight goals are eradikasi extreme poverty and hunger, achieving primary education for all, encouraging gender equality and empowerment of women, lowering child mortality, improve the health of babies, combat HIV/AIDS, malaria, and other infectious diseases, ensure environmental sustainability, develop a global partnership for development (Ngabo, 2012). The progress of the achievement of the objectives of the MDGs need to be assessed by a number of technical indicators that have been formulated in conjunction with the MDGs framework itself. A systematic assessment of the infant each country will give you an idea that makes measurements empirically becomes clear and right on target (Badiyah, 2014).

In accordance with the data from the health services of the Republic of Indonesia showed a decrease in infant mortality from the year 1999 up to the year 2015 is a special problem. Impact indicator is a measure of where the overall goal of the systems has been achieved, which include changes in cases of infant mortality from epidemic diseases, changes in the pattern of morbidity, health workforce change in behavior in systems implementation, and changes in health-related behaviours in a target population. (Nugroho, 2015).

Evaluation of existing surveillance systems can break down into stages essential as below (Alkema et al. 2015) the aims and objectives of the surveillance system, identification of the importance of public health against diseases or health events surveillance in the implementation., Identification of needed resources.,The content contained in the system, Communication and feedback between the different administrative levels., The capabilities of the system in providing useful data., Being able to find any findings and presented and used by any policy makers, Follow-up findings and improvements for the sake of perfection of system (Baldacchino et al. 2014).

The purpose of the evaluation of a public health surveillance system is to make sure the problems that focus on public health effectively and efficiently monitored. Public health surveillance systems should be evaluated periodically to determine how well the system works to meet the goals and objectives that have been set. Evaluation findings should generate a specific rekomendasi to improve quality, efficiency, and the usefulness of the surveillance itself (Berkman, 1971). In addition to the periodic evaluation of the performed surveillance system of public health must be monitored routinely to ensure that the system always menanggapi goals. (Lowery, 2015). Monitoring can be defined as the process of routine data collection and measurement will be a program or a process changes over time using a strategy and a plan that has been agreed upon previously. The difference between the implementations that have been planned and the fact identified as well as make improvements of conditions (Setiowati, 2012). On public health surveillance systems monitoring involves the regular collection and analysis of indicators for measuring how well surveillance systems reach the goal (Berhane et al. 2019). Evaluation, on the other hand, involves the use of specific study designs to assess the relevance, effectiveness, and impact of the surveillance system at regular intervals. The evaluation is often done in response to changes in the performance of a public health surveillance system (Nugroho, 2015). In conducting monitoring and evaluation of the learning outcomes expected are recommendations for improving surveillance activities. When the results of the monitoring routine is used to track the impact of a public health surveillance system, that's when monitoring can be considered for ongoing evaluation. (Lowery, 2015).

Short Message Service or better known as SMS is a service that is used in the system of sending and receiving text between mobile phones. These technologies were introduced in the year 1991 in Europe (Murhada, 2011) and later became a standard for GSM-based cellular communication. SMS much applied in mobile communication system and allows the user to make sending messages in the form of alphanumeric terminal

customers or between terminal customers with external systems such as e-mail, paging or voice mail. SMS Gateway is a device that has a function as a link or bridge between applications or systems with mobile phone. (Sunto, 2015).

There are two types of SMS Gateway of sorts, i.e. SMS Gateway in the form of hardware and hardware or in the form of software or software. According to Maarif (2014), in the system of SMS, the main mechanism is done in the system is doing the sending of short message from one terminal to another terminal to the customers. This can be done because an entity in the system called SMS Short Message Service Center (SMSC), also called Message Center (MC). SMSC is a device that performs the task of store and forward short message traffic (Priyo, 2016). Always use a regular SMSC Signal Transfer Point. (STP).

