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Web-Based Patient Queue Number Registration Application at the Sidodadi Community Health Center in Sidoarjo Regency

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Abstract. The main role of Information Technology in today's society is very dominant, and its development is happening rapidly. This technology allows us to quickly and accurately access and process information. In this case, the Sidodadi Community Health Center, located in Sidoarjo Regency, has made efforts to improve the efficiency of outpatient registration. Currently, the patient registration system is still manual, which results in long service times. This study aims to present an innovation by developing a web-based registration system. This application simplifies and optimizes the queuing process, both for users who want to take a queue number and for administrators who call queue numbers. The use of web-based technology is the right solution to improve service quality. This study has limitations in that the application development is only focused on the Sidodadi Community Health Center, Sidoarjo Regency. The main objective of this study is to produce an efficient web-based patient queue number registration application. This application will improve the patient experience, facilitate more structured queue management for Community Health Center staff, reduce patient waiting times, and provide accessibility for patients to monitor their queue information online. The method used in this study is the waterfall method, which has five stages, namely communication, planning, modeling, construction, and deployment. The application development methodology involves needs analysis, system design using the programming languages used in this study, namely PHP, HTML, CSS, and JavaScript, web-based application development, testing, and evaluation. The test results showed that the system successfully provided queue numbers in accordance with the correct queue order, and the user interface was easy to use. This study concluded that the development of the Sidodadi Community Health Center Web-Based Patient Queue Information System successfully improved the efficiency of patient registration and improved the quality of services at the Community Health Center.

Keywords: Information system, Patient registration system, Waterfall method, Website

1 Introduction

Service quality is an important assessment in public service evaluation, reflecting the extent to which citizens' needs are met in accordance with applicable laws [1]. Public services cover various activities whose main objective is to meet the needs of the community by providing goods, services, and administrative services. The implementation of public services must be based on applicable laws and regulations [2]. Technology is a collection of knowledge, tools, and methods to create solutions and meet human needs. In this case, it is important in the development of various aspects of life [3]. The main role of Information Technology in today's society is very dominant, and its development is rapid. This technology allows us to quickly and accurately access and process information [4]. In this context, the existence of computerized systems is a necessity, given their ability to facilitate information retrieval, reduce human error, and improve data security. The application of information technology includes data processing, information, management systems, and electronic work processes, as well as utilizing developments in information technology to ensure easy and economical access for the public to public services [5]. The web is currently one of the main sources of information used by various groups. The web, short for website, is a collection of pages with various digital content such as text, images, videos, audio, and animations, accessed via the internet [6]. The Sidodadi Community Health Center, located in Sidoarjo Regency, is a health facility that provides medical services to the community and strives to improve the efficiency of outpatient registration. Currently, the patient registration system at the health center is not effective and is still manual, resulting in long service times. Therefore, the researcher wanted to introduce an innovation by creating a website-based service system, namely by simplifying and optimizing the queuing process, both for users who want to take a queue number and for administrators who call queue numbers [7]. The patient registration application facilitates

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the registration process for healthcare staff and patients, and reduces the risk of errors such as calling the wrong patient. In an effort to improve service quality, the use of web-based technology is the right solution to overcome these challenges [8].

Therefore, to overcome the problems mentioned above, several detailed steps need to be taken. In the context described above, several problems arise that require careful solutions. First, the steps for implementing a web-based patient queue registration application need to be explored [9]. Second, the elements that are important for the success of the application in improving the efficiency of the patient queue registration process must be clearly identified. Finally, the concrete steps in implementing a web-based patient queue system application at the Sidodadi Community Health Center need to be explained [10]. This study has limitations in that the application development is only focused on the Sidodadi Community Health Center, Sidoarjo Regency, without involving integration with other external systems.

Thus, the main objective of this study is to produce an efficient web-based patient queue registration application [11]. This will have a significant positive impact, including improving the patient experience, facilitating more structured queue management for Puskesmas staff, reducing patient waiting times, and providing accessibility for patients to monitor their queue information online on desktops in the patient waiting room [12]. Through the efficiency generated by the web-based registration system, patients will be able to register without having to be physically present at the health center.

