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Information Technology Innovation with Tricky Card Game for Prevention and Handling Hypertension and Diabetes Mellitus to Improve the Quality of Healthy Life of the Elderly in Tilongkabila Public Health Center

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ORIGINAL ARTICLES

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ABSTRACT

Hypertension and diabetes mellitus (DM) are degenerative diseases that are often suffered by the elderly. Efforts made in the form of an information technology innovation application based on a WhatsApp bot with a tricky card game. The purpose of this study is to examine the design and implementation of information technology innovation, specifically the WhatsApp bot Gopos Health, which incorporates a challenging card game for the prevention and treatment of hypertension and diabetes mellitus, aiming to improve the quality of life for the elderly at the Tilongkabila Community Health Center. The method used in this study is a mixed method with the type of research used is sequential transformation (sequential transformative strategy). where researchers design information technology innovation with a qualitative approach, then the results of implementation and testing are obtained using a quantitative approach. The quantitative component was measured in the form of a questionnaire sheet, MO SF-12, using a paired t-test to test the effectiveness of a treatment and compare the average pre-test value and the average post-test value. The results of this study state that elderly people with hypertension and diabetes mellitus who have measured their quality of healthy life through the MO SF-12 questionnaire obtained statistical test results stating that the hypothesis H_a is accepted and H_0 is rejected ($P<0.05$), namely that there is an influence of the application of information technology innovation for the prevention and treatment of hypertension and diabetes mellitus in an effort to improve the quality of healthy life of the elderly.

Key Messages:

- The implementation of a WhatsApp-based Gopos Kesehatan bot significantly improves screening, education, and management of hypertension and diabetes mellitus among the elderly, leading to better health outcomes.
- The use of innovative educational tools, such as tricky card games, in conjunction with the WhatsApp bot enhances elderly patients' knowledge, attitudes, and study highlights the novelty of integrating accessible, low-cost technology like WhatsApp for chronic disease prevention

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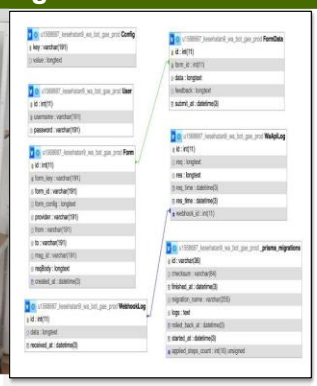
GRAPHICAL ABSTRACT

Information Technology Innovation With Tricky Card Game For Prevention And Handling Hypertension and Diabetes Mellitus In An Effort to Improve the Quality Of Healthy Life Of the Elderly in Tilongkabila Public Health Center

A smartphone displaying the "Gopos Kesehatan" WhatsApp bot interface, with chat bubbles indicating interaction.

Petugas Puskesmas (health workers) and Lansia (elderly) to the smartphone, representing data input and user interaction.



Data input → Server & API (Meta) → Database (secure, relational) → Results & Feedback

Icons of a tricky card game and screening questionnaires linked to the system, illustrating education and screening activities

INTRODUCTION

In Indonesia, the total number of elderly people has doubled compared to the previous period. In 2021, the percentage was recorded at 10.82%, equivalent to approximately 29.3 million individuals. This indicates that Indonesia has entered the stage of an aging population structure, marked by the proportion of people aged 60 and over reaching 10% of the total population (1)

The continuous increase in the elderly population will potentially exacerbate health problems caused by the decline in organ function due to disrupted homeostasis mechanisms. This phenomenon is also known as the aging process, which involves numerous changes in the elderly body, such as psychological adjustments, social shifts, and a decline in bodily functions (2). Degenerative diseases such as diabetes mellitus and hypertension are commonly experienced by the elderly.