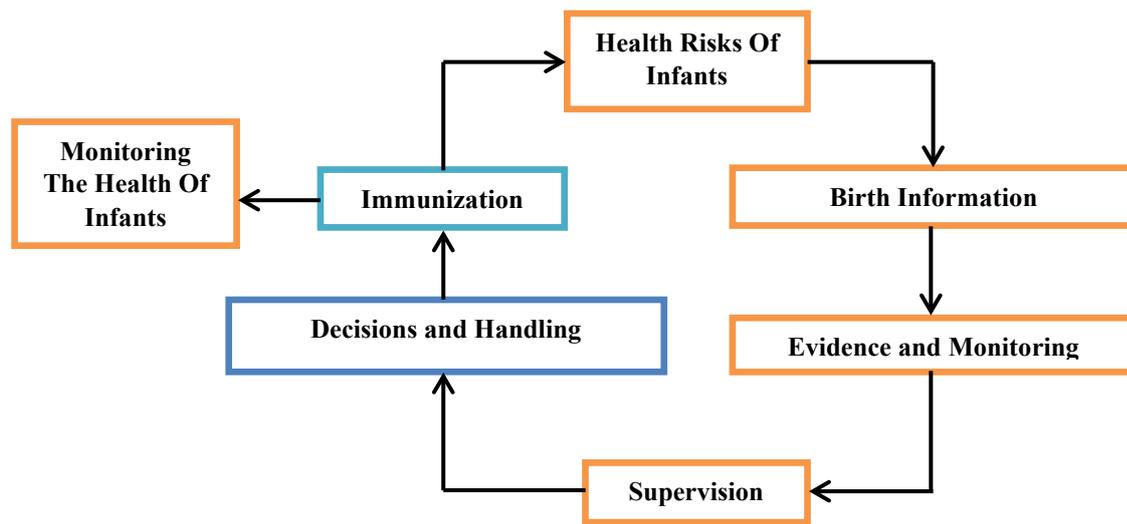


Figure 1. The Mechanism Of Monitoring The Health Of Infants

Like figure 1 shows, since the baby is in the womb, it always has health risks that can threaten its safety at any time, this condition is very dangerous, for the baby and the mother. especially for pregnant women who live in remote villages and far from health services. When a pregnant woman feels that there is a health problem in her, then she needs accurate information about what to do. Through this sms-based application, the pregnant woman can send news to the nearest health worker, and when the information is received by the health worker, action can be taken immediately by visiting the pregnant woman's house to provide assistance according to the level of pregnancy health problems (Robot, 2013).

3. Research Methodology

3.1 Location Research

Research will be carried out in the area of health care center or hospital, and observations made during the 2-year study, the sample was a new born baby started up to the age of maximum two years. For the application of the earlier application has been tested at a health care center or Griya Husada hospital of Surabaya (Notoatmojo, 2015).

3.2 Rapid Assessment Procedure

Observational research evaluative in nature with the draft cross-sectional and quantitative and qualitative approach will be undertaken to support the achievement of the objectives of this research. Quantitative data that will be collected is related to the implementation of the system of monitoring the health of the baby, including input, process and output. Input related to resources and means of supporting infrastructure available. The process of with regards to how the infant health surveillance system implemented. While the output related to the availability of data/information that is valid as a result of monitoring and utilization data for decision making. Qualitative data will also be collected to support and deepen the studies related to program performance and linkages to other sectors (Saputra, 2014).

3.3 The Subject Of Research

The target population in this research is the provider that is associated with the implementation of the monitoring of the health of the baby, that is, a midwife in the village midwife, midwives, hospital and coordinator of the executor in the health service as well as a means of supporting health facilities. Using cluster sampling, in this research will be visiting a hospital where early warning program application (Saryono, 2010).

3.4 Data Collection Research

The source of the data used in this study includes data on secondary and primary data. While the data collection methods used include documentation, interview, and observation. Data collection will be done by an assistant researcher assisted hospital staff to ease in doing coordination and approaches to the subject of research (Ignatius, 2015).

As the initial research will meet with the leaders of the hospital to obtain information about the programs and policies related to infant health monitoring systems including building capacity and financing. What policies and programs conducted by the hospital in order to strengthen the system of monitoring the health of the baby so that it can accelerate the achievement of the objectives (Hudak, 2012). With the following stages: Personnel in the field should get training about the system of monitoring the health of the baby in an effort to strengthening the achievement of government programs. Local government support for the implementation of the system of monitoring the health of infants. Identification of any barriers faced in implementing a health baby monitoring system (Gomes et al. 2016). The meeting then continued with the City Health Office to obtain information about the programs and policies related to infant health monitoring systems including capacity planning and financing. What policies and programs conducted by the hospital in order to strengthen the system of monitoring the health of the baby so that it can accelerate the achievement of the Government's program in the field of health immunization of infants (Muhammad, 2019).