Puskesmas, reducing the time usually spent in the conventional registration process [13]. This directly leads to a reduction in patient waiting times, increased Puskesmas productivity, and a more comfortable environment for patients [14].

Furthermore, to achieve the application development objectives, the methodology to be used in developing this application is requirements analysis, system design, web-based application development, testing, and evaluation [15]. At the requirements analysis stage, the important features that must be included in the application will be identified. Then, the system will be designed based on this analysis and developed in accordance with technical guidelines [16].

Referring to the situation described above, there is an opportunity to improve efficiency and accuracy in taking patient queue numbers at the Sidodadi Community Health Center. Changing from a manual method to taking queue numbers online at the health center can directly reduce errors in the order of patient queue numbers. Therefore, the need for a web-based platform is becoming increasingly important. The platform is expected to assist the Sidodadi Community Health Center in managing information and providing services such as registering new or existing patients and monitoring queue numbers digitally in the waiting room. With the use of this platform, it is hoped that the patient registration process at the Sidodadi Community Health Center can become more efficient and reduce the risk of errors in arranging patient queue numbers.

2 Method

This study uses the *waterfall* method, which takes place at the Sidodadi Community Health Center. *Waterfall* research is an approach to software development that follows a linear and structured sequence of stages [17]. At the Sidodadi Community Health Center, the data is then studied, processed, and analyzed by requesting the necessary data from health center staff and conducting interviews. The *waterfall* method guides the software development process through a series of stages that are carried out sequentially. These stages are designed to ensure that every aspect of the project receives proper attention and development [18].

This research was conducted from February 2023 to March 2023. The application was developed using the following *software: Apache, MySQL*, and the programming languages *PHP, HTML, CSS, and JavaScript*. The development involved hardware in the form of laptops. The application was implemented at the Sidodadi Community Health Center.

Testing involves *black-box testing.* The purpose of *black-box testing* is to ensure that the software or system being tested functions according to the specified requirements without having to understand or have knowledge of its internal implementation [19]. The main objective is to assess functional quality: Black-box testing examines various possible situations and inputs, including functional quality testing of features related to the queue number retrieval and queue number calling processes [20]. The purpose and objective of *black-box testing* in this application is to check the functionality of application features such as: User Queue Number Retrieval, Admin Calling, User Queue Table, Queue Number Print Page, and User-Friendly UI UX. Through *black-box testing,* it is useful to find problems in the application from the user's point of view, ensuring that the application meets expectations and specifications [21]. In practice, *black-box* testing is an important component of a comprehensive software testing strategy [22].

The black-box method we tested at this stage involved functional testing of the application, conducted by the author using QA (Quality Assurance) techniques. This was done through *trial-and-error UAT (Unit Acceptance Test)* methods. The following is the testing table.

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Table 1. Login Testing Table

No	Test Description	Expected Result	Result
1	Login attempt with an incorrect NIK or password	The system can display an appropriate error message if the NIK or password entered is incorrect	Successful
2	Login attempt without entering NIK or password	The application can display an appropriate error message if the NIK or password is not filled in	Successful
3	Attempting to log in with a registered *NIK*	The application can display the appropriate error message if the NIK entered is already registered	Successful

Table 2. Registration Testing Table

No.	Test description	Expected result	Result
1	Testing registration without filling in complete data	The application can display an appropriate error message if any data is not filled in	Successful
2	Registration attempt with an invalid *NIK* number	The application may display an error message if the data entered is invalid	Successful

Table 3. Logout Testing Table

No.	Test description	Expected Results	Results
1	Logout Test	The application can display the Logout menu and Return to Login Form	Successful

Table 4. User Admin Test Table

No	Test description	Expected result	Result
1	Testing Displaying Patient Queues and Queue Calls	The application can display the appropriate information for displaying patient queues and queue calls	Successful
2	Testing Patient Queue Calls	The application can display the appropriate Patient Queue Calls	Successful