Each year, cases of hypertension and diabetes mellitus continue to rise (3). Globally, by 2025, the number of individuals with hypertension is projected to increase by approximately 15–20%, reaching 1.5 billion people. Meanwhile, according to data from the International Diabetes Federation in 2019, the global prevalence of diabetes mellitus was 9.3%, or around 463 million people. This number is expected to rise to 578 million by 2030 and further increase to 700 million by 2045 (4).

According to the Indonesian Health Survey report, the prevalence of hypertension in Indonesia is 8.0%, affecting approximately 598,983 individuals. The highest prevalence rates are found in DKI Jakarta (12.6%), Yogyakarta (12.3%), and North Sulawesi (12.1%), while Gorontalo records a prevalence of 8.2%, or around 2,636 individuals. The prevalence of diabetes mellitus in Indonesia is 1.7%, or about 877,531 individuals, with the highest rates in DKI Jakarta (3.1%), Yogyakarta (2.9%), and East Kalimantan (2.3%). In Gorontalo Province, the prevalence is 1.7%, affecting around 3,821 individuals (5).

According to the Gorontalo Provincial Health Office, the number of individuals screened for hypertension was 7,117 (14%) in 2022, 85,708 (14%) in 2023, and 33,615 (12%) in 2024. Meanwhile, the prevalence of diabetes mellitus was 2,384 (6%) in 2022, 23,950 (5%) in 2023, and 10,735 (4%) in 2024. The highest prevalence of hypertension was found in Bone Bolango Regency, with rates of 32% in 2022, 31% in 2023, and 22% in 2024. Similarly, Bone Bolango Regency recorded one of the highest diabetes mellitus prevalence rates, with 10% in 2022, 6% in 2023, and 6% in 2024 (6).

Various promotive and preventive efforts are being implemented to prevent and control hypertension and diabetes mellitus, with the aim of improving the quality of healthy living among the elderly. According to the Indonesian Ministry of Health, promotive and preventive measures include

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strengthening information, education, and communication (IEC) through the CERDIK behavior approach, which aims to raise public awareness about regularly monitoring blood pressure and blood sugar levels, reducing the burden on early-stage medical services, providing protection services through integrated non-communicable disease (NCD) services, and empowering communities through Posbindu (Integrated Health Post) for early screening and risk factor control. These efforts are expected to encourage healthier lifestyle behaviors and help prevent and control NCDs (7).

With the advancement of information technology, health screening and education are no longer limited to gathering patients in one physical location. Instead, they can be carried out through innovative information technology solutions, making the process more effective and efficient. A study by (8) developed information technology applications based on websites and Android platforms, such as the National Health Insurance mobile program and the Indonesia Health Card. In addition, systems like mobile health (mHealth) have been implemented in various countries (9). Both applications have proven effective in improving blood pressure control in hypertensive patients and glycemic index control in diabetes mellitus patients.

Another information technology innovation that can be applied for screening and health education related to the prevention and management of hypertension and diabetes mellitus is a WhatsApp bot–based application. By using a WhatsApp bot, it is possible to collect data on blood pressure and blood sugar test results, as well as symptoms experienced by patients. Furthermore, integrating the WhatsApp bot with health education using a tricky card game can enhance knowledge about the prevention and management of hypertension and diabetes mellitus. This approach is expected to improve adherence to a healthy lifestyle and enhance the quality of life among the elderly.

Based on a preliminary study, the working area of Tilongkabila Public Health Center consists of eight villages. Among them, Bongoime Village has the highest number of elderly individuals suffering from hypertension and diabetes mellitus. Therefore, the pilot implementation of the WhatsApp bot–based application combined with the tricky card game was carried out in this village. According to an interview with the coordinator of the non-communicable disease (NCD) control program at Tilongkabila Health Center, Bone Bolango Regency has a program called Pandu Patuh aimed at controlling NCDs. This program includes activities similar to posyandu (integrated health service posts), but with the distinction that Pandu Patuh serves all patients regardless of their health insurance status.