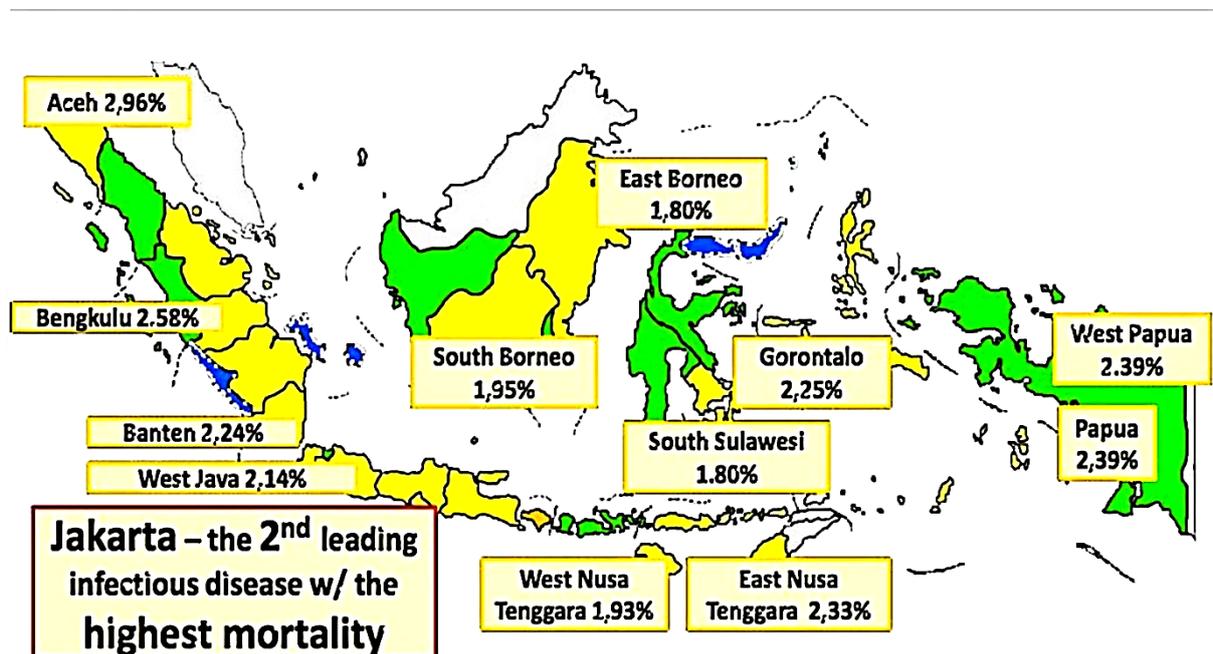


Figure 2. Map Of Indonesia That Focus On Handling Health Infant Immunization Through Movement Sources: East Java Provincial Health Office, 2019.

Like figure 2 shows, is a national map of Indonesia for health services for pregnant women who have health problems, if the figure shows 1% it means that the level of service in remote villages is still bad, if the rate shows above 1%, it means that the number of services for pregnant women who have health problems has been running smoothly. quite good. In Indonesia, only certain areas are still far from the reach of health services for pregnant women whose pregnancies have problems (Sutisna, 2014). The Indonesian government through its

ranks, assisted by private institutions and academics are working together to make a good breakthrough to solve the problem of health services for pregnant women, we academics feel called to make this sms-based application as a government partner.

4. Result And Discussion

As explained earlier, that the main purpose of this application is to detect early any health disorders a baby through an application that can be run online with mobile devices via the mobile sms gateway and path or use the web-based media. The main outputs that will be generated through the implementation of this application is. (Erawantini et. al, 2017): The application of a baby's health monitoring activities that are able to produce valid output for hospital. Baby health monitoring activities will be able to detect high risk baby early, on the scope of application of the area that is able to reach by web services. The data and information gathered from monitoring activities successfully health babies and can be utilized for decision making by health care givers in anticipation of performing the required actions. Implementation of the system of Early Warning Health infant and child in the hospital. The development of Early Warning Systems and Maintenance of the health of infants. Dissemination system of Early Warning handling the health of the baby in the hospital.

Interested parties in the implementation of this application is actually the hospitals, where when the application is implemented in a spearhead into the collecting data at the hospital. Object data collection is a newborn baby's health conditions that have impaired health against health conditions. Implementing data entry which became about everything related to the health of the baby is a nurse and midwife who works at the hospital. The data collected by them is about the number of babies in the hospital and beyond, all types of illnesses suffered by infants and the number or frequency of the birth of a baby. The process of collecting data on everything from level to level in the rural area around the hospital. Through the charging of such data will be monitored and known early, the kind of health disorders a baby like what should get the handling of early. Because data through sms gateway will certainly save time and become much more quickly and efficiently. Output results data is conducted will provide a signal and input to the hospital that can be used as consideration in making decisions about the handling of priority health problems in babies early and this condition will provide speed emergency response on granting of services of the hospital. So that the desired impact, health disorders will not result in conditions harmful to babies and can prevent deaths of babies as early as possible. All the data that has been collected in the main server can be important information for clinics in monitor and improve services to patients with disorders of newborn disease he suffered. The process of early detection, early warning systems could become a foothold for the hospital in early action before interference suffered by infants health is getting worse. With the presence of this application allows local governments in this hospital may be more intensive in the monitor and trace the whereabouts of the baby who suffered health problems through periodic immunization.