Table 5. Patient User Test Table

No	Test Description	Expected result	Result
1	User test to take a queue number	The application can display the queue number according to the order of registered patients	Successful
2	Queue number print page	The application can print queue numbers when the print command is clicked on the web page.	Successful

This study reveals that the Web-Based Patient Queue Number Registration Application at the Sidodadi Community Health Center has the potential to improve registration efficiency. The Waterfall method, which was applied in this project, involves six main stages that are carried out sequentially: coding, analysis, specification, design, testing, and implementation [23].

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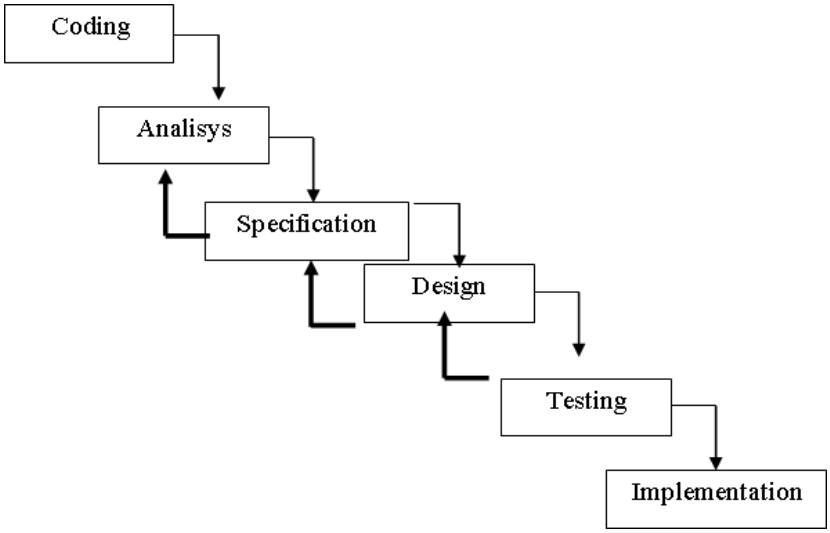

Figure 1. Waterfall Method

The *Waterfall* methodology is linear, so each stage must be completed before moving on to the next stage [24]. Explanation in the context of application regarding each stage of the *Waterfall* Method in the development of the application in sequence:

a. Analysis:
   Identification of problems and needs at the Community Health Center related to patient registration and interviews with medical and administrative staff to understand the registration process and existing problems.
b. Specification:
   Prepare specification documents containing a complete description of the features, workflow, and appearance of the application. Determine the technology to be used, such as the appropriate programming language and database.
c. Design:
   Creating wireframes or prototypes of the application interface to illustrate how the application will look, designing a database to store patient information and queue numbers.
d. Implementation:
   Implementing the interface design into PHP, HTML, CSS, and JavaScript code, and developing the application's business logic using the selected programming language.
e. Testing:
   Testing all application features to ensure that everything works properly, and identifying and fixing any bugs or problems that may be found [25].

Table relationship illustration of the queue, depicting the sequence of the process flow in the patient queue information system:

