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Posyandu Information System in Payaman Village to Optimize Web-Based Health Services for Toddlers and the Elderly

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Abstract

The information system at Payaman Village Posyandu is currently still done manually by recording data using paper, making it vulnerable to errors in data processing and storage. This approach is less efficient, especially in managing registration data for toddlers and the elderly, as well as recording health history which is often not well documented. To overcome this problem, a website-based information system was developed which aims to increase efficiency and accuracy in the Posyandu administration process. This system is designed to make it easier to register participants, monitor the growth of toddlers and the health of the elderly in a more structured and well documented manner and carried out well by staff. The main users of this system are posyandu officers and village midwives who have access to health data and patient examination history. This system was built using the Waterfall software development method, with PHP and MySQL-based technology as the database. This system allows online registration to be carried out by Posyandu officers, central management of health data, and automatic creation of health history recapitulation reports. With this system, the Posyandu service process can be carried out more effectively, efficiently and transparently. In addition, the data stored in the system can be used for more accurate analysis of village community health. The implementation of this system is expected to improve the quality of health services at the Payaman Village Posyandu, reduce the risk of recording errors, and provide benefits for health workers in monitoring patient conditions on an ongoing basis.

Introduction

Posyandu is a public health service that plays an important role in monitoring the health of toddlers and the elderly. In Payaman Village, recording of posyandu activities is still done manually using paper documents, which risks causing recording errors, data loss, and inaccurate health information. This method also makes it difficult for officers to carry out periodic health monitoring and hinders the data analysis process (Ramadhani et al., 2024; Soh et al., 2015). Without a structured system, medical decision-making becomes slower and less efficient, so a digital solution is needed that can optimize the management of health information at the integrated health post. To overcome these obstacles, a web-based integrated health post information system was developed which was designed to increase efficiency in registration, data recording, and monitoring the health of toddlers and the elderly (Albahri et al., 2018; Abdussalaam et al., 2024; Sezgin et al., 2020). This system allows integrated health post officers and village midwives to access health data more quickly and accurately, making it easier to make medical decisions. This data digitization also ensures that health information

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is stored safely and in a more organized manner, and minimizes recording errors that often occur in manual systems (Sharma et al., 2021; Pai et al., 2021; Yaqoob et al., 2022; Shojaei et al., 2024; Ifezue, 2020; Al-Jaroodi et al., 2020).

The development of this system uses the Waterfall method, which ensures that each stage is carried out systematically, from needs analysis to implementation (Pargaonkar,, 2023; Bani & Sutjiatmo, 2024; Ahituv et al., 2002). Technology with PHP and MySQL languages is used to support online registration and real-time health data integration by posyandu officers (Maulana et al., 2024; Ardianto et al., 2023; Rahutomo et al., 2022; Sugiarto et al., 2025; Herlinah, 2024). With this system, it is hoped that posyandu services in Payaman Village can be more optimal, as well as improve the quality of health data management. In addition, this system can be a solution to various problems related to data recording and continuous monitoring of public health. This study aims to develop a website-based posyandu information system to improve the effectiveness and efficiency of health services for toddlers and the elderly in Payaman Village. This system not only helps officers in recording data and compiling health data reports for the elderly and toddlers, but can also be used as a model for other villages facing similar obstacles (Byrne & Sahay, 2007). With this innovation, it is hoped that the quality of public health services will increase, and have a positive impact on the welfare of the elderly and the growth of toddlers in Payaman Village.

There are several previous studies related to web-based posyandu information systems as follows:

Ramadhani et al. (2024) Conducting research entitled "Implementation of WhatsApp Bot in Registration and Monitoring of Service Services at Notary Offices Using RAD Case Study at Web-Based Notary Offices". The research methods used are observation, interview and literature study methods. The results of this study were developed using the Rapid Application Development (RAD) method and equipped with the WA BOT feature to facilitate consultation without having to come to the office. However, its limitations lie in the interaction that is still limited, because bots may be less effective in handling more complex questions or situations than humans.

Similar research entitled "Design of Elderly Data Collection Information System (Lansia) at Integrated Service Post (Posyandu) in Sebapo Village". Susanto et al. (2024) develop a system to overcome the problem of manual data collection that was previously done with Excel. This method is time consuming and prone to data errors. Therefore, a web-based information system is designed to facilitate the process of recording and searching for elderly data. It is hoped that this system can increase efficiency and accuracy in data collection, as well as accelerate decision-making related to elderly health services at the integrated health post.

conducted a study entitled "Design of Monitoring Information System for Posyandu Parakan Salak Sukabumi Activities". (Fauzi, 2022) aims to improve efficiency in recording and managing maternal and child health data. So far, posyandu activities are still carried out manually using Microsoft Excel and paper, which is at risk of data loss and recording errors. This study has succeeded in overcoming the challenges in monitoring and registration, but the system developed still has several shortcomings, namely it is not designed for a larger scale and has not been integrated with online services or automatic notifications.

Furthermore, the research entitled "Posyandu Information System, Pelemgede Hamlet, Sodo Village, Paliyan District, Gunung Kidul Regency" by Putra et al. (2022). Recording at Posyandu Pelemgede Hamlet is still done manually, so it is prone to data loss and information inaccuracy. This condition hinders service efficiency and slows down medical decision-making. To overcome this problem, a web-based information system was developed with PHP, Laravel, and MySQL. This system aims to facilitate recording and monitoring health more accurately and efficiently. With the implementation of this system, the administration

ISSN: 2716-3865 (Print), 2721-1290 (Online)

process becomes more organized, reduces recording errors, and improves the quality of health services for mothers and children.