The program involves screening and health education, which so far has only been conducted through lectures and discussions, without utilizing information technology innovations such as WhatsApp bot–based applications or tricky card games. Tricky Card game is an educational game designed to increase public understanding and awareness of chronic diseases, such as hypertension and diabetes, through interactive methods (10). The educational goal of this card game is to increase knowledge in preventing hypertension and diabetes in the elderly (11).

This gap highlights the potential for research on the application of IT-based innovations to support the prevention and management of hypertension and diabetes mellitus, with the aim of improving the healthy living standards of the elderly at Tilongkabila Health Center. The objective of this study is to explore the design and implementation of the GoPos Kesehatan information technology innovation, integrated with a tricky card game, for the prevention and management of hypertension and diabetes mellitus in an effort to improve the quality of healthy living among the elderly at Tilongkabila Health Center.

METHODS

Study employs a mixed-method approach, which combines both quantitative and qualitative research methods. This research was conducted in the working area of Tilongkabila Public Health Center. The study took place from June to November 2024. type of research used in this study is the sequential transformative strategy, in which the researcher conducts the collection and analysis of both quantitative and qualitative data separately. The qualitative approach is applied during the design phase of the information technology innovation. Meanwhile, the quantitative approach is used to assess participants' knowledge and compliance levels before and after the health education intervention using the tricky card game.

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The population of this study consists of all elderly individuals in the working area of Tilongkabila Public Health Center. The sample includes all elderly residents of Bongoime Village who participated in the screening through the WhatsApp bot application. From this group, 30 elderly individuals with hypertension and 30 with diabetes mellitus were selected based on the screening results and adjusted according to inclusion and exclusion criteria. The sampling technique used in this study was multi-stage sampling.

Tricky Card game is an educational tool designed to increase understanding of hypertension and diabetes mellitus through interactive and engaging methods. Each card contains important information related to these chronic diseases, such as risk factors, symptoms, prevention, and management. This educational content includes providing information about hypertension, educational and engaging games, and providing a healthy lifestyle guidebook for seniors with hypertension. The goal is to stimulate physical and cognitive abilities, and improve the knowledge and attitudes of seniors regarding preventing hypertension and diabetes (12).

The game's rules require seniors to guess the information on the cards, followed by a brief discussion to clarify and deepen understanding. Game sessions are typically conducted in groups, facilitated by an educator or healthcare professional, who guides the game, ensures correct understanding, and opens the discussion session.

Before starting the game, the seniors with hypertension are given an explanation of how to play, as follows:

1. There are four players.
2. The cards are shuffled by the group facilitator.
3. The cards are dealt to each player, each receiving four cards.
4. The first, second, third, and fourth players are determined.
5. The first player guesses one of the cards, based on the sub-theme determined by the first player.
6. If the card is correctly guessed, it becomes the property of the guesser (the first player). Before the card is given to the first player, the sub-theme on the card is explained by the player whose card was correctly guessed. This increases knowledge and hopefully encourages the elderly with hypertension to demonstrate compliant attitudes and behaviors by adopting a healthy lifestyle to prevent, control, and treat hypertension and diabetes.
7. If the card is guessed incorrectly, the guesser must draw a card from the pile provided.
8. When one of the players has collected four cards that have the same sub-theme and has collected two of the same theme, then that player is declared the winner.

The educational message in this trick card game is to provide information about hypertension and diabetes, starting with recognizing the signs and symptoms, then prevention, age-related risk factors, control through regular exercise, management, warning signs, complications, and herbal therapies for hypertension and diabetes. This can improve the prevention and management of hypertension and diabetes in the elderly, thereby improving their quality of life and improving their health.

For replication, it's worth noting that this game combines entertainment with educational content, with each card designed to be informative and engaging, and foster learning among the elderly. These sessions are integrated with health education activities, often conducted simultaneously using WhatsApp bots and trick cards.

