



Designing and Developing Posyandu Information System for Posyandu Groups of Gerbangmas Siaga Lumajang

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Abstract

Posyandu is a community-based activity aims to decrease the number of maternal mortality (AKI), infant mortality (AKB), and toddler mortality (AKBA). There are 8 integrated healthcare centers (POSYANDU) in Gerbangmas Siaga of Dawuhan Lor Village, Lumajang. Based on the interview conducted previously, it showed that the bookkeeping of pregnant women and toddler registration data was still manual. The problems occurred when using this kind of method are the writing was hard to read, the pen ink was blotted, the registry book was easily torn, and most of the registry files were not

yet filled. The solution to this problem is designing and developing an information system for Posyandu Gerbang Mas Siaga Lumajang. This study type was Research and Development with waterfall method. The data was collected through interview, documentation and brainstorming. The result of this study is an information system for Posyandu Gerbangmas Siaga Lumajang that can assist the healthcare activity and the entry of pregnant women and toddlers' data register. There are several menus in this system such as the User data menu that consists of the data of pregnant women and toddlers, the master data menu that consists of data entry for Posyandu, data entry for activity, data entry for immunization on pregnant women and toddlers, entry menu for counseling on pregnant women and toddlers, and the transaction menu consists of the entry of pregnant women and toddlers schedule and message data. The strength of this system is the register report feature for posyandu gerbangmas siaga and the broadcast message feature through whatsapp gateway. Cadres and midwives are supposed to read and comprehend the manual book of SIPADU (Sistem Informasi Posyandu/Posyandu Information System) that has been made before operating the application.

Keywords: Posyandu, Research and Development, Posyandu Information System, Waterfall, WhatsApp gateway

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Introduction

Maternal Mortality Rate (AKI) is the whole maternal mortality cases in each 100.000 live births. The number of maternal mortalities collected from the family health program registry in the Ministry of Health in 2020 showed 4.627 cases in Indonesia. This number was increasing than 2019 with 4.221 cases (Kemenkes RI, 2021). The maternal mortality rate trend in the last 3 years was declining. The maternal mortality in 2018 was 104 in 100.000 live births, declined to 98 in 100.000 live births in 2019, and became 97 in 100.000 live births in 2020. This achievement was below the strategic plan target which means the effort in decreasing the maternal mortality rate has gone well (Dinkes Kabupaten Lumajang, 2021). The following is the graphic of Maternal Mortality Rate (AKI) trend in Lumajang Regency during 2016-2020:



Figure 1 The Maternal Mortality Rate (AKI) trend graphic in 2016-2020

According to the cause, most of maternal mortality in 2020 was caused by hemorrhage with 1.330 cases, hypertension during pregnancy with 1.110 cases, and blood circulatory system disorders with 230 cases (Kemenkes RI, 2021). The effort to accelerate the decline of Maternal Mortality Rate is conducted by making sure that each mother is able to access a good quality maternal health service (Kemenkes RI, 2021). The following is the graphic of Infant Mortality Rate (AKB) in Lumajang Regency during 2016-2020:

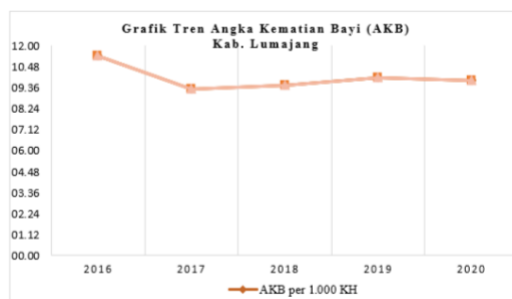


Figure 2 The Infant Mortality Rate (AKB) trend graphic in 2016-2020

Different from the Maternal Mortality Rate (AKI) trend that tend to be high, the Infant Mortality Rate (AKB) is declining across the years. Lumajang becomes one of the regencies in East Java Province that experiences an increasing number of Infant Mortality Rate. The infant mortality rate trend in the last 3 years was increasing. The infant mortality in 2018 was 9.45 in 1000 live births, increased to 10.00 in 1000 live births in 2019, and became 10.10 in 1000 live births in 2020. In the strategic plan, the infant mortality rate target was 9.4 per 1000 live births, hence the achievement in Lumajang Regency did not fit the target (Dinkes Kabupaten Lumajang, 2021).