And the last one conducted a study entitled "Designing a Web-Based Posyandu Information System for Kayen Hamlet with Waterfall" by Saputro (2022). The problems faced in Posyandu services in Pedukuhan Kayen are that data recording is still done manually, causing incomplete information, difficulty in making reports, and the risk of data loss or damage. To overcome this problem, a web-based information system was developed using the Waterfall method, which includes the stages of needs analysis, system design, coding, testing, and implementation and maintenance. With this system, data recording becomes neater, reports can be made automatically, and information can be accessed more quickly and transparently by interested parties.

Methods

Research methods in the integrated health post information system in Payaman village to optimize web-based health services for toddlers and the elderly using a qualitative approach (Sugiyono, 2016). This approach aims to understand the existing process, identify user needs, and analyze existing problems. The results of the analysis obtained will also be used to design a system that increases efficiency and accuracy. This research was conducted at the Posyandu Lansia dan Balita located in Payaman Village with data collection methods through observation, interviews, and documentation studies. Observations were made by directly observing the registration process and health data collection of toddlers and the elderly in order to understand the system used. Interviews were conducted with the Head of Posyandu, Mrs. Umroh as the village midwife, to obtain in-depth information regarding the registration procedure, health data monitoring, and obstacles faced in managing the Posyandu. In addition, the documentation study method was applied through literature studies and document analysis. Literature studies refer to various sources such as books, journals, and relevant scientific articles in order to build a strong theoretical foundation. Meanwhile, document analysis was used as a complement to observations and interviews by reviewing the recapitulation of registration and health data collection of toddlers and the elderly at the Posyandu Payaman Village. This combination of methods is expected to provide a comprehensive understanding of the Posyandu recording and service system in the village.

System Development Methods

The Waterfall Model is a method in system development that applies stages sequentially and systematically (Dikana et al., 2022). Each stage, from planning to maintenance, must be fully completed before moving on to the next stage. This approach ensures that each step receives detailed attention and documentation. This section will outline the main stages in the Waterfall Model to provide a deeper insight into the structured software development process (Saputro, 2022). The general stages in the Waterfall Model are as follows:

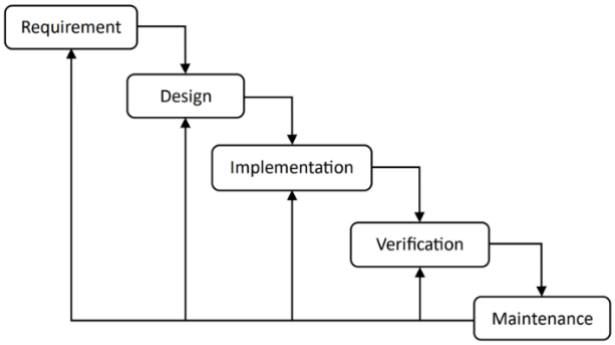

Figure 1. Waterfall Method

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Requirements

At this stage, the system developer must interact with users to understand the software requirements and existing limitations. Information can be obtained through interviews, discussions, or direct surveys. The collected data is then analyzed to ensure that the designed system can optimally meet user needs.

Design

At this stage, the system designer is responsible for compiling a detailed system design. The main focus is to identify hardware and software requirements, and determine the overall system architecture. This process includes selecting appropriate components, compiling the system structure, and ensuring that each element is well integrated. With careful planning, the system built is expected to operate optimally and meet user needs effectively.

Implementation

In this phase, the system is divided into smaller projects called units, which will be integrated in the next phase. Each unit is developed and tested to ensure its functionality, in a process known as unit testing. In this way, developers can detect and fix problems before the units are combined into a complete system.

Verification

In this phase, the system is validated and tested to ensure that all rules, both specific and overall, have been met. This testing process includes several types, such as unit testing, which is performed on certain parts of the code to ensure its functionality. Next, system testing is performed to assess the performance of the system after all components are installed. Finally, acceptance testing is performed with users to ensure that all their needs and expectations are met. In this way, it is expected that the system can function properly and according to what the user wants.

Maintenance

This is the final phase of the waterfall method. At this stage, the software that has been developed begins to operate and enters the maintenance phase. This maintenance includes fixing errors or bugs that may not have been detected in previous stages. In addition, this phase also involves system updates and adjustments based on user feedback, so that the software can continue to function properly and meet changing needs over time. With proper maintenance, it is hoped that the software can remain relevant and effective in the long term.

Results and Discussion

This study develops a web-based system entitled "Posyandu Information System in Payaman Village for Optimizing Web-Based Health Services for Toddlers and the Elderly". This study aims to be a means in the process of managing registration data and health history that includes a registration system that is directly connected to the health history of toddlers and the elderly. In addition, this application also supports the process of inputting toddler or elderly data which can facilitate officers in recording data for each RW. In developing this application, the author uses use cases as an application framework. Use case diagrams are diagrams for modeling the behavior of a system that will be designed by describing the interaction between one or more actors who will use the system (Hutabri & Putri, 2019).

Use Case

This use case diagram shows the process of using the Posyandu Information System involving two types of users, namely admin and officer. After logging in, the admin has full access to various features, including user management, elderly and toddler data management, service recording, and report management. Meanwhile, officers can use the elderly and toddler data

ISSN: 2716-3865 (Print), 2721-1290 (Online)

management, service recording, and report management features. The main difference between the two is that the admin has full control over the system, while officers focus more on recording and managing data related to Posyandu services.

