# MOBILE APPLICATION DEVELOPMENT FOR CHRONIC DISEASES RECORDING OF ARMY MEMBERS

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**ABSTRACT**

Health services for army personnel play a crucial role in supporting military readiness and national defense. However, the current chronic disease data collection for army members is still conducted manually, causing inefficiencies in updating health information and hindering prompt promotive and preventive actions. This situation highlights the urgency for an integrated and accessible information system that allows health officers to monitor chronic illness cases more efficiently, especially in supporting early interventions and reducing curative and rehabilitative workloads. This research presents the development of a Mobile Device Application designed specifically for chronic disease data recording among army members, implemented in the Brawijaya Military Regional Health Unit (Kesdam V Brawijaya). The application, which is an expansion of the previously developed RAPI (Realtime Accountable Professional Integrative) system, utilizes Progressive Web App (PWA) technology to ensure accessibility and flexibility for users. The development followed the System Development Life Cycle (SDLC) methodology, with features tailored to stakeholder requirements, such as data grouping, diagnosis tracking, check-up history, and real-time reporting. The testing phase showed valid results for all system functionalities and confirmed compatibility across various smartphone types. The application successfully met all functional specifications and user needs, enabling faster access to health data, supporting preventive action planning, and reducing delays in chronic disease treatment monitoring. In conclusion, this application offers an effective, user-friendly, and scalable solution to improve health service delivery and chronic disease management for military personnel.

**Keyword :** *Mobile Application, Software Engineering, Progressive Web App, Chronic Disease*

## 1. INTRODUCTION

Health is a human right and one element of welfare that must be realized in accordance with the ideals of the Indonesian nation as intended in Pancasila and the 1945 Constitution of the Republic of Indonesia. Every activity is an effort to maintain and improve the highest level of public health. implemented based on non-discriminatory, participatory, and sustainable principles in the context of forming Indonesia's human resources, as well as increasing the nation's resilience and competitiveness for national development. Health technology is any form of tool and/or method intended to help diagnose, prevent, and treat human health problems [1].

Members of the TNI army, civil servants of the Ministry of Defense, and their family members receive health services as stated in Presidential Regulation Number 12 of 2013 concerning Health Insurance. The health services guaranteed by BPJS Health to members of the TNI army and Civil Servants of the Ministry of Defense and their family members are individual health services, including promotive, preventive, curative, and rehabilitative services including drug services and consumable medical materials in accordance with necessary medical needs [2].

TNI army members, Ministry of Defense civil servants, and their families who are treated in health facilities outside the Ministry of Defense and army health facilities must report to their units. Reporting as intended is to obtain information on the patient's health status for the purposes of unit health data which is reported in stages to the higher unit [3]. The Ministry of Defense and army health units can request medical data on members of the TNI and civil servants of the Ministry of Defense and their families who are treated in health facilities outside the Ministry of Defense and TNI, in accordance with applicable regulations [2].

Currently, data collection on members' chronic diseases is carried out periodically, but using manual methods, and the data is often not updated properly. Therefore, a mechanism is needed that makes it easier to collect data and access information so that promotive and preventive actions to maintain the health of members who have chronic diseases can be carried out. It is hoped that mobile device applications can be a solution for easy input of data and access to information because operations can be carried out anytime and anywhere with internet access [4].

The Android-based Prolanis application [4] has previously been proven to be able to facilitate the performance of community health center personnel as those responsible for the program in monitoring the health of Prolanis participants, managing patient medical results data, patient examination history and real-time activity schedules. It is also hoped that it will become a forum for education regarding diseases related to Prolanis which can minimize the delivery of wrong information to patients.

The invention takes the form of developing the RAPI application system: Regional Military Health Database for Health Services Section (YANKES). The proposed invention is intended to provide promotive and preventive efforts for the health of army members in the Brawijaya Military District V area. Furthermore, the proposed invention is more specific to the health services section, especially in the field of data collection on chronic diseases that are suspected to be the cause of sudden death of members.

There are three aspects that can determine the success of the implementation of periodic health examinations. These aspects include the implementation aspect, the awareness aspect, and the facilities and infrastructure aspect [5]. There is a hope that the results of this invention can provide benefits to the main stakeholders, in this case the Kesdam V Brawijaya, because it can practically and efficiently solve the problems of updating members' chronic disease data which is currently still done manually so that This is very difficult when immediate information is needed for promotive and preventive services in military area health.