Sampling was conducted using a purposive sampling technique. The sample size was 60 respondents, consisting of 30 with hypertension and 30 with diabetes mellitus. The sampling criteria were based on the following criteria: respondents were elderly in Bongoime Village, within the Tilongkabila Community Health Center working area, and had no comorbidities.

The Medical Outcome Short Form (MO SF) questionnaire sheet measuring tool - 12 Health Survey is used to measure the quality of life regarding an individual's assessment of their ability to carry out daily activities, namely physically, psychologically, socially and environmentally, with a score of > 50% can be stated as good, while < 50% can be stated as less.

The findings of the qualitative phase are important to implement because this design was chosen to be able to design a WhatsApp bot-based application by conducting system requirements interviews, software, functional unit testing and after all the data was collected, it was then processed using univariate

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analysis to calculate the frequency distribution and percentage of each variable.

Data collection was carried out through in-depth interviews with health center staff to analyze system requirements, which served as the basis for the development and design of the application. Subsequent data collection was conducted using the WhatsApp bot application to screen elderly individuals with hypertension and diabetes mellitus. To measure the quality of life of the elderly, the Medical Outcome Short Form (MO SF)-12 Health Survey questionnaire was used. This standardized instrument does not require validity and reliability testing. The MO SF-12 is a Likert-scale questionnaire consisting of 12 items, which include both positive and negative statements.

Medical Outcome Short Form (MO SF)-12 Health Survey is an instrument tool as a measure of quality of life to reduce the burden on respondents, which consists of eight domains, the first is limitations in physical activity due to health problems, the second is social activity due to physical or emotional problems, the third is usual role activities due to physical health problems, the fourth is body pain, the fifth is general mental health, the sixth is usual role activities due to emotional problems, the seventh is Vitality, and the last is General Health Perception.

Classification was conducted based on the total quality of life scores of each elderly individual with hypertension and diabetes mellitus. Descriptive analysis was then performed to determine the minimum, maximum, mean values, and standard deviation. The data were analyzed using computerized software, specifically SPSS for Windows Version 17. The statistical test used in this study was the paired T-test.

RESULTS

This study involves the design of an information technology innovation, which includes system needs analysis, database design, and system architecture planning. The implementation stage involved unit function testing by applying the information technology innovation integrated with the tricky card game for the prevention and management of diabetes mellitus and hypertension, as part of efforts to improve the healthy quality of life among the elderly. The results of the study are as follows:

System Requirements Analysis

The system requirements review aims to understand the needs of the system to be developed. These specifications include both data and functional requirements. The data requirements were obtained from interviews with three staff members at Tilongkabila Public Health Center. The expected data outcome is that, through the use of information technology innovations, accurate data can be collected during the screening of elderly individuals with hypertension and diabetes mellitus. This would enable the identification of high-risk areas, allowing for follow-up actions in the prevention, treatment, and control of non-communicable diseases (NCDs) such as hypertension and diabetes mellitus. Health center staff also suggested including restricted fields that cannot be altered—such as age and gender. In addition, they expressed expectations that this technological innovation would enhance service delivery. The results of the interviews with the health center staff are as follows:

Respondent 1: "*My hope is that this information system can carry out accurate screenings, making it easier to map high-risk areas for elderly individuals with hypertension and diabetes mellitus, and to follow up with prevention, treatment, and control of non-communicable diseases (NCDs)*."

Respondent 2: "*My expectation for this information technology innovation is that it provides reports on non-modifiable risk factors, such as gender and age*."

Respondent 3: "*My hope for this technological innovation is that the application is user-friendly and does not require downloading large-sized apps that consume significant storage space*."