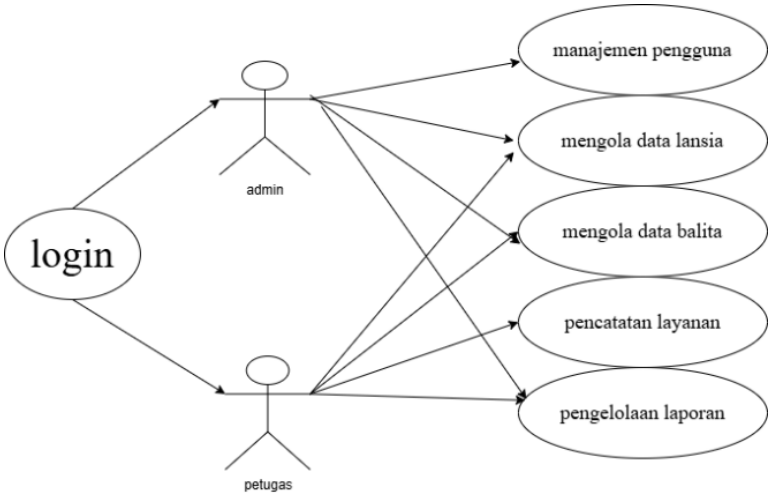

Figure 2. use case of posyandu system

Flow chart

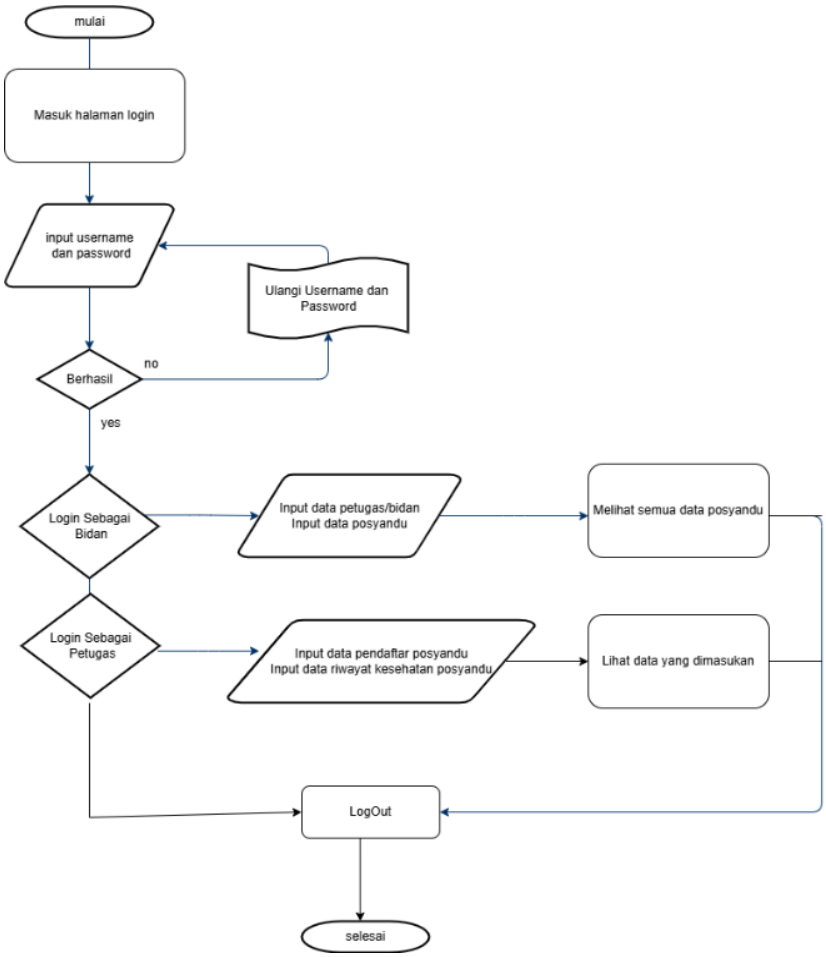

Figure 1. Flow chart

The flowchart of the login and usage of the Posyandu Information System begins with the user entering a username and password to access the system. If the login is unsuccessful, the user must repeat the process until they successfully log in. After successfully logging in, the user selects a role as a midwife or officer. Midwives have access to add officer data, midwives,

ISSN: 2716-3865 (Print), 2721-1290 (Online)

and Posyandu information, as well as being able to view all available Posyandu data. Meanwhile, officers can enter Posyandu registrant data and health history, and view the data that has been entered. After finishing using the system, users can log out to end the session.

Dfd Context

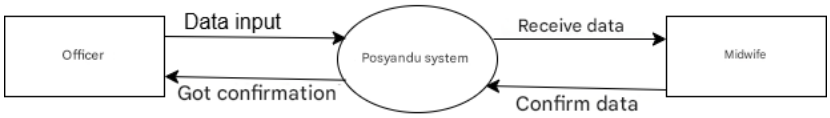

Figure 2. Dfd Context

This contextual DFD diagram illustrates the exchange of data in the Posyandu System between officers and midwives. Officers enter data into the system, which is then forwarded to the midwife for verification. After the midwife confirms, the system will send a notification or feedback to the officer as a form of confirmation. This flow shows how the Posyandu System acts as an intermediary in the data processing and validation process carried out by officers and midwives.