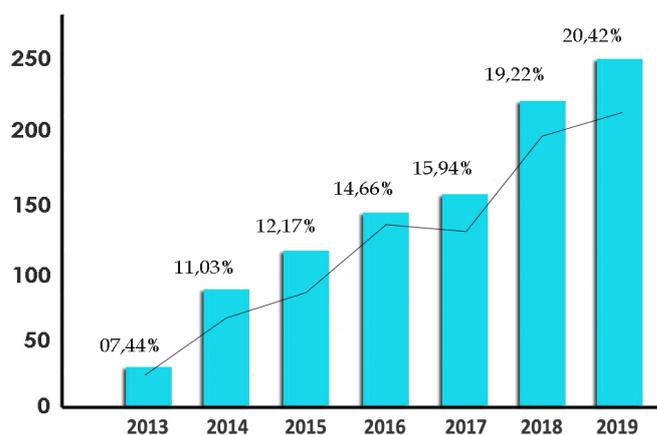


Figure 3. Infant Health Improvement Programs In Indonesia Every Year Through The Implementation of Increased Immunization Activities

Sources: Public Health Office. Malang, 2019

Like figure 3 shows, it can be seen an increase in the efforts of the Indonesian government in an effort to gradually increase national activities in improving maternal and infant health from 2013 to September 2019.

This program aims to reduce the mortality rate of infants who experience health problems each year due to limited information and the distance of adequate health services because of the distance of their residence so that health services are not affordable. The role of the private sector and academics is needed to assist the government in various forms of efforts including the creation of applications in the field of health, especially maternal and child health, which can be accessed through cellular networks and web networks. By providing application services that can be accessed via the internet, every mother and baby is able to get complete and correct information about the process of good baby health care through proper immunization. This activity is specifically for mothers who have babies under the age of 59 weeks. Babies under 59 weeks of age are still very easily ill, so handling is extra careful. To create good conditions regarding the health care of the baby, the mother must get the correct information quickly. With the increasingly broad reach of health services using this application it can easily be detected the presence and number of babies who suffer when the immunization period. And in the end the infant mortality rate due to disease factors that are able to attack them during immunization can be reduced and minimized (Buckley, 2013). For the successful implementation of web and mobile-based applications, a pilot project in Malang, East Java has been successfully implemented, with the permission of the East Java provincial health office. The results obtained were quite good in its application, when meeting with health service officials, they gave recommendations that this application would allow it to be implemented nationally. This kind of application program specifically for immunization health services in Indonesia is still relatively rare. Of course the application of this application in the world of child and infant health received a good response from the Malang district government, even the East Java provincial government hopes that this application program can be expanded through extension activities to health service centers such as health centers, public hospitals, maternity hospitals and health service centers in remote areas.

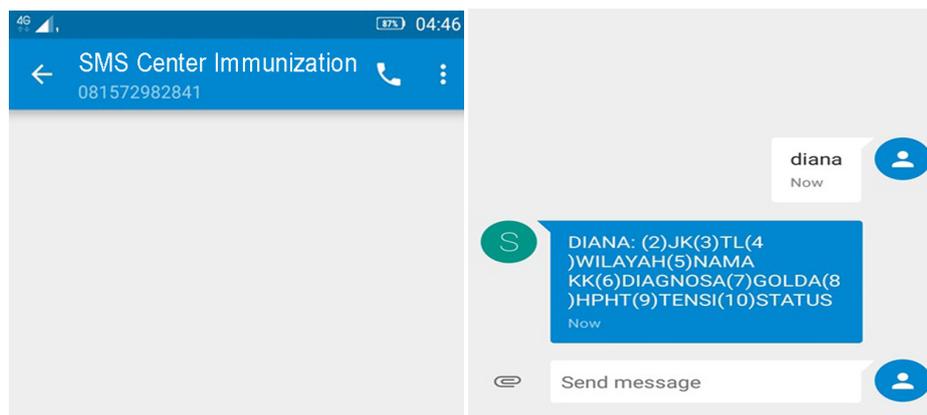


Figure 4. Application of SMS-Based Infant Immunization Activities
Sources: Research Output Application, 2018

Like figure 4 shows, the form of SMS-based infant immunization applications. Through the SMS-based application, a mother who has just given birth or a mother who has a baby aged 0 to 59 weeks, can use the application to obtain complete and important information about baby care related to the immunization process. Infants aged 0 to 59 weeks are a critical period of treatment and prevention of all types of diseases that can occur. This application performs an important role in the process of disseminating information about the correct way and form of care when a mother is caring for and protecting her baby from various dangerous diseases. This activity is very important for a mother, so that she can understand and know all kinds of risks that can occur in the future if their baby does not get immunizations correctly according to their age level. The function of this SMS-based application can represent health workers who should come to provide information, but due to the limited range of services for mothers and their babies who are in remote places and far from the reach of health services, this application can replace the task (Khanum, 2017). With the help of this application, a mother will still get useful information in maintaining the health of their babies regularly according to the schedule of immunization activities. This application can also be a solution to the limited number of health workers associated with infant immunization activities. The application model that is easy to operate using a mobile device makes the process of receiving information run quickly and accurately. Another benefit that can be obtained through the use of this application is that if a mother finds health problems in their baby, the reporting process to the health center can also run quickly and efficiently, information can be sent quickly, which will eventually get answers or instructions through SMS in an effort to deal with infant health problems. This

program has been successfully implemented for several months in Malang district, in an effort to collect and monitor the number of mothers who have babies who are in the period of immunization. Another benefit obtained by officers is that the process of gathering information in the field through this SMS-based application becomes a tool that greatly helps the performance of health workers, especially health workers from Malang district health offices.