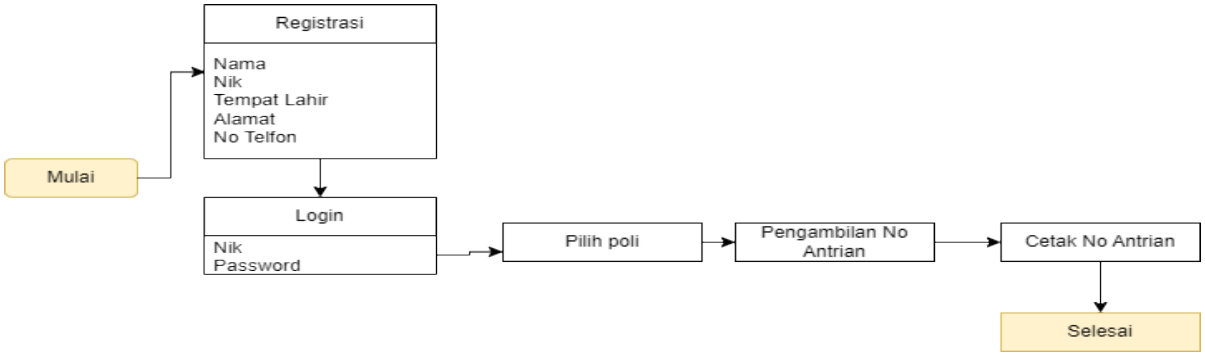

Figure 2. Queue Flowchart

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3 Results and Discussion

This research resulted in *a Web-based* Patient Queuing Information System *for* the Sidodadi *Community* Health Center*,* which was designed using *PHP, CSS, JavaScript*, and *HTML* programming languages with the *Waterfall* method. This system provides *a* special user *design*, namely queue numbers and visual queue calls. In this system, patients can easily take a queue number at the location provided by the Sidodadi Community Health Center. There is also a call system with counter number information. The system interface has been designed so that the queue number and counter number information are displayed simultaneously on one page. Thus, patients can easily see and understand the next step in their queue process. For administrators, there is a queue data menu that allows them to monitor the total number of queues in progress. This capability provides important information for more efficient queue planning and management. In addition, this system also has a voice feature for calling patients to the registration counter. This aims to make it easier for patients to understand the queue call with clear visuals and reduce the possibility of confusion.

The results of testing using *Black box Testing* revealed several findings. *The Blackbox Testing results showed that* the system successfully provided queue numbers in the correct order, and that the user interface or *GUI (Graphical User Interface)* was easy to use for users who may not have technical experience in the registration process. Queue number retrieval was also intuitive and efficient, indicating that the system had successfully met the expected quality standards.

Furthermore, it can be seen that the main menu displays menu options for patients and staff, including queue number retrieval and patient queue calls at the Sidodadi Community Health Center. This interface design aims to reflect how users will interact with the system visually and intuitively.

A description of the carefully designed program user interface can be seen in the appendix to this article, providing a clearer visual overview of how the main menu display and overall user interface contribute to a better user experience in the patient queue registration process at the Sidodadi Community Health Center, Sidoarjo Regency.

3.1 Use Case Sequence Diagram

Figure 1. Use Case Sequence Diagram illustrates the flow of activities *in* the queuing system. First, patients go to the online registration computer at the Sidodadi Community Health Center to register as new patients or log in as existing patients. Then, patients select the clinic they want to visit. After that, patients receive a queue number and go to the officer to pay for registration services or insurance claims, then patients wait for the doctor to call them to receive services.