ERD

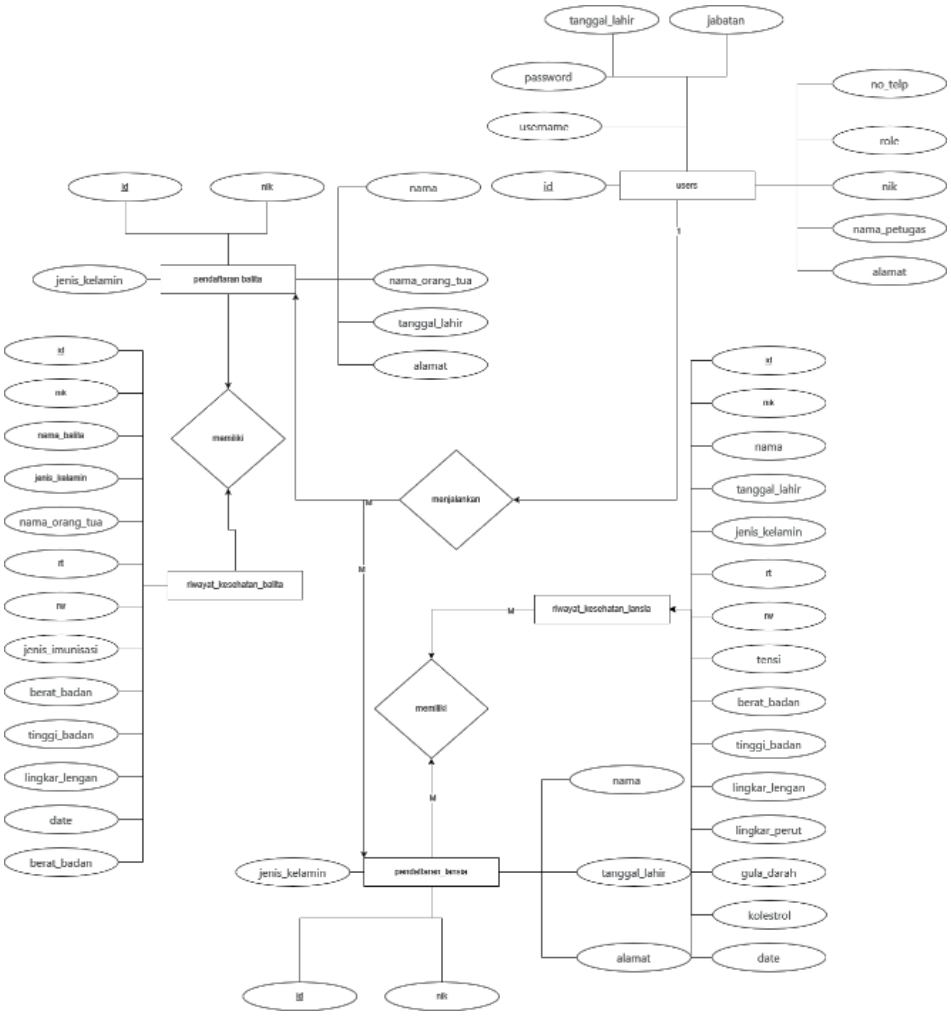

Figure 3. ERD Posyandu System

ERD (Entity Relationship Diagram) shows the data structure in the Posyandu Information System, which consists of several main entities, namely Midwives, Toddler Registration, Elderly Registration, and Toddler and Elderly Health Records. The Midwife entity is responsible for storing user data, while the Toddler Registration and Elderly Registration

ISSN: 2716-3865 (Print), 2721-1290 (Online)

entities record the identity and personal information of each individual. Each toddler and elderly person has a health record that records various data, such as weight, height, head circumference, and cholesterol levels. The relationship between these entities allows the integration of registration data with health records, so that the development of village community health can be monitored systematically.

Implementation

Coding

Coding will change the system design prepared in a computer language that can then be executed. Coding is done using Css which is a php framework.

Application Login Page

The following image is the initial display of the application used as a login place for users (midwives and officers).

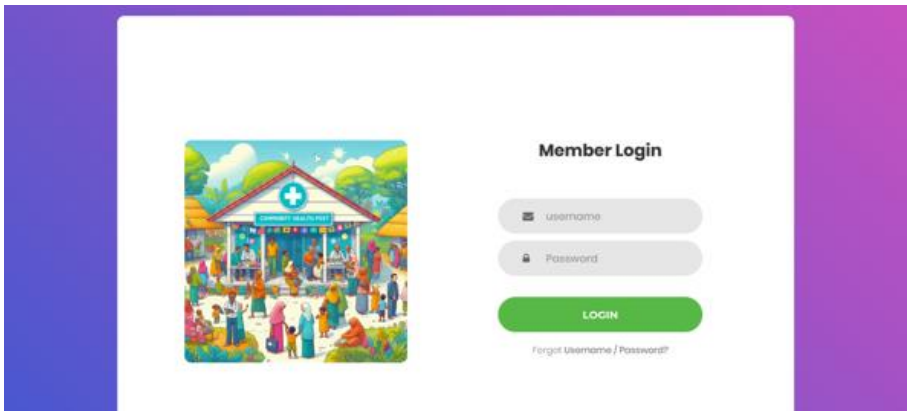

Figure 4. Login Application

The following image shows the initial display of the login page application which consists of a username and password.

Midwife application page

The following image is the initial display of the application used as a login place for users (midwives).

