

Design of the 'Sehat Bareng' Information System for Early Digital-Based Screening of Hypertension and Diabetes



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ABSTRACT

Hypertension and diabetes are two non-communicable diseases with high prevalence in Indonesia; however, community practices for monitoring and early detection remain low. This study aims to design a self-screening system called "Sehat Bareng" as a tool to help identify health risks early and increase health awareness. The study employed a system design approach using the System Development Life Cycle (SDLC) stages, starting with a user needs survey, process flow modeling, and interface development. The survey was conducted with 10 adult respondents who had experience using digital devices. Survey results showed that most respondents had not been regularly checking their blood pressure or blood sugar levels. The designed system provides a simple screening workflow, automatic risk assessment, and educational feedback. Interface evaluation indicated that the system is easy to understand, although adjustments are needed for text size and readability on mobile displays. This study contributes an initial design of a community-based screening system that can support promotive and preventive efforts in controlling non-communicable diseases. The system has the potential for further development for implementation in larger populations.

Keywords:

Health information system
Self-screening
Hypertension
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INTRODUCTION

Hypertension and diabetes mellitus are two non-communicable diseases (NCDs) that contribute significantly to increased morbidity and mortality in Indonesia. The IDF Diabetes Atlas reports that Indonesia ranks fifth in the world in terms of the number of people living with diabetes, and its prevalence continues to rise, especially among the productive age group (Magliano DJ, 2021). National surveys indicate a gap in hypertension diagnosis in Indonesia—many individuals have elevated blood pressure based on measurements but have not yet been diagnosed by a physician. Furthermore, data show that hypertension control and routine monitoring remain low. This condition indicates that early detection of NCDs in the community is still limited (Kemenkes BKPK, 2024; Oktamianti et al., 2023).

Early detection of hypertension and diabetes in formal healthcare services in Indonesia faces structural challenges: limited and unevenly distributed healthcare personnel, unequal geographic access, especially outside urban areas, and workload and operational processes at primary care facilities that hinder consistent screening (Widyaningsih et al., 2022; Wulandari et al., 2022). Therefore, an approach is needed that enables communities to perform self-



screening easily and sustainably. Several studies from 2020-2025 show that mobile health (m-health) interventions can strengthen blood pressure monitoring and diabetes control through targeted education in apps, automatic reminders, and data-based feedback, resulting in improved self-monitoring adherence, better blood pressure control, and reduced HbA1c compared to standard care (Kerr et al., 2024; Gerber et al., 2023; Miao et al., 2024; Tam et al., 2021).

However, some studies indicate that mobile health applications face sustainability challenges: designs often do not consider users' needs and contexts, leading to perceptions of irrelevance, difficulty understanding features, or discontinuation of use over time (Drabarek et al., 2025; An et al., 2023). This underscores that system design must be user-oriented from the early development stage. A user-centered design approach has been shown to improve acceptability and usability of health applications, including for hypertension management.

Based on this background, this study designs the "Sehat Bareng" Information System, a self-screening system for detecting hypertension and diabetes risk, equipped with health education features and medication reminders. The system is developed using the System Development Life Cycle (SDLC) approach, focusing on formulating user requirements, modeling system processes, and designing a simple, informative, and easy-to-use interface.

The aim of this study is to produce a digital screening system design that can support community-based early detection of NCDs and serve as the foundation for further system implementation.

METHODS

Participant Characteristics and Research Design

This study employed a system design approach, beginning with a user needs survey, followed by system development using the System Development Life Cycle (SDLC) approach. The survey was conducted among the general population meeting the following criteria: age ≥ 18 years, able to read and use digital devices (smartphone or laptop), and willing to provide consent to participate. Respondents with a history of complex medical diagnoses requiring intensive monitoring in healthcare facilities were excluded, as the system focuses on self-screening in the community.

Most respondents were young adults (age range 19-24 years) with a student background. These characteristics are relevant to the early development stage, aiming to understand user perceptions and readiness to use digital systems among groups familiar with technology and representing potential early users of mobile health applications.

Sampling Procedures

Sampling was conducted using accidental sampling, selecting respondents who met the criteria and voluntarily completed the questionnaire. Data collection was carried out online via digital forms distributed through social media and student communication networks. The process did not involve sensitive personal data, and respondent confidentiality was ensured. The study followed ethical principles for non-interventional research, with participation being voluntary and respondents free to withdraw at any time.

Sample Size, Power, and Precision

The user needs survey involved 10 respondents, determined based on the objectives of the formative design stage, which aimed to identify needs, usability issues, and feature preferences. This number aligns with early design evaluation approaches, where 5-12 respondents are considered sufficient to identify key patterns of needs and usability issues before further system development at a larger trial scale. No power analysis was conducted, as the study did not aim to test relationships between variables but to develop system design specifications.