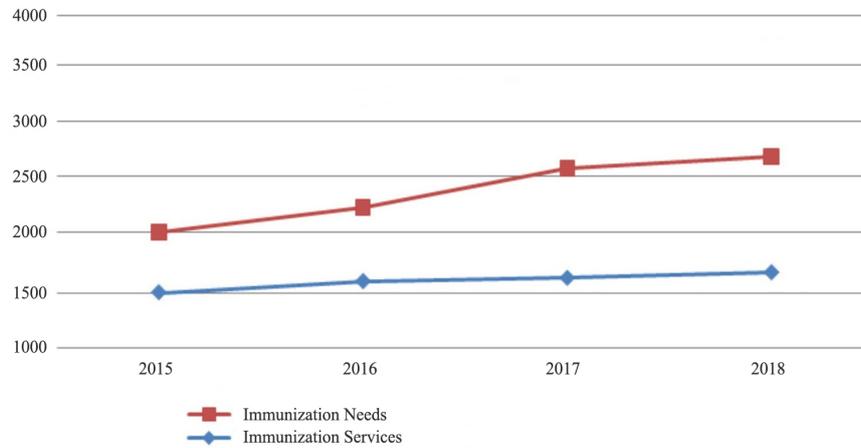


Figure 5. Condition of Service Availability Level With Immunization Service Needs In Malang District Period 2015 to 2018

Sources: Public Health Office. Malang, 2019

Like figure 5 shows, it is clear that health services in the field of infant immunization in Malang are still not fully adequate compared to the needs of immunization services to improve infant health. The blue line shows the level of immunization services for infant health, and the red line shows the demand for infant health immunization services. there is a gap between the two lines, this shows the service is not the same as the need. This condition is the reason why it is necessary to create an SMS-based application program to improve infant immunization services in Malang district. Through the application of improving infant health in the field of immunization, benefits for the health department can be obtained in the form of: 1) Data on certain areas that have not yet received good immunization coverage because of the conditions in remote areas, 2) Data on infant mortality rates due to impact health problems do not get immunization services, 3) Better concentration of immunization services in certain areas that have not yet received maximum coverage of immunization services, 4) More targeted immunization services for groups of mothers who have health problems in their babies (Erawantini et al. 2017).

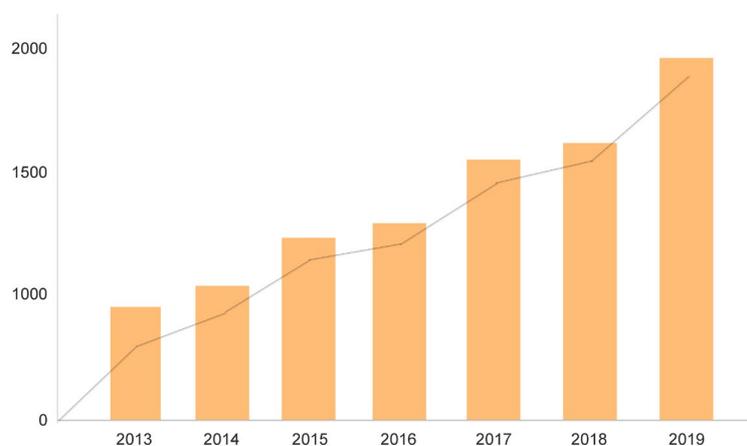


Figure 6. Birth Rates In Malang District With Immunization Services From 2013 to 2019

Sources: Public Health Office. Malang, 2019.

Like figure 6 shows, an increase in the number of births in Malang district from 2013 to September 2019, which is illustrated in the orange color field. While lines across the graph show immunization activities that were successfully carried out in infants. The main focus of immunization in infants is the age of birth from 0 to 59 weeks. Although immunization activity services are not yet optimal, the efforts of the Malang district government have been maximized in efforts to provide immunization to reduce or reduce infant mortality. The success of this activity thanks to the support of SMS-based applications that have been successfully applied in 18 districts in Malang district. This is very helpful for mothers in caring for their babies at the age of 0 to 59 weeks in a period of good growth through the dissemination of various forms of important information via SMS that is closely related to the health level of infants in remote areas that still tend to be difficult to serve directly. Important counseling is done by health workers twice a month in remote areas to convey the process of good and measured baby health care to mothers, and if there are babies who are found to be suffering from certain diseases and need help, they will be referred to the nearest specialized hospital for further treatment from baby. This is very important because the level of knowledge of mothers in the city is different from the general knowledge of mothers in remote villages. In fact we, as a research team, participated in providing counseling to puskesmas and maternity hospitals by posting brochures about the importance of immunization activities. This activity has the full support of Malang health service officials, in an effort to succeed in the infant immunization program that focuses on reducing infant mortality (Dietz, 2007).