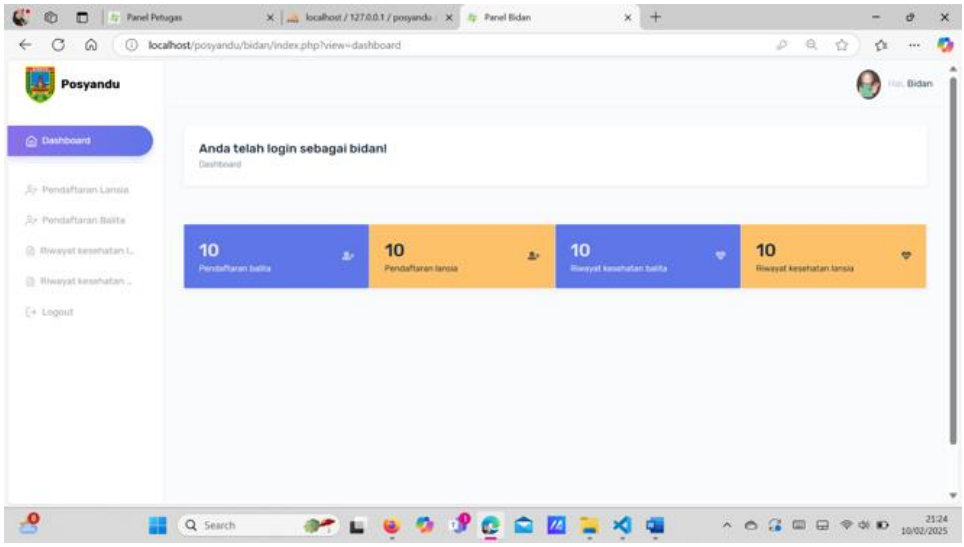

Figure 5. Midwife Dashboard

ISSN: 2716-3865 (Print), 2721-1290 (Online)

The following image is a dashboard page that contains several menu options that can be selected by the midwife. One of the menus in this application is Elderly Registration and Toddler Registration, used to view data.

Officer application page

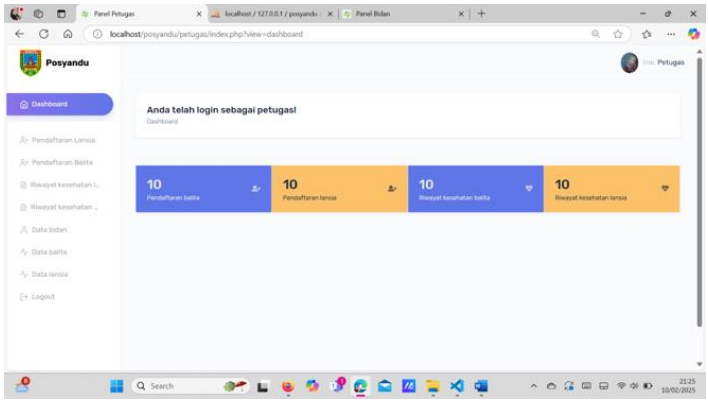

Figure 6. Officer Dashboard

In the following image is a dashboard page which contains several menu options that midwives can choose from. One of the menus in this application is elderly registration and toddler registration, used to add to the list of elderly and toddlers.

Registration page for Elderly and Toddlers (Officer)

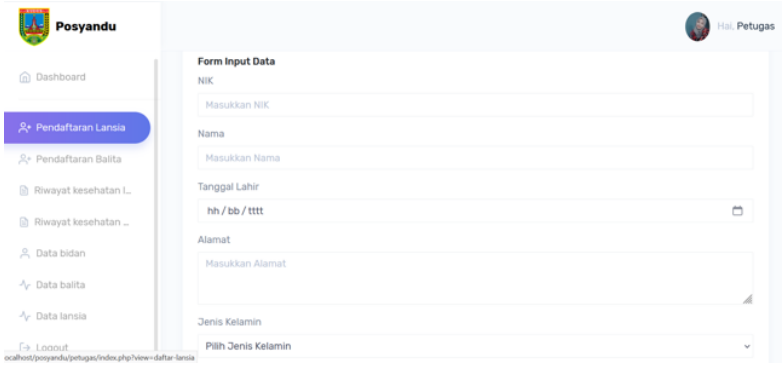

Figure 7. Registration of Elderly and Toddlers

In the registration section, there is a menu for the elderly and toddlers that contains data on the NIK list, name, date of birth, address, and gender. This page is useful for officers in entering elderly and toddler data.

Elderly and Toddler History Page (Officer)

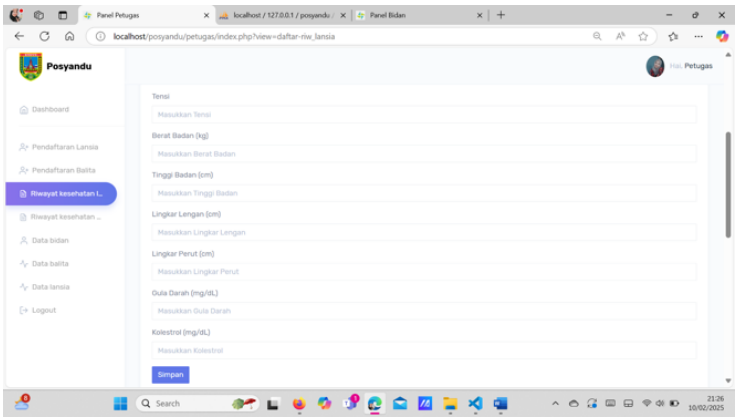

Figure 8. Health History of Toddlers and the Elderly

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Next is the Elderly and Toddler Health History page, used to record the health of the Elderly and Toddlers of the registrants. After the Registration process carried out by the user (Officer), the data will then enter the admin system on this Officer registration page.