Measures and Instruments

Data collection instruments included a user needs survey questionnaire and a prototype interface evaluation guide. The survey questionnaire covered respondents' knowledge of hypertension and diabetes risk factors, preventive behaviors (e.g., diet and physical activity), and attitudes toward using digital media for health monitoring. Additionally, the system interface prototype of "Sehat Bareng" was evaluated through structured short interviews to gather feedback on color selection comfort, icon clarity, navigation ease, and readability on mobile devices. This approach allowed direct identification of user needs, which informed system design.

Data Analysis

Collected data were analyzed descriptively to describe respondent characteristics and patterns of knowledge, behavior, and attitudes related to NCD prevention. Interface evaluation results were summarized to capture user feedback on usability, navigation flow, and feature clarity, identifying aspects that were satisfactory and those needing improvement. These findings were then used to define functional and non-functional system requirements and guide the simplification of user workflows, visualized through Context Diagrams and Level 0 DFDs. The analysis supported the design process rather than inferential statistical testing, as the focus was on system design and early validation of user experience.

RESULTS AND DISCUSSION

Respondent Characteristics

A total of 10 respondents participated in the user needs survey. The majority of respondents were aged 19-21 years and were students. These characteristics align with the early design phase, where users with experience using digital devices can provide initial input regarding system needs and usability. In addition, most respondents reported that they had not been regularly checking their blood pressure or blood sugar levels, highlighting the relevance of implementing a digital screening system as a self-monitoring tool.

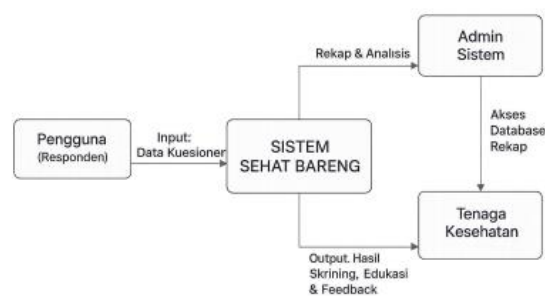
These findings indicate that even among young adults, regular self-health monitoring habits are lacking, suggesting that digital application-based interventions can serve as a relevant promotive strategy.

Tabel 1. Respondent Characteristics

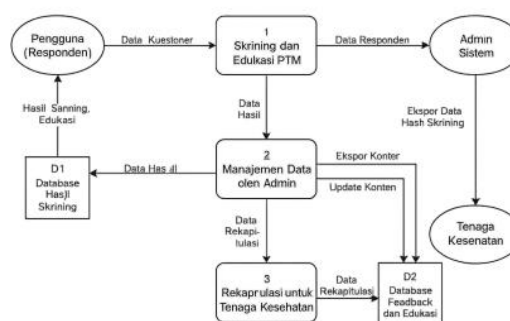
Characteristics	Details (n=10)
Age	19 years (20%) 20 years (50%) 21 years (30%)
Gender	Female (60%), Male (40%)
Status	Student (80%)
Medical Examination History	Not routine (70%)

System Design Results

Based on the needs analysis, a system workflow was developed and represented using a Context Diagram and Level 0 DFD. The system receives input in the form of user questionnaire data, processes scores for hypertension and diabetes risk, presents results as risk categories (low, medium, high), and provides educational recommendations and health behavior reminders.

**Figure 1. Context Diagram**

At this level, the system functions as an intermediary between users, administrators, and healthcare professionals. Users enter their personal data and complete the screening questionnaire, after which the system processes this information into outputs, including screening results and educational recommendations. Administrators manage the database and update educational content, while healthcare professionals are involved only when follow-up or referrals are needed. This relational structure reflects the system's orientation toward self-use while still allowing integration with healthcare services if required.

**Figure 2. DFD Level 0 (brief description)**

The system processes are further detailed in the Level 0 DFD, which shows that the core workflow consists of four main steps: completing the questionnaire, processing risk scores, presenting results, and storing data for monitoring purposes. This process mapping approach follows the principle of designing a simple and easily understandable system, ensuring that the user workflow is not burdensome. This is important, as several previous studies have found that health applications are often abandoned if the workflow is too complex or does not provide clear feedback to users (Giebel et al., 2024; Galavi, Montazeri, et al., 2024).