## 2. LITERATURE REVIEW

### 2.1. Chronic Disease

Chronic diseases are persistent conditions that can lead to disability in affected individuals. The recovery process for these diseases requires long-term care. Statistically, the majority of older adult's experience one or more chronic diseases. Data indicate that 62% of individuals aged 65 years and older have at least two or more chronic conditions. The risk of chronic disease in older adults increases as bodily functions decline due to the aging process. Additionally, unhealthy lifestyle factors, such as smoking, alcohol consumption, and an unbalanced diet, also contribute to the increased risk of chronic diseases [6].

The number of older adults with chronic diseases in Indonesia is relatively high. Approximately 28.53% of individuals aged 60–69 years report health complaints related to chronic diseases, with the percentage increasing with age. Chronic diseases not only affect physical health but can also impact the psychological well-being of older adults, one of which is anxiety. Anxiety is a feeling of insecurity and perceived threat toward a particular condition or situation. In the context of chronic diseases, anxiety may arise due to the life-threatening nature of these conditions. Additionally, uncertainty in the healing process, as the progression of chronic diseases is difficult to predict, further exacerbates anxiety among older adults suffering from chronic illnesses [7].

Ineffective health management issues can be addressed through nursing management by implementing the nursing care method, which consists of assessment, diagnosis, intervention, implementation, and evaluation. One of the interventions that can be applied in health management is decision-making support. This intervention involves a structured plan that provides information and support to individuals in making health-related decisions. Decision-making support includes various types of interventions, such as observational interventions, therapeutic interventions, educational interventions, and collaborative interventions involving multiple relevant parties [8].

### 2.2. Progressive Web App (PWA)

A Progressive Web Application (PWA) functions similarly to a native or traditional application, as it is designed within an equivalent navigation, interaction environment, and user interface. The fundamental distinction between these technologies lies in the fact that PWAs do not require installation from application stores like Google Play or the App Store. Instead, they operate directly within the device's browser. PWAs are regarded as an advancement of applications built using HTML5, incorporating Service Workers, which enable seamless execution of services within the browser while running in the background. [9][10]. Progressive Web Applications (PWAs) can function even without an internet connection. These applications leverage modern web technologies and APIs to enhance mobile web experiences. Key technologies include Service Workers, which operate in the background to enable functionalities independent of a web page or user interaction, and Web Application Manifests, JSON files that define metadata such as application names, colors, and icons for differentiation. By utilizing these features, PWAs can integrate capabilities traditionally exclusive to native applications, such as offline access, push notifications, and an application launcher icon [11]. An illustration of Progressive Web App (PWA) can be seen in Figure 1.

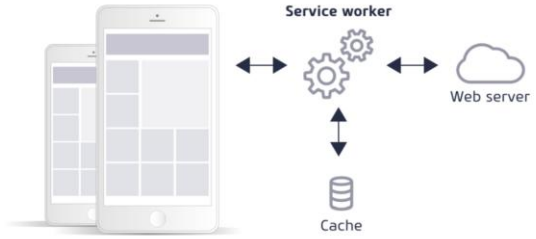


Figure 1. Illustration of Progressive Web App (PWA)

## 3. RESEARCH METHOD

Research and development in health science and technology is aimed at producing health information, technology, technology products, and health information technology (IT) to support health development. The development of technology, technology products, information technology (IT),

and Health Information is carried out in accordance with the provisions of intellectual property rights (IPR). For research on new emerging or re-emerging infectious diseases that can cause health concerns and public health emergencies (PHEIC), benefit sharing and re-tracing of their origins must be considered (tracking system) in the national interest [2][4].

The object of this research is the Mobile Device Application for Data Collection on Chronic Diseases of Members in the ranks of Kesdam V Brawijaya. This research uses the System Development Life Cycle (SDLC) method in developing information systems [12]. Furthermore, data was obtained from interviews, observations, and literature and document reviews. The research procedure process is depicted in Figure 2.

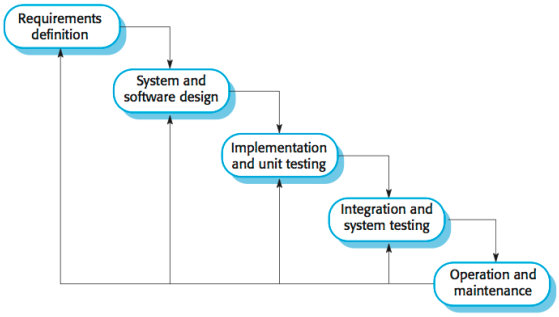


Figure 2. Software Development Life Cycle (SDLC)

Mobile Apps or mobile applications are applications that can run on a smart device (smartphone). Mobile applications can help users connect to the internet network and make it easier for users to use internet applications on the devices they use. Mobile applications are a collection of programs that users can use to carry out a function or activity. Mobile applications can be run on devices carried by users even if the user moves from place to place and tends to be small in size [13].