Midwife Data Page

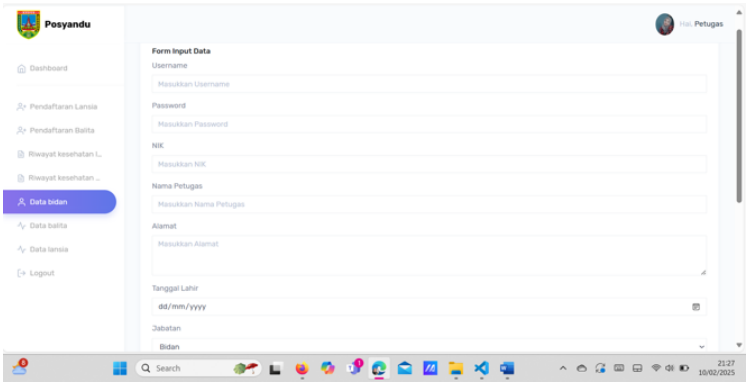

Figure 9. Midwife Data

Still in the midwife data menu, here is a menu displaying data on midwives and officers on duty.

Toddler Data Page (Officer)

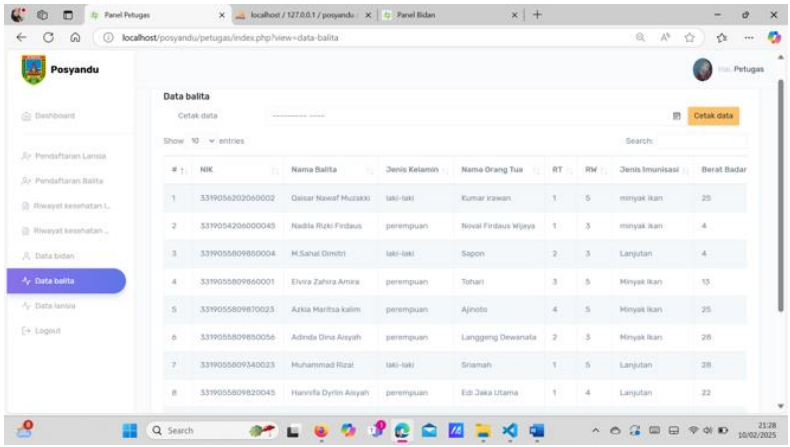

Figure 10. Toddler Data

This page consists of a recap of registration data and toddler health history which is carried out every month.

Elderly Data Page (Officer)

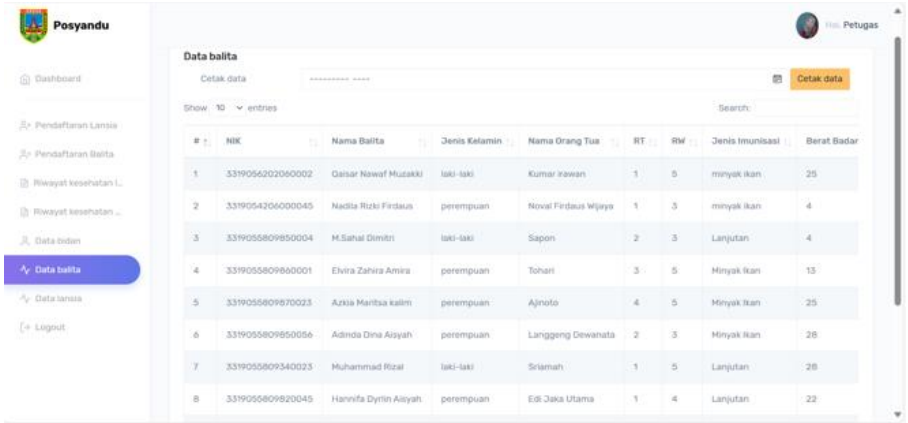

Figure 11. Elderly Data

ISSN: 2716-3865 (Print), 2721-1290 (Online)

This page consists of a recap of registration data and health history of the elderly which is carried out every month.

Monthly Data Print Page (Officers and Midwives)