To develop the use of this application, every housewife who has just given birth must report her birth by stating the mother's full name, their baby's name and full residential address via SMS communication to the health service center by accessing the cellular number provided, so that health workers can accurately find and track their address. This is important in an effort to exercise health control for their babies, especially those related to immunization problems. This program can be successful if there is counseling in the form of information through the media that can be delivered to the public regularly (Calyn, 2015).

5. Conclusion

There are several things that can be used as the conclusion of the results of the research which has been discussed above, the conclusion will be focused on:

Government's role in lowering the mortality rate of newborn babies repeatedly done since the year 1999 need a program that can reliably detect the disease early can interfere with the health of the baby. On the other hand the emergence of application programs, early warning is helpful government programs that run through the hospital in an attempt to lower the rate of infant mortality through immunization programs. In the presence of the application program is surely the Government is able to improve its performance in tackling and lowering the infant mortality rate for this is considered the very issues need attention in a serious.

The level of readiness of the implementation program of this application is quite high because it is very easy to implement in an environment of hospitals by medical personnel on duty there to monitor and collect data on the authentic all the time in an effort to minimize the death rate babies due to health problems that often threaten the salvation of infants. Through this program, the Government will be able to speed up service levels and roles and responsibilities in the future in order to help deal with the baby's health. With the help of sms gateway and web base, surely it is not too difficult to implement this program. Given the recent electronic devices and information technology is increasingly booming certainly increasingly support the implementation of this application program that can cover wide areas due to run web-based and device-based mobile. The implementation of the programme in the long term, cannot be released from all obstacles that may occur, therefore there are suggestions and recommendations to be considerate and repairs to the front in order to fine-tune the program application:

Expand the dissemination activities must be carried out by hospitals in districts, villages until the level region smallest. The goal is that the distribution of safety handling the baby who suffered health problems her pregnancy can be faster and more accurate in the process of monitoring the baby. Surely these things forward needs a policy to develop the programs become more flexible so that it is easily accessed by users i.e. babies tend to be or possibly may experience health problems during its growth. After this successful application programs apply at the level of the hospital, of course, the implementation of this application program does not stop just up there alone. Furthermore requires the efforts of the development toward other functions in the field of health especially in overcoming various health problems for society more broadly. Other programs that can be developed from this application program is early warning in the application program to monitor the health of infants up to the age of 36 days calculated from the time of the birth of the baby. Because of the level of health of babies at an early age like this are also prone to experiencing health problems. So in addition to the safety of

the baby can be controlled with good health and disorders, growth period the baby up to the age of 36 days can also be carefully controlled.

This SMS based application is felt to be increasingly important because several considerations, including health workers at the district level, are still too limited. With this application, the role of health workers in serving the community can be increased even though it is limited by distance and time. Another factor to consider is the level of knowledge of people living in remote areas who are still lagging behind in understanding the importance of immunization for the health of their babies. On the other hand, the development of technology in the field of information has progressed so far, if this is not utilized, the program to reduce infant mortality in remote areas will still be difficult to overcome by the local government all the time. With the application of this SMS-based application, local government programs aimed at immunization activities nationally can be helped properly, including the process of collecting data related to the health of infants and mothers after giving birth, and can help health workers and their institutions in gathering data on new types of diseases that may arise related to infant growth during immunization. why is it more prioritizing developing SMS-based applications? Most ordinary people understand how to use cellular devices in a simple form, even though mobile devices are now a daily necessity in the process of communicating in every aspect of life, including people who live in villages. Therefore the development of SMS-based applications is felt to be more suitable for the community in the village, easier to operate by every family member who has this device. In everyday life, the use of applications that run using mobile devices can be easier to use, does not confuse users, easy access, simple form, does not require special expertise. Based on interviews conducted in the previous period, people in villages are more familiar with cellular devices in their lives than devices that are run using different methods. This has given a better hope to the local government in reducing the infant mortality rate due to ignorance of mothers in handling immunizations for their babies' health. After being successful and running well in Malang district, this application program will be developed and implemented in other areas with the same goal of reducing infant mortality for rural communities living in remote areas and beyond the reach of health services.

Acknowledgement

On this occasion, thanks to the research team colleagues who have focused on taking the time, starting from the initial preparation stage of the data collection process, to the completion of the report completion, hopefully at other times we can conduct research in one more team, greetings and respect.

Conflict of Interest

All parties involved in this study, including the research team, the health care centers involved, and the local government have given their approval that the results of this study are published in the form of scientific articles.