The high Maternal Mortality Rate (AKI) and Infant Mortality Rate (AKB) become a concern for the government, thus the government has provided numerous efforts to decrease the mortality rate. One of them is through the Integrated Health Center (POSYANDU) program. Posyandu is aimed to support the effort in declining the Maternal and Infant Mortality Rate through community empowerment by conducting the “5 Tables System” (Kementrian Kesehatan RI, 2012). One of the integrated health center that has the 5 programs is Posyandu Gerbangmas Siaga of Dawuhan Lor Village, Sukodono, Lumajang. This activity is conducted for pregnant women, breastfeeding mothers, and toddlers. All files during posyandu such as the register book containing the parents and toddlers data (body weight, height, arm circumference, and head circumference) were recorded manually. Recording data manually may cause damage on the registry book, need longer time in recording the data, cause invalidity and inaccuracy in recording the data, difficulty



in reading the old handwriting, and inaccuracy in the report making as the registration was recorded manually by the cadre. Managing data manually has several weaknesses such as longer time needed and data accuracy will be somewhat unacceptable since the error possibility is bigger (Verawati dan Kuncoro, 2019).

Other problems occurred in Posyandu Gerbangmas Siaga were the register cohort book from the public health center (puskesmas) that should be filled monthly has not yet been filled since the cadre was still manually writing the data on the posyandu register book that the cohort books was left empty. The posyandu schedule was announced to the pregnant women through several ways such as being announced through loud speakers and the cadres reminded the pregnant women and breastfeeding mothers in their neighborhood verbally. Surely, these ways have not yet reached the participants thoroughl.

Based on the problems above and the development of information and technology nowadays, an information system is needed, especially for the health service. Posyandu Gerbangmas Siaga of Dawuhan Lor Village needs to implement an information system to ease the implementation of 5 main programs of Posyandu by electronically recording the posyandu activity that all data will be securely stored in the database. This will help the report making and thoroughly announce the posyandu schedule through reminder feature in the form of message by using WhatsApp gateway broadcasted to all posyandu participants. Thus, this study entitled “Designing and Developing Posyandu Information System for Posyandu Groups of Gerbangmas Siaga Lumajang” was made. This system is expected to increase the posyandu cadre work efficiency in implementing the 5 tables work system as well as increasing the health service quality, especially posyandu.

Methods

This is a Research and Development study about designing and developing a web-based posyandu information system with reminder feature for Posyandu Gerbangmas Siaga Lumajang. This study



used a structured programming by using Waterfall method and the data was collected through interview, observation, documentation, and brainstorming. The subjects of this study were 7 people and 1 midwife in Posyandu Gerbangmas Siaga Lumajang.

Results and Discussion

1. Requirement and Analysis Definition

a. Problems Identification

This is the initial step to identify and analyze the posyandu information system requirement. In this step, the data needed for designing the web-based information system with reminder feature was collected through interviewing the posyandu cadre and village midwife. Posyandu Gerbangmas Siaga conducted a monthly posyandu activity for infants, toddlers, and pregnant women. The posyandu data such as the infant, toddler, and pregnant women register were still recorded manually which later will give additional burden to the cadre at the time of weighing. The participant data that was recorded manually shall be recorded in the posyandu register book from puskesmas where this will cause delay in making the register report since the register book has not yet been filled. Analisis Kebutuhan

b. Need Analysis

User need analysis is an initial stage conducted by collecting data and information to analyze the problems and analyze the requirement in designing and developing an information system (Shiddiq *et al.*, 2020). In this stage, interview and brainstorming activity were conducted with the respondents such as the posyandu cadre and village midwife. The following are the system requirement analysis:

1) Functional Requirement

Functional requirement consists of login menu; master menu that consists of toddlers, pregnant women, posyandu cadre, and village midwife; add data, edit data, and delete buttons on each master data form; report menu containing the report of toddler and pregnant women visit to posyandu; WhatsApp gateway feature; logout menu.



2) Non-functional Requirement

- a) Operational: using XAMPP, MySQL, PHPMyAdmin, Codeigniter. Power Designer, Microsoft visio 2019, Figma, visual studio code, and PHP programming language.
- b) System Security equipped with username and password based on the access right.
- c) Information: providing an information alert if we are sure to logout or not, an alert when the username and password is invalid in the login process, and an alert when the data is going to be deleted.