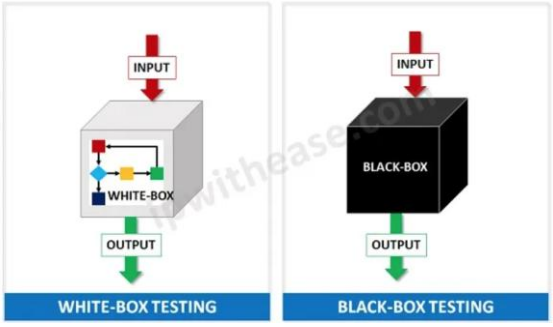


Figure 3. Illustration of whitebox testing and blackbox testing

The application developed will later be tested using the Blackbox Testing methods. While whitebox testing is a detailed investigation of the internal logic and structure of the code and tester needs to have full knowledge of the source code, blackbox testing is a testing technique without having any knowledge of the internal workings of the application. It only examines the fundamental aspects of the system and has no or little relevance to the internal logical structure of the system [14]. An illustration of difference between Whitebox Testing and Blackbox Testing can be seen in Figure 3.

## 4. RESULT AND DISCUSSION

### 4.1. Requirement Analysis

The development of mobile device application for chronic diseases recording underscore the need for a meticulous approach in identifying and articulating the specific requirements of mobile applications. As such, the following Table 1 delineates a comprehensive set of requirements, each meticulously crafted to align with contemporary standards and expectations in mobile app development. These requirements encompass a spectrum of essential elements, ranging the functional criteria specifications.

Table 1. Requirements Specification

| Req. ID | Requirement Detail |
|---|---|
| Req. 01 | The system must be able to authenticate users based on email and password. |
| Req. 02 | The system must be able to store data on personnel who have chronic/long-term illnesses. |
| Req. 03 | The system must be able to group personnel data based on work units to make management and monitoring easier. |
| Req. 04 | The system must be able to search for personnel data based on name as a search keyword. |
| Req. 05 | The system must be able to display a list of personnel along with information on the number of diagnoses and the date of the last check/control. |
| Req. 06 | The system must be able to display indicators of sick personnel who are late in carrying out controls/checks. |
| Req. 07 | The system must be able to add diagnoses of chronic diseases to member data, both new and existing (additional diagnoses). |
| Req. 08 | The system must be able to add check/control history to member data. |
| Req. 09 | The system must be able to deactivate data on personnel who die or retire or move. |
| Req. 10 | The system must be able to display information on the chronic diseases most commonly suffered by members. |
| Req. 11 | The system must be able to display information on chronic diseases that most often cause member deaths. |
| Req. 12 | The system must be able to provide report data that can be downloaded in Excel form for further data processing. |

### 4.2. User Interface

In the preceding discussions, we meticulously outlined the requirement specifications essential for our project. Now, we transition into the tangible realization of these specifications through the development of the mobile application interface. This interface is not just a visual and interactive representation of our ideas but a carefully crafted user experience that adheres to the detailed requirements previously established. Each element of the interface, from the layout to the functionality, has been designed to align seamlessly with our specified objectives. By focusing on user-centric design principles and technical precision, the interface serves as a bridge, turning abstract requirements into a concrete, user-friendly mobile application. This step is crucial as it brings our conceptual framework to life, offering a tangible solution that users can navigate and experience firsthand.

The mobile application login interface satisfies the parameters specified in requirement ID req.01. After successfully logging in using email as username and secured password, the user is brought to the main menu page, which offers module symbols or features that the user can select based on their access rights. Administrator level user has access to menu for managing user access as illustrated in Figure 4.