References

- Abdallah, H. Alalawin, Main N. Alolayyan, Heba H. Hijazi, Yasser Bentahar. Evaluation of the Importance of the Smart Mobile Health and Telehealth Application-A Systematic Literature Review, *International Journal of Innovation, Creativity and Change*, Vol. 11, Issue 1, pp. 263-282. 2020
- Ailes, E. C., Dawson, A. L., Lind, J. N., Gilboa, S. M., Frey, M. T., Broussard, C. S., et al. Opioid prescription claims among women of reproductive age—United States, 2008–2012. *MMWR*, 64(2), 37–41. 2015
- Alkema, L., Chou, D., Hogan, D., Zhang, S., Moller, A.B., Gemmill, A., Fat, D.M., Boerma, T., Temmerman, M., Mathers, C. et al. Global, regional, and national levels and trends in baby mortality between 1990 and with scenario-based projections to 2030: A systematic analysis by the UN Baby Mortality Estimation Inter-Agency Group. *Lancet* 2016. p.462–474. 2015.
- Astuti, Maya. *Buku Pintar Kehamilan*. Penerbit: Nuha Medika, Jakarta. 2011
- Badiyah, Siti. *Kehamilan Persalinan dan Gangguan Kehamilan*. Jakarta: Nuha Medika. 2011. p.234. 2014
- Baldacchino, A., Arbuckle, K., Petrie, D. J., & McCowan, C. Neurobehavioral consequences of chronic intrauterine opioid exposure in infants and preschool children: A systematic review and meta-analysis. *BMC Psychiatry*, 14, 104. <https://doi.org/10.1186/1471-244x-14-104>. 2014
- Berhane, Fseha Teklehaimanot and Gebrehiwot Gebremariam Welearegawi, Prevalence of Stunting and Associated Factors in Children of 6-59 Months' Old in Ethiopia, Pages 162-169, <https://doi.org/10.6000/1929-4247.2019.08.04.7>, 2019

- Berkman, P. L. Life stress and psychological well-being: A replication of Langner's analysis in the Midtown Manhattan Study. *Journal of Health and Social Behavior*, 12(1), pages. 35–45. 1971
- Buckley, V., Razaghi, A., & Haber, P. Predictors of neonatal outcomes amongst a methadone and/or heroin-dependent population referred to a multidisciplinary perinatal and family drug health service. *Australian and New Zealand Journal of Obstetrics and Gynaecology*, 53(5), 464–470. <https://doi.org/10.1111/ajog.12080>. 2013
- Calyn G, Ostrowski M. Maternal Health. 18-05-2015 [online]. Available <https://www.wilsoncenter.org/publication/delivering-solutions-advancing-dialogue-to-improve-bayi-health>. 2015
- Dietz, P. M., Williams, S. B., Callaghan, W. M., Bachman, D. J., Whitlock, E. P., & Hornbrook, M. C. Clinically identified maternal depression before, during, and after pregnancies ending in live births. *American Journal of Psychiatry*, 164 (10), 1515–1520. <https://doi.org/10.1176/appi.ajp.2007.06111893>. 2007
- Erawantini, Feby., Karimah, R.N. Rancangan Early Warning Systems (E-Wars) Untuk Deteksi Dini Kejadian Stroke, *Seminar Nasional Hasil Penelitian*. 20-01-2017. Available file:///F:/MAU%20DOWNLOAD/792-2994-1-PB. 2017
- Gomes, T., & Juurlink, D. N. Opioid use and overdose: what we've learned in Ontario. *Health Quarterly*, 18 (4), 8–11. 2016
- Hudak, M. L., & Tan, R. C. Neonatal drug withdrawal. *Pediatrics*, 129 (2), e540–e560. <https://doi.org/10.1542/peds.2011-3212>. 2012
- Ignatius, Rafaka. *Aplikasi Kesehatan Berbasis Mobile*, Bandung: Alfabeta, p.334. 2015
- Khanum, Sabiha. Designing a Pregnancy Care Network for Pregnant Women, *Technologies*, 22-02-2017. Available <http://www.mdpi.com/2227-7080/5/4/80/htm>. 2017
- Lowery, Martin. *Emergenetics*. Jakarta: Gramedia Pustaka Utama. p.96. 2015
- Maarif, Riyan. Manfaat dan Kegunaan Teknologi Informasi Bagi Kesehatan. 28-03-2014. Available. <https://www.riyanmaarif.blogspot.com>. 2014.
- Muhammad, Abdulkadir, Ruslan Rainis. Estimation of Maternal Mortality using Sisterhood Method in Jigawa State, Nigeria, *International Journal of Innovation, Creativity and Change*, Vol. 9, Issue 10, pp. 222-236. 2019
- Murhada. *Pengantar Teknologi Informasi*. Jakarta: Mitra Wacana Media. p.96. 2011
- Ngabo, Fidel. Designing and Implementing an Innovative SMS-based alert system (Rapid SMS -MCH) to monitor pregnancy and reduce bayi and child deaths in Rwanda. *The Pan African Medical Journal*. 22-11-2012. Available. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3542808/>. 2012
- Notoatmojo, Soekidjo. *Metodologi Penelitian Kesehatan*. Jakarta: Rineka Cipta. 2015. p.202.
- Nugroho, Heri. *Teknik Informasi Kesehatan*. Sekolah Tinggi Elektro Dan Informatika. Institut Teknologi Bandung. p.187. 2015
- Preston, John. *Komputer dan Masyarakat*, Yogyakarta: Andi Publisher. p.78. 2007
- Priyo, Sutanto. *Analisis Data Bidang Kesehatan*. Jakarta: Raja Grafindo Persada, p.216. 2016
- Robot, Jimmy. Proses Bisnis Dan Kebutuhan Informasi Kesehatan. *Jurnal Teknik Informatika*. Jakarta. 2013. Vo. 2. No. 01. pp.119-128, 2013
- Saputra, Uhar. *Pembelajaran Berbasis Riset*, Jakarta: Refika Aditama. p.68. 2014
- Saryono. *Instrumen Penelitian Bidang Kesehatan*, Jakarta: Nuha Medika. p.111. 2010
- Setiowati, Trio. *Ilmu Kesehatan Masyarakat*, Jakarta: Refika Aditama. p.110. 2012
- Sukarni, Icesmi. *Kehamilan, Persalinan & Nifas*, Jakarta: Nuha Medika. p.207. 2012
- Sunto, Aryo. *Teknologi Mobile Untuk Diagnosis Penyakit*, Jakarta: Media Pustaka. p.219. 2015
- Sutisna, Endang. *Pemberdayaan Masyarakat Dibiidang Kesehatan*. Yogyakarta: UGM Press. p.93. 2014