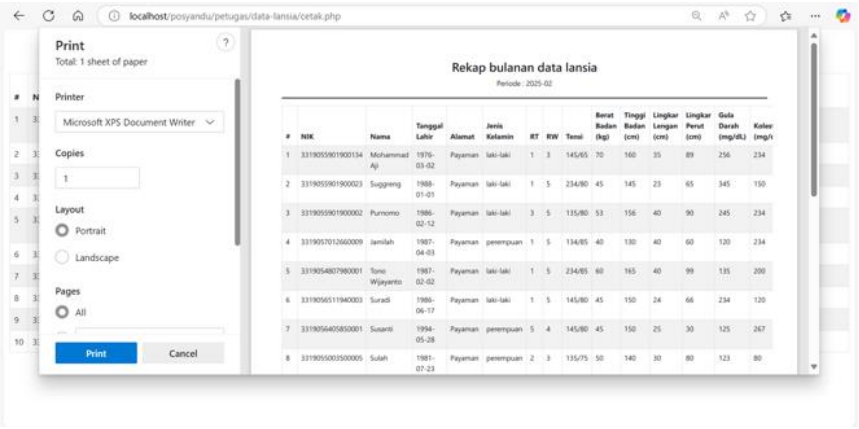

Figure 12. Monthly Recap Data for the Elderly

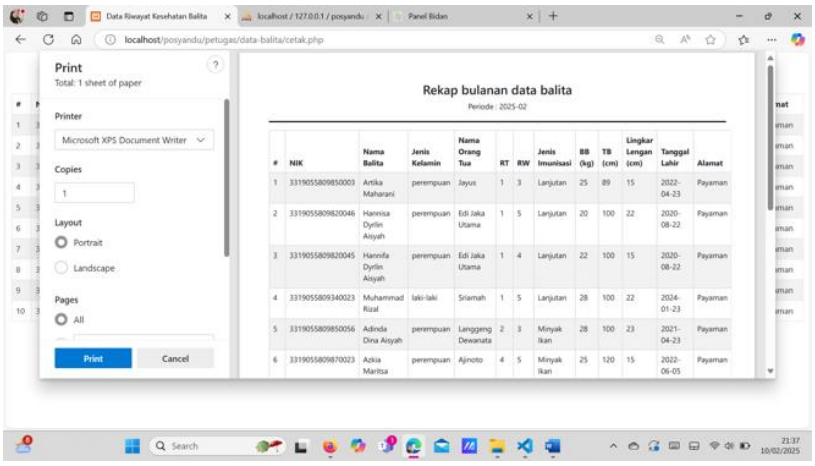

Figure 13. Toddler Monthly Recap Data

The following is a display of Toddler data on the toddler menu where officers can monitor Toddler data and Elderly Data and can also be printed in .PDF format.

This study successfully developed and implemented a web-based "Posyandu Information System in Payaman Village to Optimize Toddler and Elderly Health Services" for posyandu data management, focusing on the toddler and elderly registration system that is directly connected to the health history of toddlers and elderly, as well as reports for each RW. Based on the test results, the system has met all the designed functionality, with the following details:

Table 1. Key Functionality Success

Functionality	Description
Login	Verifies user data accurately, displays error messages for incorrect input, and ensures secure access.
Dashboard	Displays role-based data, offering an intuitive experience tailored to each user type.
Toddler Registration	Enables officers to input accurate toddler data, which is then successfully saved in the system.
Elderly Registration	Allows officers to input accurate elderly data, which is successfully stored.

ISSN: 2716-3865 (Print), 2721-1290 (Online)

Toddler Health History	Officers can conduct checks based on set data, and the toddler's health history is properly recorded.
Elderly Health History	Officers can conduct checks based on set data, and the elderly's health history is properly recorded.
Toddler Data Recap	Summarizes toddler data using address-based relations, includes RW-level data, and supports PDF export.
Elderly Data Recap	Summarizes elderly data using address-based relations, includes RW-level data, and supports PDF export.
Data Management	Officers and admins can add, delete, and edit toddler and elderly records.
User Data	Admins can manage user accounts by adding or removing officer-level users.

Several core functions of the system create an environment for productive yet protected health data handling among elderly patients and infant patients. User credentials receive proper verification followed by clear alerts about errors in the secure login process of the system. Protecting vital health data and maintaining authorized access to and changes on data represents a basic system requirement. The dashboard offers improved user interaction because it shows role-specific important information to each user. Users receive responsibilities-specific information through this approach so their workflow remains efficient and their potential errors are reduced.

The system maintains effective core operation performance for toddler and elderly registration functions which enables officers to perform data entry and storage. The system requires accurate records maintenance for future health monitoring and reporting. The system permits authorized personnel to input medical records connected to health histories of both toddler and elderly populations into the platform. The recorded data enables healthcare tracking throughout time and supports better professional decisions for care delivery.

Both user groups can access summarized views of information through their data recap functions that use geographic units including RW (Rukun Warga). Health assessment data organized through this format serves communal needs especially for community health assessments and can become PDF files people share with stakeholders. The data management system together with user data features allows administration users to maintain system records while controlling user access. User management functions are limited to account administration for admins while both admins and officers can modify toddler and elderly data as required. The capabilities enable the system to operate with the most current personnel information and population data.

Table 2. System Evaluation

Category	Description
Design and Layout	User-friendly interface with clear navigation and adequate feedback, making the system easy to understand and operate.
Expected Functionality	All core features (registration, health history tracking, employee management) function properly, supporting accurate and complete posyandu data collection.
Further Development	Recommend transitioning to a web-based system for improved accuracy and integrity, and implementing data encryption to enhance security against unauthorized access.
Overall Impact	The system improves data management, reduces manual errors, and enhances operational efficiency for posyandu services in Payaman Village.

ISSN: 2716-3865 (Print), 2721-1290 (Online)

The application presents its design alongside user-friendly layout features which enable smooth administration by field users and administrative personnel. Such interfaces that combine a minimalistic approach with quick feedback elements enable users to execute tasks correctly thus reducing training times and eliminating mistakes. There is an effective delivery of all intended operational components within the application framework. The application exhibits proper functionality through its features dedicated for toddler and elderly patients along with health history documentation and user account administration. The system operates with reliable support for posyandu daily operations by maintaining accurate data entries at every point of service. There exists a crucial need for this performance feature to keep community health records safe.