2. System and Software Design

The next step is making the software design or, in this study it is called as system prototype. Making a prototype was started by making the system flowchart, context diagram, data flow diagram, DFD Level 1, and ERD.

a. System Flowchart

System flowchart shows the whole system working flow. This chart explains the orders of the procedures within the system (Jogiyanto, 2005). The posyandu information system in Posyandu Gerbangmas Siaga Lumajang was started from pregnant woman or toddler visiting posyandu and making a registration. Then, the cadre adds the social data of the pregnant woman or toddler. After that, the pregnant woman or toddler will be examined or weighed and measured by midwife and assisted by the cadre. The examination and measuring result will be entered to the information system by the cadre. The midwife can see all the pregnant women and toddlers' data input by the cadre, and the midwife may download the register report of the pregnant women and toddlers. The posyandu schedule for the pregnant woman and toddler will be added by the cadre to the information system by following the village midwife direction. Lastly, the cadre will send the added schedule through the WhatsApp gateway feature.

b. Context Diagram

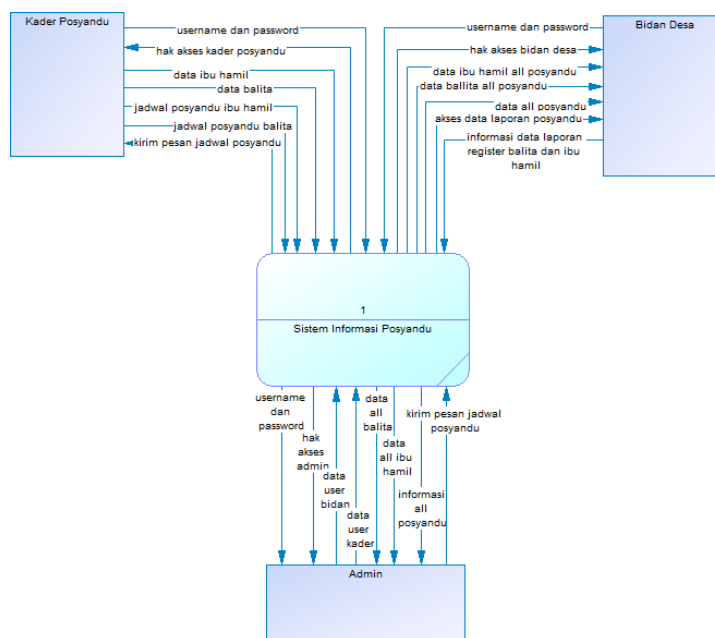


Figure 3 Context Diagram

DFD level 0 is also known as fundamental system model or context diagram. It is a diagram consists of a process that depicts the circumstance of a system (Rosa & Shalahuddin, 2018). Context diagram of the information system for Posyandu Gerangmas Siaga Lumajang had 3 entities; posyandu cadre, village midwife, and admin.

c. DFD Level 1

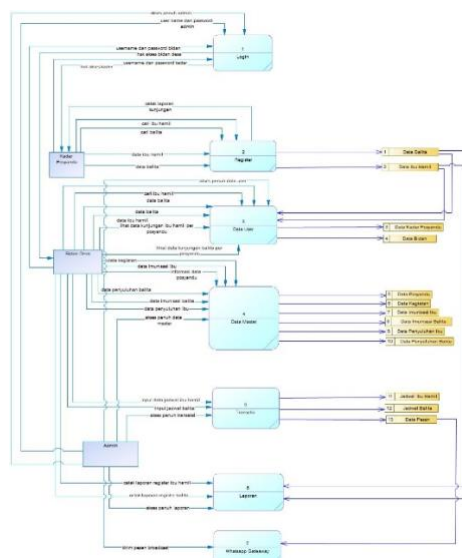


Figure 4 DFD Level 1

Context diagram explains the most common stages, while data flow diagram breaks down every process in detail (Fadholi *et al.*, 2021). Data flow diagram (DFD) level 1 is the explanation of DFD level 0 that consisted of 3 entities; posyandu cadre, village midwife, and admin. The system had 6 processes, they were login, register, User data, master data, transaction, report, and WhatsApp gateway. DFD level 1 was started from posyandu cadre, village midwife, and admin that had to enter their username and password to proceed to the login process in the posyandu information system. After that, the cadre will login to the system and go to the user data menu to add the toddler or pregnant woman data. The cadre will enter the patient's social data and the examination result of the pregnant woman which will be stored in user data menus; toddler and pregnant woman. The next step, the village midwife will input the supporting data for each posyandu, view and print every visit report of the toddler and pregnant woman that has been stored in every posyandu. Admin is a user that gains a full access to the system and is able to do all data processing such as data input, data editing, and data removal. Admin also has an access right to process the midwife and cadre data such as the username and password. Admin is in charge of broadcasting the message to all posyandu participants through WhatsApp gateway.

d. ERD



Entity Relationship Diagram (ERD) is a figure or diagram that shows how information was made, stored, and used in a business system (Santoso & Nurmalina, 2017). ERD was used to make a data structure model and data interrelationship that later will be used as reference in making database. ERD in the posyandu information system was designed to have 11 entities. The relationship in the posyandu information system ERD generated 11 relations that were interrelated among entities.

