Improvement of maternal and child health status through the design of posyandu mobile service application in kelurahan pancoran mas depok city

Dona Suzana 1, Dharmayanti 2, Rachmi Ridho 1
1 Faculty of Pharmacy, Gunadarma University, Indonesia
2 IT Major in Faculty of Industrial Technology, Gunadarma University, Indonesia
1 Email: donasuzana@staff.gunadarma.ac.id

Abstract. Indicators in assessing the success of health services and health development programs are the maternal mortality, infant and children under five years old mortality. Comprehensive handling is very important and beginning of nutrition care in pregnancy. Posyandu (Integrated services center for mothers and children under five years) as a form of institution that involves community participation in maternal and toddler health problems is the spearhead for reducing this mortality rate. The cooperation between Puskesmas (Community Health Centers) and Posyandu in public health supervision issues required good communication and clear reporting so that problems arise can be handled quickly. Therefore, it takes an application system that can bridge communication between the two institutions in the prevention of maternal and child mortality, nutrition problems, especially malnutrition and stunting in children. The mobile-based application is expected to help public health supervision by integrating the performance of posyandu cadres, midwives and doctors in Kelurahan Pancoran Mas, Depok City.

1. Introduction
The Health development program for the 2015-2019 period is the Healthy Indonesia Program with the aim of improving the health status and nutritional status of the community through health efforts and community empowerment and one of its main targets is by improving The health and nutrition status of Mothers and children [1]. The problem of health development in terms of maternal and child health efforts is the high maternal mortality rate, although it has seen a decline but is still far from the target of the MDGs in 2015 [1]. In 2016, Depok City recorded 16 cases of maternal deaths during childbirth and 91 cases of infant deaths. Death during pregnancy is caused by bleeding, high blood pressure during pregnancy (eclampsia), infection, obstructed labor and miscarriage complications [2]. Nutritional disorders can cause stunting (short children), impaired brain development resulting in low cognitive abilities and educational achievement as well as permanent growth disorder [3]. Many factors that cause nutritional problems are lack of nutritional intake and limited basic health services, limited food accessibility, poor foster pattern, and limited availability of drinking water and lack of proper sanitation [4].

The government in dealing with these problems really needs the role of posyandu cadres who are the spearhead in the field. Posyandu cadres work to assist puskesmas and midwives in monitoring, supervision and receiving reports on the condition of pregnant women [5]. The implementation of social tasks encountered many obstacles faced by posyandu cadres in conducting routine tasks Posyandu Kader
every month (Posyandu activities). Among the existing problems are the lack of human resources (HR) in quantity and quality, and the weak information and coordination system between health workers from puskesmas or midwives practicing independently with posyandu cadres [6]. Routine coordination and information delivery efforts require time, cost and transportation. Another problem is the communication and delivery of information by posyandu cadres with health workers in dealing with problems such as emergency cases of pregnant women and infants. The lack of commitment and enthusiasm of posyandu cadres in carrying out duties and posyandu management also becomes an important obstacle in the implementation of maternal and toddler health programs in the community [6].

The results of observations on posyandu cadres can be concluded that these constraints can be overcome by building an integrated information system between posyandu cadres, midwives and doctors in the implementation of the Monitoring program Maternal mortality, infant and toddlers based on mobile. The mobile application is used for processing surveillance data by Posyandu cadres in pregnant women and their babies and children under five.

The initial stage is to analyze the problem by conducting studies in literature and interviews with Posyandu cadres, midwives and doctors about the information needs of each data manager. Furthermore, the design phase of information system according to the analysis results. Initial planning uses Unified Modelling Language (UML) by utilizing the use case diagram, followed by creating the design of the input and output display as a system development step reference.

2. Research Framework
Communication and data are problems in the supervision and handling of maternal, infant and toddler health in a posyandu. Posyandu in Kelurahan Pancoran Mas Depok does not yet have the technology support to improve the performance of posyandu cadres. Research is aimed at helping with technologies that can process data quickly and accurately.

The method used in the study refers to the six-phase process of the UML method [7] by conducting development according to the needs. Figure 1 shows the stage in building mobile-based applications for surveillance supervision of mother and baby and toddlers at Posyandu.