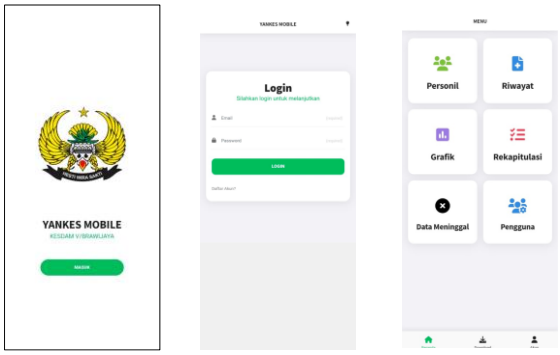


Figure 4. Login and main menu

Requirements ID req.02 and req.03 oblige the program to be able to arrange data based on personnel units in order to facilitate data monitoring. As shown in Figure 5, the grouping is given in the form of a dropdown menu containing the names of the units under Kesdam V Brawijaya, allowing application users to select which units they want to access data. There are 101 units registered in the database to classify members of the V Brawijaya District Health Ministry who have chronic illnesses and need to be monitored

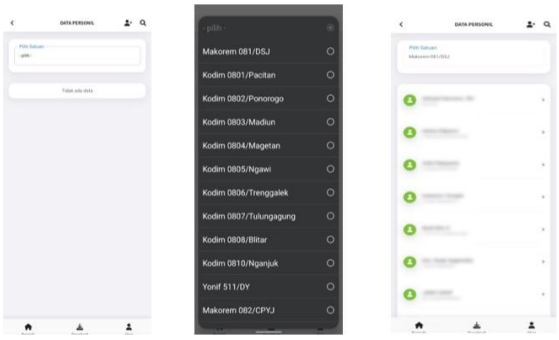


Figure 5. Personnel data grouping menu

Detailed personnel data can be viewed by application users by clicking on one of the names from the list of names displayed after selecting a unit. Searching for data using names (ID req.04) and adding new personnel data (ID req.05) can be accessed via the icon in the top right corner of the screen. The data displayed is NRP for military members, or NIP for civil servants, or NIK for families, full name, place and date of birth, military rank, job title, telephone number and address as presented in Figure 6.

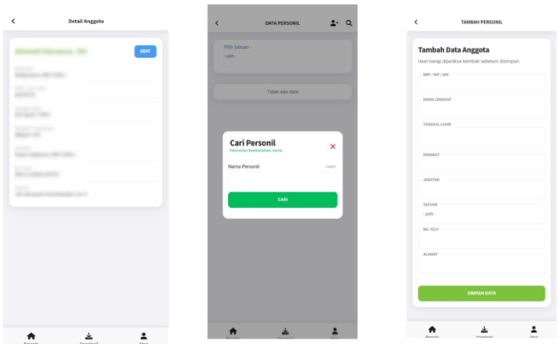


Figure 6. Personnel data search and addition menu

As shown in Figure 7, red colored date is used as indicator of sick personnel who are late in carrying out medical controls/checks to fulfill requirement ID req.06, while lateness is defined as the last check date being more than one month ago. Additional diagnostic result or disease history data and control or medical check-up data can be added by clicking the add data buttons which will appear after one of the personnel's names is clicked. This feature fulfills the requirements ID req.07 and req.08. Data deactivation can be done by operators or administrators by selecting the delete button (a trash basket icon) when viewing detailed personnel data. The reason for deactivating data can be chosen because the person concerned died, retired, or was transferred to another military area.

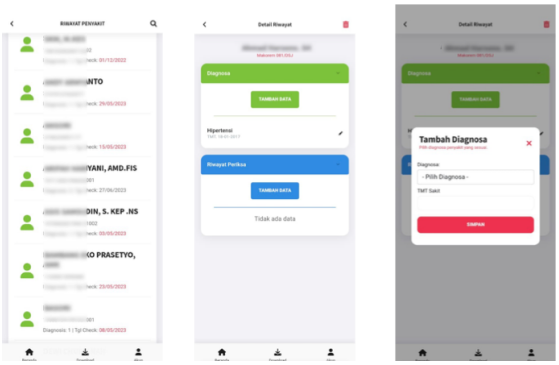


Figure 7. Personnel diagnose and medical check history

Features to fulfill requirement of ID req. 10, about displaying information on the chronic diseases most commonly suffered by members has been fulfilled by the system through display in graphical form. While ID req 11, for showing information on the chronic diseases most commonly suffered by members are shown presented in the form of a grouped list which has been sorted. As shown in Figure 8, report data also can be downloaded by users that have administrator access for further data processing purposes.