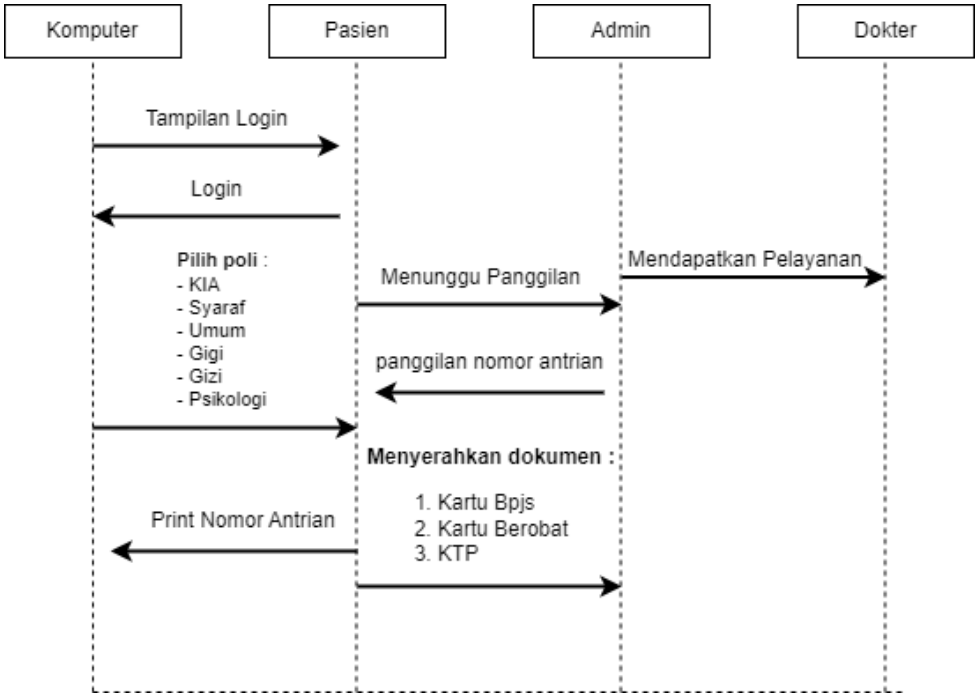

Figure 3. Use Case Sequence Diagram

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3.2 Program User Interface

3.2.1 Main Menu

The main menu displays login information for existing patients and administrators. New patients can create a new account by clicking "Register New."

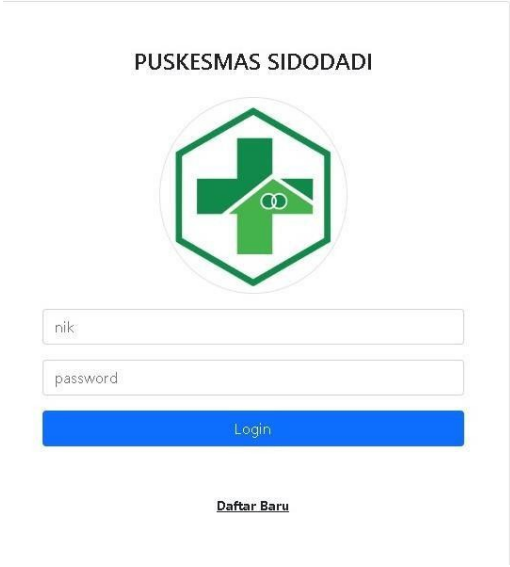

Figure 4. Design Interface for Login or New Registration for Sidodadi Community Health Center Patients

3.2.2 Admin User Display

Displaying the Interface Design for Calling Patient Queues to the Counter in the Sidodadi Community Health Center Web-Based Patient Queue Information System. The microphone *(mic)* logo, presented in black and white, has an important meaning in indicating the status of patient queue calls. The logo is a clear visual indicator: if it is green, it indicates that the queue has not been called. Conversely, if the microphone logo is black and white, it indicates that the queue has been called and the patient is expected to proceed to the registration counter. This design principle provides visual clarification that is easy for officers to understand, reducing potential confusion and providing precise instructions for following the queue process .