Improvement opportunities exist for the system to advance. The system needs a complete integration of a web-based platform for future improvement. Real-time data updates combined with broader accessibility and more efficient oversight would be possible through this system improvement (Alubaie et al., 2024; Liu et al., 2024). The implementation of data encryption is strongly suggested because it offers protection against healthcare information breaches as well as unauthorized access to sensitive personal data.

The research introduces a web-based information system that transforms Posyandu services through modern management techniques for monitoring toddler and senior citizen populations in Payaman Village. The PHP-MySQL stack and Waterfall model architecture transformed operational manual processes into a digital system that greatly improves the existing health data management issues derived from paper-based systems.

The change from manual to digital documentation both accelerated data processing while maintaining accuracy through findings which demonstrate how non-digital health data systems create risks through human mistakes and duplicated data and lost information (Sharma et al., 2021; Soh et al., 2015; Ramadhani et al., 2024). The system enables real-time data visibility alongside structuredmedical history recording which promotes evidence-based healthcare while following recommendations from Albahri et al. (2018), Pai et al. (2021) and Sezgin et al. (2020) to digitalize healthcare for better community results.

The system features a complete set of designed elements that enables various functions which include dashboard capabilities for roles and registration modules together with automatic health report generation. The implementation of health recapitulation features grouped by Rukun Warga (RW) enables the system to capture local administrative dynamics thus enhancing health data use for decision-making processes. E-health platform adoption rates improve when platforms are customized for the local socio-geographical profile of communities as demonstrated by research from Putra et al. (2022) and Saputro (2022).

Additional developments are possible in multiple sectors of the system. The system identifies as web-based but its accessible functionality rests within local intranets without integrating cloud resources or offering mobile device compatibility. The restricted system accessibility harms scalability together with preventing remote operation which modern public health informatics systems need according to Yaqoob et al. (2022). User demands for system scalability could challenge the maintenance of the PHP and MySQL architecture due to its limited scalability and the absence of layered API structure or modular microservices design features (Ahituv et al., 2002; Pargaonkar, 2023; Baumgartner, 2022; Luntovskyy & Shubyn, 2020).

The study mentions data protection encryption but fails to present thorough implementation methods for data security. Health information remains exposed to serious security risks because the healthcare sector lacks a comprehensive cybersecurity framework which would include secure login methods with role assignment protection and data encryption practices (Yaqoob et al., 2022; Sharma et al., 2021; Javaid et al., 2023; Joshua et al., 2022; Ksibi et al.,

ISSN: 2716-3865 (Print), 2721-1290 (Online)

2023; Vikash, 2022). The adoption of encryption standards which include TLS for data transmission and AES for storage encryption improves trust measures while meeting regulatory standards when expanded to village-wide implementation.

System usability and training remain essential points for critical reflection within the system. The study notes that the interface is easy to use but does not provide quantitative results about user interface usability or any metrics except skilled opinions. Research has proven that effective health IT systems function best with reliable operations and widespread user approval which evolves through continuous training programs and response systems (Byrne & Sahay, 2007; Sezgin et al., 2020; Tariq, 2024; Esmaeilzadeh, 2024). Future research should perform official usability tests with the System Usability Scale (SUS) and gather field feedback from midwives together with officers and community members to enhance successive interface protocols.

Systems which were developed in Sebapo Village and Sukabumi regions (Susanto et al., 2024; Fauzi, 2022) initiated from manual documentation yet their solutions maintained restricted scope and did not integrate role-tailored interfaces along with automatic data processing functions. This system stands out because of its important features which include monthly recap reports along with PDF downloads and RW data segmentation capabilities that make it both detailed and able to replicate itself. Implementation of the Waterfall model for development remains an important subject for consideration during this project (Mishra & Alzoubi, 2023; Famoti et al., 2025). The Waterfall method delivers explicit sequential procedures but finds limited effectiveness in dynamic healthcare environments because it fails to adapt like Agile and RAD processes do (Ramadhani et al., 2024; Bani & Sutjiatmo, 2024). The next system updates should incorporate hybrid architecture which enables individual section updates that maintain the system core—this design will benefit future functionalities such as telehealth integration alongside AI health risk analysis.

The system developed in Payaman Village serves as a replicable template which other communities having similar Posyandu structures can implement. The system needs ongoing financing and digital education training for its sustainability and cooperation from both healthcare institutions and local government health agencies. The successful expansion of posyandu systems will depend heavily on database integration with provincial health offices as well as national electronic health records systems to maintain continuous care and public health planning (Maulana et al., 2024; Rahutomo et al., 2022).

Conclusion

The introduction of the "Posyandu Information System in Payaman Village" delivers a major breakthrough in community-based health service delivery through digitizing manual health data management for toddlers and elderly adults. This web-based platform has enhanced various operational processes through improved efficiency standards and enhanced data accuracy together with enhanced organizational practices. The system successfully deployed all essential functions which include secure sign-in authorization and role-based interfaces as well as health record integration and concussion-oriented summary printing. These functionalities match operational demands of Posyandu services. The system streamlines work processes between midwives and officers and improves the accessibility and reliability of health data for more responsive medical decision making. RW-level data recapitulation integrated with PDF report exporting features support community-level administrators in their tasks and health program evaluation processes.

The study emphasizes future work requirements encompass two key areas including extending system accessibility online as well as adopting robust security measures such as encryption technology and secure access authentication. Building and expanding this system

ISSN: 2716-3865 (Print), 2721-1290 (Online)

will require attention to strengthen security measures and data integrity because such improvements serve as the foundation for larger system implementation.

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