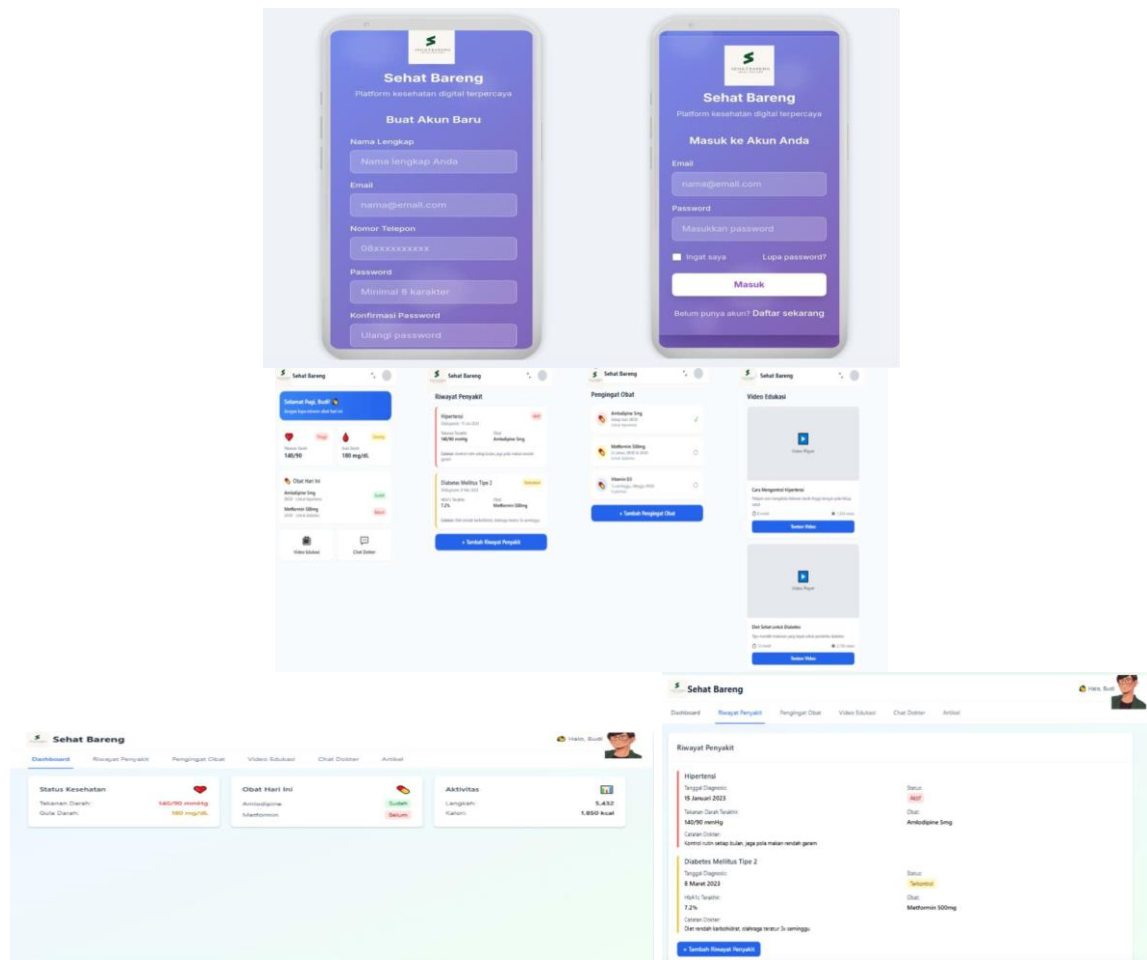


Figure 3. User Interface

The interface prototype was then tested with the same respondents through a simple evaluation regarding appearance and ease of use. Most respondents reported that the menu navigation was easy to understand, the icons were sufficiently representative, and the workflow felt logical, particularly for the examination history and medication reminder features. However, feedback suggested improving color contrast and text size on the mobile display to enhance comfort for users with smaller screens. Recommendations regarding color contrast and text size align with m-health design guidelines emphasizing readability, clear visual hierarchy, and interface responsiveness across different screen sizes (Shin et al., 2024; Galavi, Norouzi, et al., 2024).

The system design results and feedback indicate that app-based self-screening has the potential to strengthen awareness and preventive actions for hypertension and diabetes. The

“Sehat Bareng” system not only facilitates risk questionnaire completion but also emphasizes education and continuous monitoring through medication reminders and easily understandable health information. This approach is consistent with findings from Kerr et al. (2024), Gerber et al. (2023), and Miao et al. (2024), which demonstrate that structured digital support can enhance adherence to self-monitoring and improve blood pressure and blood glucose control.

Overall, this study confirms that the success of a digital screening system is determined not only by the accuracy of risk calculation but also by the extent to which the system is accepted, understood, and used sustainably by users. Therefore, interface improvements and further testing with more diverse population groups are necessary next steps to ensure system readiness before large-scale implementation.

CONCLUSIONS

This study successfully designed the “Sehat Bareng” self-screening system to detect risks of hypertension and diabetes using the System Development Life Cycle (SDLC) approach. Survey results indicated that users have access to and the ability to use digital devices, but are not yet accustomed to routine health monitoring. The developed system provides a simple screening workflow, clear risk assessment results, and educational and reminder features that support self-monitoring. Interface evaluation showed that the system is easy to understand, although all respondents suggested improvements to readability on mobile displays. These findings demonstrate that a digital screening system can contribute as a supportive tool for increasing awareness and community-based early detection of non-communicable diseases (NCDs). Further development is recommended to involve a larger and more diverse user group to obtain a more comprehensive understanding of user needs. In addition, interface design refinement is needed to make it more inclusive for users with varying levels of digital literacy. Integration of the system with primary healthcare services or national health platforms is also recommended to ensure continued use of the system for preventive actions and sustainable clinical follow-up.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

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