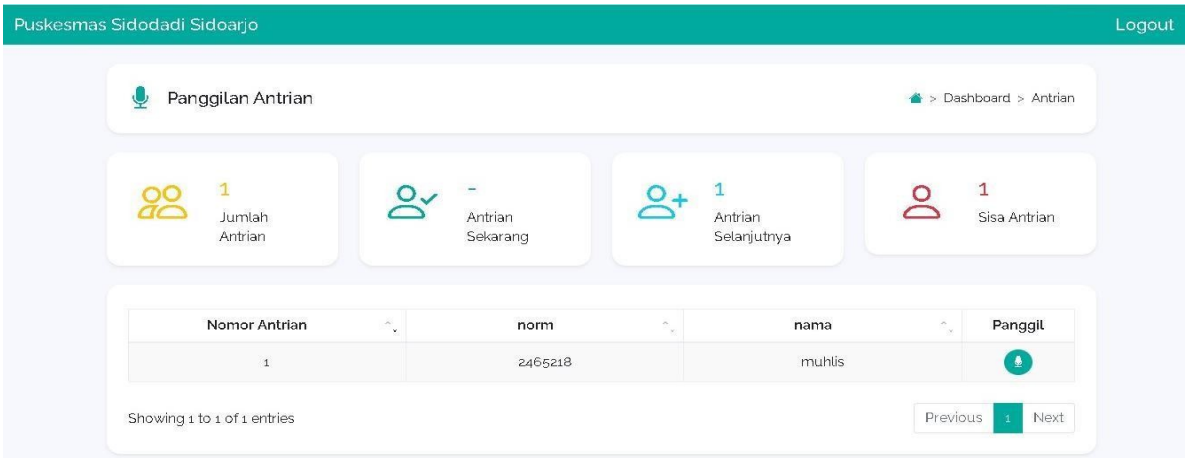

Figure 5. Page on the Admin Account in Queue Calling

3.2.3 Creating a New Account for New Patients

The new account registration form page for new patients at the Sidodadi Community Health Center has an easy-to-understand display. The form contains a registration form (name, ID number, place of birth, date of birth, address, telephone number, BPJS number, password, retype password). Once everything is filled in, click submit.

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Figure 6. New Patient Registration Form Display

3.2.4 Login Page for Registered Accounts

Page to log back in to register for a clinic.

Figure 7. Re-login Display

3.2.5 Selection of the Target Poli

Page for selecting the desired clinic

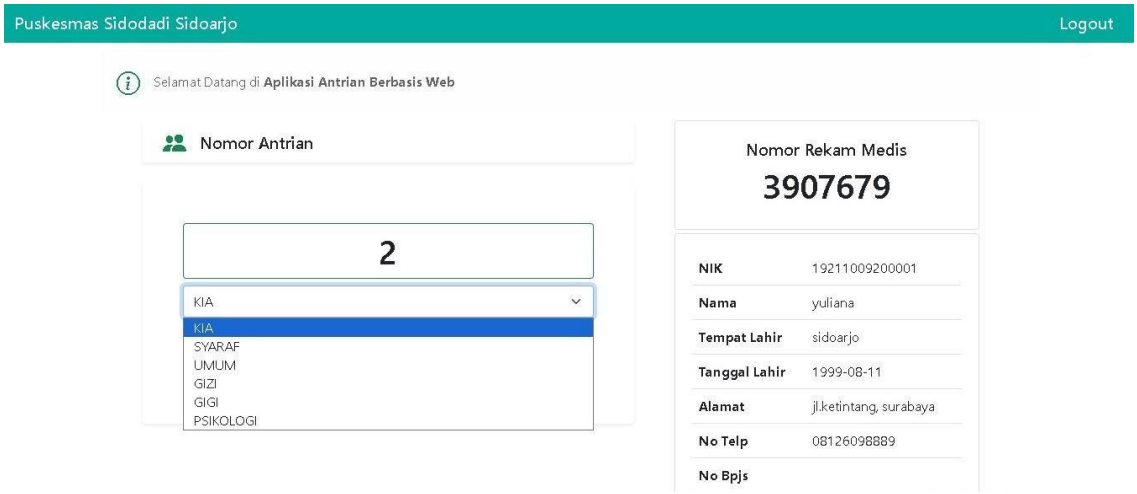

Figure 8. Poli Selection Display

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3.2.6 Queue Number Retrieval

The interface design is intended to facilitate the process of obtaining and printing queue numbers for patients who are going to the registration counter. This image shows a visual display of how patients can interact with the system to easily obtain their queue numbers. This process is carried out using the print feature provided by the interface. The purpose of this interface design is to improve the efficiency of the registration process and reduce patient waiting times through clear and intuitive steps.