2. Implementation and Unit Testing

In this stage, the posyandu information system was made. This system was made by using several applications such as XAMPP, visual code, Codeigniter, CSS, and Google Chrome.



Figure 5. Login Page

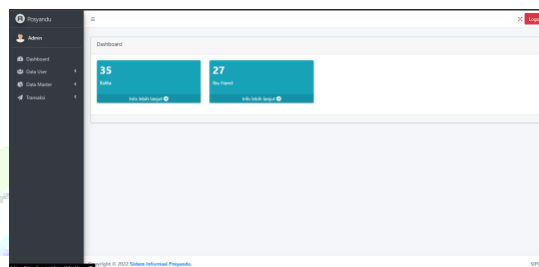


Figure 6. Dashboard Page

The initial display of the posyandu information system is the login page for the user to log into the system by entering their username and password. Next, the user will have the dashboard as the main page after being success in logging in to the posyandu information system. In this menu, there were information regarding total toddlers and pregnant women that had been stored.



No	Name	Email	Alamat	Telepon	Profil	Aksi
1	Yusuf Huda	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]
2	Salsana Purnamasari	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]
3	Yusuf Huda	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]
4	Salsana Purnamasari	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]
5	Yusuf Huda	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]
6	Salsana Purnamasari	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]
7	Yusuf Huda	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]
8	Salsana Purnamasari	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]

Figure 7. User Cadre data page

No	Name	Email	Alamat	Telepon	Profil	Aksi
1	Yusuf Huda	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]
2	Salsana Purnamasari	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]

Figure 8. User Midwife data page

Above were the menu display of user Cadre and Midwife that was being used by the system administrator as user data. In this menu, system administrator could search or add new user data, edit the user data, and delete the user data.

No	Name	Email	Alamat	Telepon	Profil	Aksi
1	Yusuf Huda	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]
2	Salsana Purnamasari	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]
3	Yusuf Huda	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]
4	Salsana Purnamasari	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]

Figure 9. Pregnant Woman Data Page

No	Name	Email	Alamat	Telepon	Profil	Aksi
1	Yusuf Huda	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]
2	Salsana Purnamasari	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]
3	Yusuf Huda	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]
4	Salsana Purnamasari	gusniyusuf@gmail.com	Bumi Serayu 1002	0827942338	01/01/2023	[Edit] [Hapus]

Figure 10. Toddler Data Page

Menu data *User* ibu hamil adalah menu yang menampilkan data hasil pemeriksaan ibu hamil di posyandu. Sedangkan menu data *User* balita merupakan menu yang menampilkan data hasil pemeriksaan balita di posyandu. Data *User* ibu hamil dan balita akan diinputkan oleh kader posyandu.

Pregnant woman data menu displayed the examination result of the pregnant woman in posyandu. Meanwhile, menu user data toddler displayed the examination result of the toddler in posyandu. Pregnant woman and toddler data will be input by posyandu cadre.

The following figures were the display menu of posyandu data. Posyandu data contains list of name and location of posyandu gerbangmas siaga members in Dawuhan Lor Village, Sukodono sub-district. There were 8 posyandu with different names and locations. User could see, search, delete, and edit the posyandu data. Figure 12 showed the maternal immunization data display. This



menu contains information regarding the types of immunization program in the posyandu and its description. User may see, delete, search, and edit the maternal immunization data. The user may also see the data of pregnant women that had received immunization