Biographies

Made Kamisutara. Completed his education in the field of informatics and completed his undergraduate degree in 1999 at the Adhi Tama Institute in Surabaya. Continuing studies in the Postgraduate Program in Informatics Engineering graduated in 2007 at the November 10 Institute (ITS) Surabaya. He has been a lecturer at Narotama University in Surabaya since 2011. Besides actively teaching, he also actively researches and writes books. The book that was written was *Micro Controller: Wireless Smart Switching* (2016) published by Narotama University Press. Another book that was successfully completed was *The Application of Information Technology in Early Warning conditions in minimizing the Death Rate of Pregnant Women and Babies* (2017). Has a

concern in the field of developing MSMEs, especially in the field of Web-based application design, in an effort to support the progress of online-based small business actors.

I Putu Artaya. Born in Jakarta on June 29, 1966, obtained a master's degree in human resource management from Narotama University, Surabaya, in 2002. An economics degree in marketing management from the same campus, graduated in 1991. Besides teaching, he was also active in activities research, as a researcher and as a principal researcher. Other activities carried out are routine writing books, and the most phenomenal is the book entitled Salesmanship - Building a Sales Network, Optimizing small business centers in the field of food security and much more.

Tubagus Purworusmiardi. Lecturers and lecturers in the management study program, Narotama University Surabaya's economics faculty, experts in management information systems, in addition to teaching activities, the lecturer concerned also routinely writes books and scientific publications in several media.

Agus Sukoco. Lecturer of Narotama University, Department of Management, Jalan AR Hakim 51, Surabaya, Indonesia. Routine activities other than teaching are as researchers, textbook authors, and also active in community service activities.

IGA Sri Deviyanti. In academic activities, he actively teaches subjects Industrial Ergonomics and Strategic Management. Active as a researcher in the field of management science industry since 2010 and several community service activities society that deals with modeling technology in an appropriate manner industrial application field. One of the works in the field of research is Planning of Layout of Industrial Shipyard Industrial Facilities Lamongan. Other activities that have begun to be pursued at this time are activities write a textbook as a contributor. One textbook work that has written as a Supporting Pillar for MSMEs Entering the Free Market in 2019

Abdul Talib Bon. A professor of Production and Operations Management in the Faculty of Technology Management and Business at the Universiti Tun Hussein Onn Malaysia since 1999. He has a PhD in Computer Science, which he obtained from the Universite de La Rochelle, France in the year 2008. His doctoral thesis was on topic Process Quality Improvement on Beltline Moulding Manufacturing. He studied Business Administration in the Universiti Kebangsaan Malaysia for which he was awarded the MBA in the year 1998. He's bachelor degree and diploma in Mechanical Engineering which his obtained from the Universiti Teknologi Malaysia. He received his postgraduate certificate in Mechatronics and Robotics from Carlisle, United Kingdom in 1997. He had published more 150 International Proceedings and International Journals and 8 books. He is a member of MSORSM, IIF, IEOM, IIE, INFORMS, TAM and MIM.