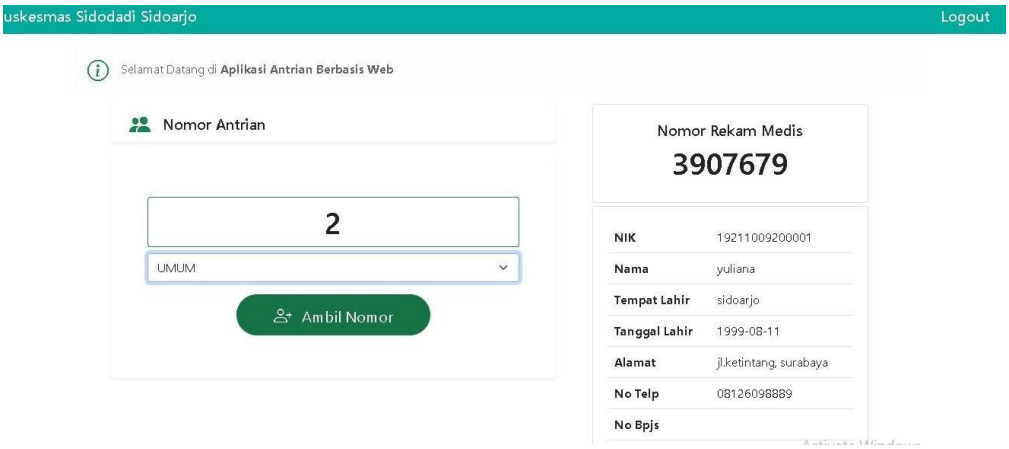

Figure 9. Patient Queue Number Retrieval Display

3.2.7 Queue Number Printing Display

Shows the interface design specifically for printing patient queue numbers. This interface is designed with the aim of making it easier for patients to get their queue numbers. This image clearly shows how patients can select the option to print their own queue numbers.

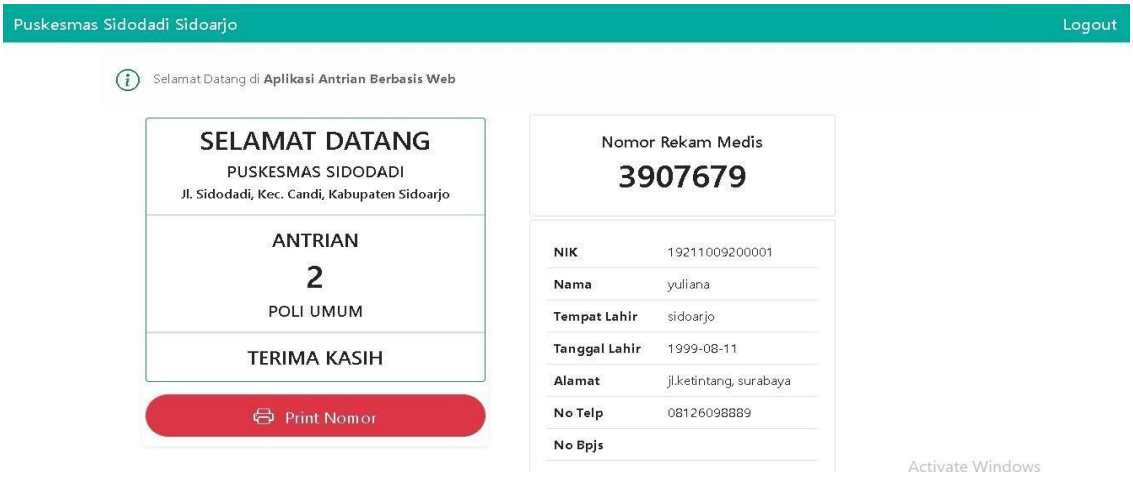

Figure 10. Patient Queue Number Print Interface Design

4 Conclusion

This study concludes that the development of the Sidodadi Community Health Center Web-Based Patient Queuing Information System has successfully improved efficiency in the patient registration process and resulted in a significant increase in the number of patient registrations. The application is effective in making it easier for patients to obtain queue numbers, clearly displaying counter number information, and providing an integrated interface to facilitate patient navigation. Furthermore, this application simplifies administrative tasks by providing a queue data menu, which allows for more efficient queue monitoring by administrators.

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