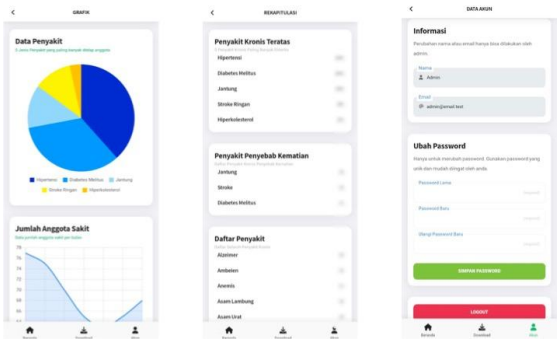


Figure 8. Data Recapitulation and Download

### 4.3. Testing

Mobile application testing is carried out by creating a number of test cases according to the list of requirements described in table 1. As shown in Table 2, the results of the testing process are presented based on the expected output if the application module or feature is used. Valid test results show that the output and input are appropriate and are considered to meet the needs that have been previously defined.

Table 2. Blackbox testing results

| Requirement | Input | Desired Output | Result |
|---|---|---|---|
| Req. 01 | Email and password | Login successfully if the email and password are correct and displays an error message if the email and password are incorrect | Valid |
| Req. 02 | Detailed personnel data | Successfully saved to database | Valid |
| Req. 03 | Click Work Unit Options | List of personnel/members who have chronic/chronic illnesses in the work unit | Valid |
| Req. 04 | Member Name (partial or full) | List of personnel whose names match the search keywords | Valid |
| Req. 05 | Click Work Unit Options | List of personnel with information on number of diagnoses and last date | Valid |
| Req. 06 | Work Click Unit Options | List of personnel with dates in red for last check date > 2 months | Valid |
| Req. 07 | Enter the disease data options in the detailed personnel data | Stored in the database in the name of the selected personnel | Valid |
| Req. 08 | Input check/control data | Stored in the database in the name of the selected personnel | Valid |
| Req. 09 | Choice of reason for data deactivation (died / moved / retired) | Personnel data does not appear in search (disabled) | Valid |
| Req. 10 | Click the Recapitulation menu | Display a list of recapitulation of disease names sorted by number of sufferers | Valid |
| Req. 11 | Click the Recapitulation menu | Display a list of recapitulation of disease names sorted by the number of sufferers who died | Valid |
| Req. 12 | Click the Download Menu | Data recapitulation Excel file | Valid |

The problem that often occurs with mobile applications is related to the compatibility of the application with various types of smartphone devices that are widely available in society. Therefore, to ensure that the application can be used properly by users, testing has also been carried out on several types of smartphones with different brands and types as well as different specifications. The results obtained as shown in Table 3 were quite satisfactory, namely that the application ran well on all the devices we used for testing.

Table 3. Compatibility Testing Result

| No | Smartphone Type and Specification | Result |
|---|---|---|
| 1 | Nokia 5.3 (Android 10; Qualcomm Snapdragon 665; RAM 6 GB) | Running well |
| 2 | Lenovo S4 (Android 8; Qualcomm Snapdragon 625; RAM 4 GB) | Running well |
| 3 | Xiaomi Redmi 10 (Android 11; Mediatek Helio G88; RAM 4 GB) | Running well |
| 4 | Samsung S20 FE (Android 11; Exynos 990; RAM 8 GB) | Running well |
| 5 | Samsung A52 (Android 11; Qualcomm Snapdragon 720G; RAM 8 GB) | Running well |
| 6 | Xiaomi Redmi Note 8 (Android 10; Qualcomm Snapdragon 665; RAM 4 GB) | Running well |
| 7 | Xiaomi Redmi S2 (Android 8; Qualcomm Snapdragon 625; RAM 3 GB) | Running well |
| 8 | Vivo Y75 (Android 11; MediaTek Dimensity 700; RAM 8 GB) | Running well |
| 9 | Samsung A33 (Android 12; Exynos 1280; RAM 8 GB) | Running well |

## 5. CONCLUSION

The development and implementation of a mobile application for chronic disease data recording among army members represent a significant advancement in health informatics within military healthcare services. The research successfully demonstrated that integrating a Progressive Web Application (PWA) into the health data management system substantially improves the efficiency, accuracy, and timeliness of chronic disease monitoring in the military environment. The system, developed through a structured System Development Life Cycle (SDLC) approach, met all predefined functional and user requirements, as evidenced by the blackbox testing results showing 100% validity across all modules and compatibility across various smartphone devices. Future research can quantitatively assess how the use of the application affects health outcomes, such as reduced complications, earlier treatment of chronic diseases, or improved follow-up adherence. Additionally, studies could measure time and cost efficiency improvements within the health unit.

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