Operational requirements outline the specific steps for each role implemented to solve problems. Based on interviews with three Tilongkabila Community Health Center officers, three main themes related to information technology innovation needs were identified. First, the need for a system capable of accurate screening to facilitate the mapping of areas at risk for elderly people with hypertension and diabetes mellitus, while also supporting follow-up prevention, treatment, and control of NCDs. Second, the importance of monitoring non-modifiable risk factors, such as age and gender, to ensure that the data generated is more comprehensive. Third, the need for a user-friendly application that does not require large

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storage space, making it easily accessible to staff. The following roles are controlled by this information system: the WhatsApp bot number that will be provided to the elderly. The home menu allows you to select hypertension or diabetes mellitus, along with information related to hypertension and diabetes mellitus.

System and Software Design

Software planning begins with the preparation of a system architecture framework in the following image:

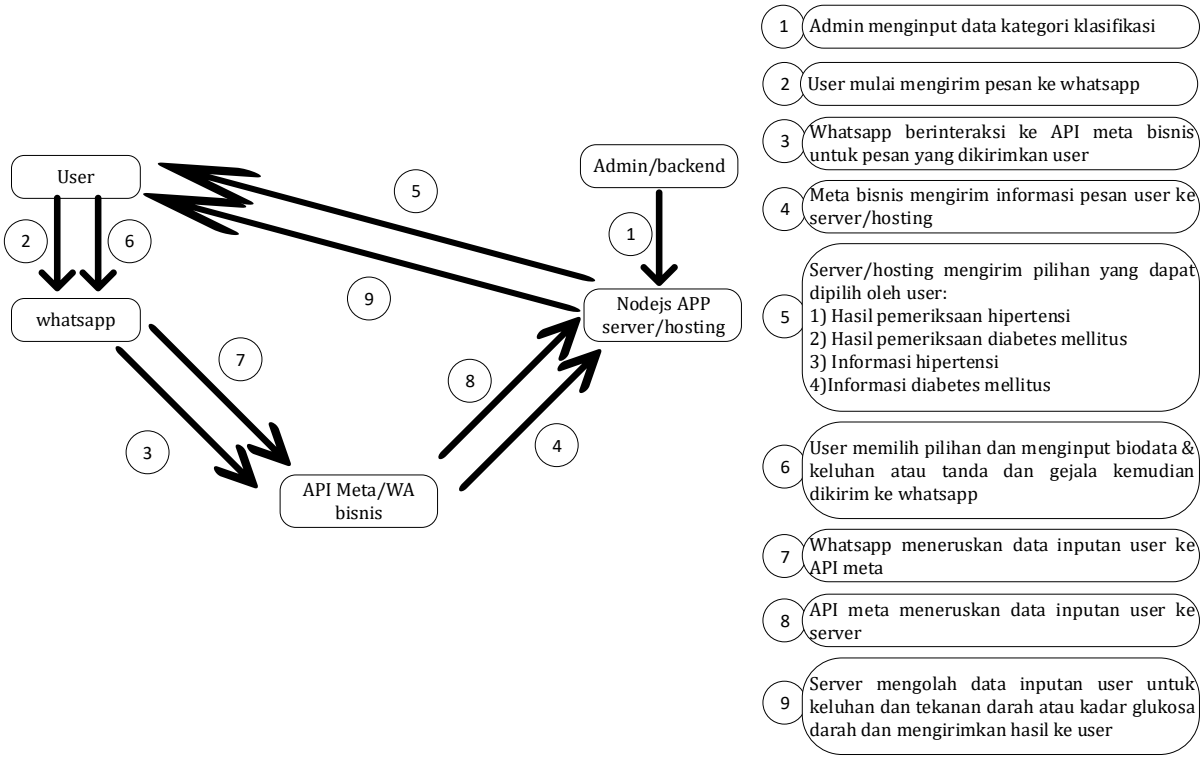

Figure 1. System Architecture

The system architecture diagram above illustrates the workflow of the developed WhatsApp bot application. The process begins with the admin inputting data such as gender, age, classifications of hypertension and diabetes mellitus, as well as information related to these diseases. Next, the user initiates a conversation on WhatsApp by sending a message starting with a period ("."). WhatsApp communicates with the Meta Business API to process the message sent by the user. The Meta Business API then forwards the user's message to the server/hosting. The server responds by displaying the home menu, allowing the user to choose a submenu. Afterward, the user inputs their personal information such as age, gender, blood pressure or blood glucose results, and symptoms based on what they are experiencing.