1. Posyandu System Modeling is to identify the ability of the system to be built and identify user needs for information to be obtained.
2. Analysis of the needs of a posyandu system mobile application that is identifying functional and non-functional requirements in the program being developed.
3. The system design is elaborate a draft posyandu to realize the program into mobile applications using UML
4. Development of a mobile application program using java android.
5. Verification and validation test, which tests the suitability of the program with the information needs of each user.
6. Submission of the mobile application to the Posyandu of Kelurahan Pancoran Mas, namely submitting the program and documentation as well as conducting training for each user ie posyandu cadres in each Rukun Warga (RT), responsible Midwives and Puskesmas Doctors so that the system can be implemented properly.
3. RESULTS AND DISCUSSION

3.1 Needs Analysis
The mobile application system for Posyandu which is used for surveillance of mothers, infants and toddlers in preventing malnutrition and stunting is developed using the UML approach. The initial step is analyzing the needs of each user for the application, the need for presenting data and information, and the health needs of the mother and baby health monitor and toddlers/children under-five years old. 

Analysis of Posyandu system requirements as follows:
- Application users are Posyandu Cadres, Midwives and Doctors. There are 24 Posyandu in Kelurahan Pancoran Mas Depok, so there is one Posyandu cadre as the application user representative. Midwives are health care workers who oversee one Posyandu while doctors are doctors who are in Puskesmas (Community Health centers) in Kelurahan Pancoran Mas who are responsible for Posyandu activities. Information needed for input is in accordance with the guidelines for implementing Posyandu activities.
- Recording the condition of mother and baby and toddlers in every Posyandu activity as well as recording for reporting activities for health workers so that the supervision function can run well.
- The function of communication between cadres, midwives and doctors in the event of an emergency to citizens is the responsibility of the cadres.
- Making outputs from records carried out for all Posyandus as a report on the condition of public health, especially for supervision of stunting problems in the area.
3.2 Design of Usecase Diagrams
Based on the needs analysis, it was designed using a usecase diagram shown in Figure 2.

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**Figure 2. Posyandu Usecase Diagram Application**

Usecase Posyandu application diagram with the following activities:
- Login, to enter the application with an account that has been created by the admin.
- Posyandu cadres and midwives can input data for recording posyandu participants and recording services provided every month.
- The input data is in accordance with what is written in the Kartu Menuju Sehat manual, making it easy for Posyandu cadres to fill in the data.
- All input data is stored in an online database to be linked to the website so that Puskesmas doctors can oversee the implementation of Posyandu activities in all Kelurahan Pancoran Mas and the overall data of Posyandu participants can be seen.
- Ensure that functional and non-functional applications run well.
- Log out, exit the application.

3.3 Design of Posyandu Application Display
The usecase diagram design is the basis for creating mobile-based application display designs for surveillance of mothers and their babies and toddlers.

The display design consists of:
1. Login page

This page is used to enter the access rights granted by the application admin to prevent unwanted users from using data contained in the application. Figure 3 shows the appearance of the Login page.
2. Main page
This display contains the main menu of the Posyandu application relating to services in the field, entering new participant data or entering services every month by cadres or midwives in participant examination, can be seen in Figure 4.

3. Posyandu Participant Registration Page
This page is used to enter data on new Posyandu participants, there are 4 screens to make it easier to enter data so that both cadres and midwives have no difficulty in entering full participant data. Figure 5 shows 4 screens for complete data entry for Posyandu participants.
4. Registration of Pregnant Women
This page for recording the services of pregnant women participants upon the arrival of periodic checkups, is shown in Figure 6.
5. Pregnancy History
The page recording the history of pregnancy in pregnant women and the results of input that has been confirmed its truth. Figure 7 is a page view to enter the pregnancy history data of a Posyandu participant and the confirmation screen for the correct data entry.

6. Pregnant Women Examination
Figure 8 is a display for recording pregnant woman examinations on a regular basis filled by cadres and midwives and a screen to confirm the results of input.
7. Examination of Postpartum Mother
Page to check the health of mothers after giving birth as part of supervision to prevent maternal deaths.

8. Newborn Checkup
A page to enter data and keep a record of the health of the baby from newborn until reaching the toddler period. Health actions taken at the time of inspection at Posyandu by Posyandu cadres are shown in Figure 10.
9. Data Search Page
The design of the display to find Posyandu participant data used by cadres or midwives, is shown in Figure 11.

4. CONCLUSION
The role of the Posyandu in the community is an extension of the government program and has a function to be able to prevent the occurrence of death for mothers and their babies and toddlers because it is always monitored by local Posyandu cadres.
Kelurahan Pancoran Mas Depok has 24 Posyandu so it needs technology support to facilitate communication and reporting from cadres and local midwives who are responsible. Communication of the results of the mobile application is expected to reduce the maternal and infant mortality rates because emergency problems can be resolved quickly and accurately. The design of a mobile-based Posyandu application system is the first step to develop a program by designing in accordance with the results of the needs analysis based on interviews with application users. Program development is a further step from the results of system design and it is expected that the results of application design and design can help complete program completion.

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