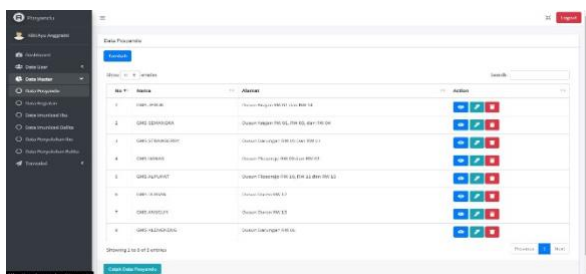


Figure 11. Posyandu Activity Display Page

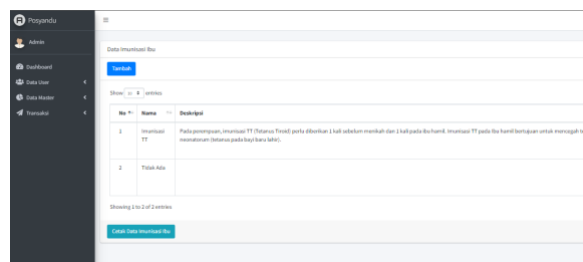


Figure 12. Maternal Immunization Page

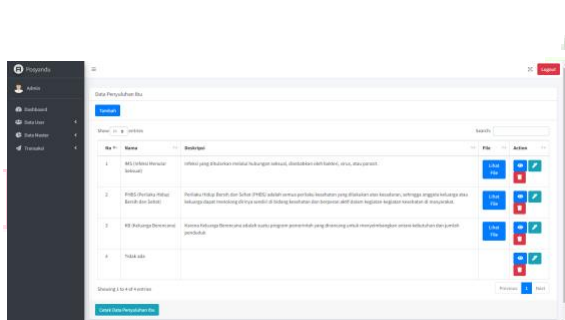


Figure 13. Mother Counseling Page

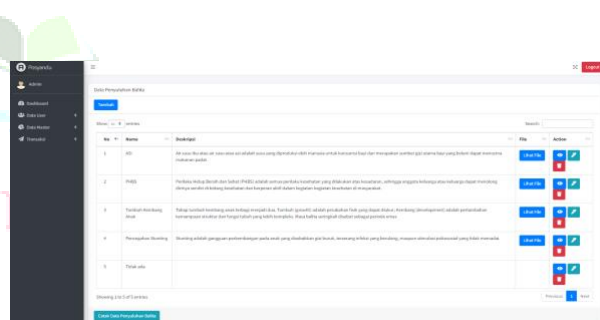


Figure 14. Toddler Counseling Page

Figure 13 menunjukkan tampilan data penyuluhan ibu. Menu ini berisi informasi kegiatan penyuluhan program posyandu bagi ibu hamil yang dilengkapi dengan deskripsi dan *file powepoint* dari setiap jenis penyuluhan. *User* dapat melihat, mencari, menghapus dan mengedit data penyuluhan ibu. Figure 14 merupakan tampilan data penyuluhan balita. Menu ini berisi informasi kegiatan penyuluhan program posyandu bagi balita yang dilengkapi dengan deskripsi dan *file powepoint* dari setiap jenis penyuluhan. *User* dapat melihat, mencari, menghapus dan mengedit data penyuluhan ibu.

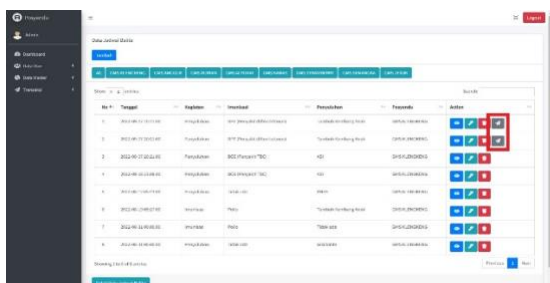


Figure 15. Send Message Page

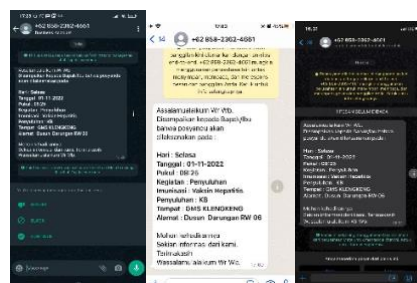


Figure 16. Whatsapp Gateway Feature

Messaging feature was used to broadcast message to all posyandu gerbangmas siaga participants based on their registered posyandu. After adding the data, the schedule will be saved and there will be a paper airplane icon. After clicking the message feature, the message will be broadcasted to the participants through WhatsApp with their previously chosen posyandu. This is also known as the WhatsApp gateway feature. Figure 16 above is the result of message feature in the posyandu information system. The message will be sent to the posyandu participant phone number. This was aimed to provide information and remind the participant to visit the posyandu.

3. Integration and System Testing

Testing is a stage from Waterfall method used as reference if the software that has been made has fitted the first stage. This stage used Black-Box Testing method that emphasized on the system function (Hanifah et al., 2016). The result showed that the posyandu information system was successfully applied.

Conclusion and Recommendation

The information system for Posyandu Gerbangmas Siaga Lumajang has met the user needs for the information system in the form of web-based system that could ease the user in recording the register of toddlers and pregnant women in the posyandu. All data in this system was stored securely in the database that could help in making report for posyandu and broadcasting the posyandu schedule to all participants through reminder feature. This study could be developed by adding features in the system, integrating it with e-cohort, and this system is expected to be able to display the graphic of toddlers and pregnant women examination result.



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