WhatsApp forwards this input to the Meta API, which in turn sends the user data to the server. The server processes the data based on the user's input and sends the results back to the user via WhatsApp. The results provided by the server are based on the user's input and include the classification of hypertension, whether the user's blood glucose levels are within the normal range (for diabetes mellitus patients), and recommendations for the prevention, treatment, and management of non-communicable diseases (NCDs).

Furthermore, a database design design is formed related to the whatsapp bot information technology innovation that will be developed. The database design image is as follows:

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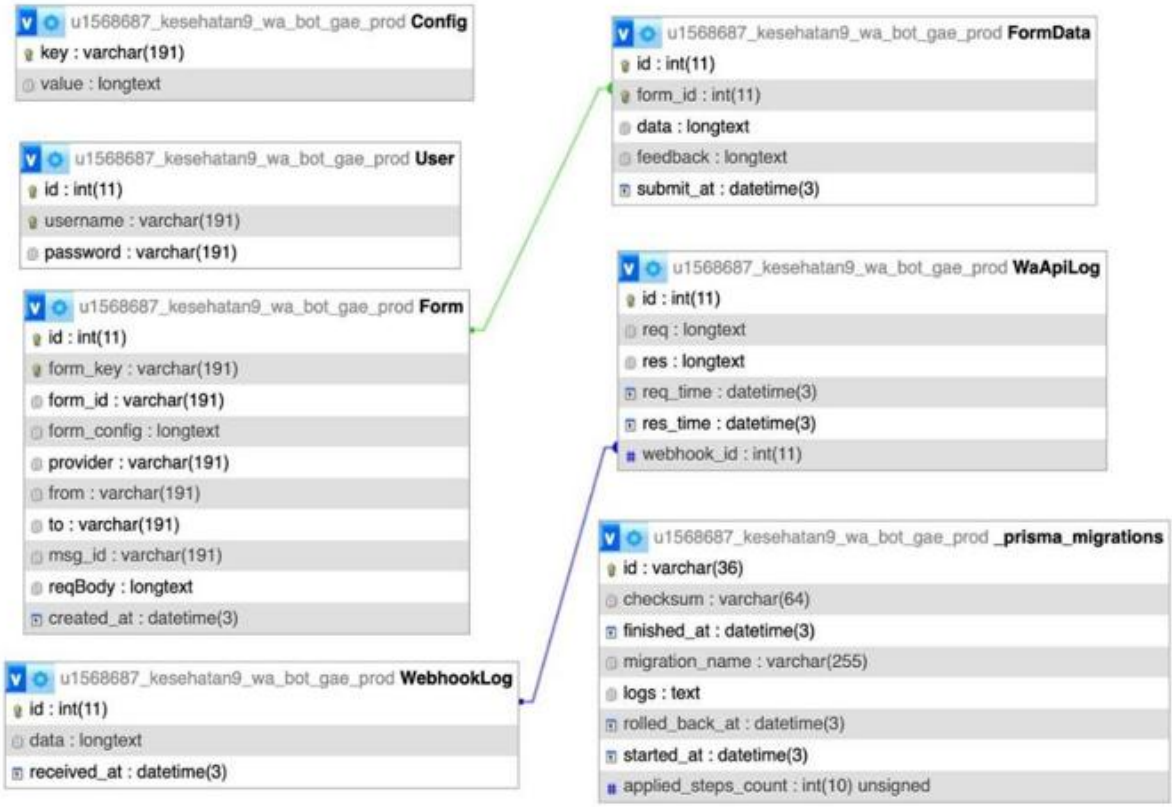

Figure 2. Draft Database Design

Implementation and unit testing of functions

After the WhatsApp bot-based application has been formed which is named "Gopos Kesehatan", the next stage is the implementation and unit testing of the whatsapp bot-based application functions carried out on 3 Puskesmas officers who previously provided input regarding data needs analysis. Puskesmas officers are determined as a sample to carry out function testing considering that officers also understand and understand the whatsapp bot application developed and can operate the system. In addition, whatsapp bot-based application testing was carried out on 30 elderly people with hypertension and 30 elderly people with diabetes mellitus. The implementation results based on interviews with 3 Puskesmas officers are as follows:

Respondent 1. "*Officers are required to be able to understand and understand whatsapp bot-based applications and be able to operate them*".

Respondent 2. "*The operation of whatapp bot-based applications is very easy to understand so that it can be applied by officers*".

After testing on Puskesmas officers, the next implementation and testing of whatsapp bot-based applications on elderly respondents. The initial stage is to carry out screening of parents with hypertension and diabetes mellitus who are at high risk. The next stage provides tricky card game health education to improve knowledge, attitudes and healthy lifestyle compliance so as to develop the quality of life of the elderly. The results of the implementation and trial of whatsapp bot applications and health education through tricky card games include.

Table 1 shows the characteristics of elderly respondents with hypertension and elderly with diabetes mellitus. Elderly respondents with hypertension are mostly aged 56-65 years (late elderly) as much as 53%, most of the last education is elementary school (50%), almost entirely female (97%), mostly not working (80%), and family history "there is" hypertension sufferers (67%) and no hypertension sufferers (33%). Meanwhile, elderly respondents with diabetes mellitus were mostly aged 56-65 years (late elderly) as much as 63%, most of them had elementary school education (77%), almost all of them were female (97%), most of them did not work (57%), and the respondents "there is" a family with diabetes

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mellitus was 40% and most of them "no" had diabetes mellitus (60%).

Table 1. Frequency Distribution of Respondent Characteristics

Respondent Characteristics	Elderly Patients with Hypertension		Elderly Patients with Diabetes Melitus	
	n	%	n	%
Age				
Pre-elderly	14	47	-	-
56 – 65 Years (Late elderly)	16	53	19	63
>65 Years (Elderly)	-	-	11	37
Education:				
Elementary School	15	50	23	77
Junior High School	8	27	3	10
Senior High School	7	23	3	10
Limited Liability Company	-	-	1	3
Gender				
Woman	29	97	29	97
Man	1	1	1	1
Job				
Work	6	20	13	43
Doesn't Work	24	80	17	57
Family History of Hypertension				
Yes	20	67	12	40
No	10	33	18	60

Table 2. Frequency Distribution of Healthy Quality of Life of Elderly Patients with Hypertension and Diabetes Mellitus Before and After the Application of Information Technology Innovation (Gopos Kesehatan).

Elderly	Measurement	Min	Max	Mean	Std. Deviation
Hypertension	Before	18	40	28.40	5.763
	After	28	49	39.53	5.283
Diabetes mellitus	Before	22	35	28.73	3.581
	After	24	42	35.27	4.891

Table 2 shows the frequency distribution of elderly people with hypertension and elderly people with diabetes mellitus. In the elderly with hypertension, the minimum numbers before and after applying the Gopos Health information technology innovation are 18 and 28, respectively, the maximum numbers are 40 and 49, respectively. In addition, the mean before and after measuring the quality of life of elderly people with hypertension is 28.40 and 39.53. In the elderly with diabetes mellitus, the minimum numbers before and after applying the Gopos Health information technology innovation are 22 and 24, the maximum numbers are 35 and 42, respectively. In addition, the mean before and after measuring the quality of life of elderly people with hypertension is 28.73 and 35.27.

Table 3. Data Normality Test Results

Elderly People with Hypertension	Elderly People with Diabetes Melitus
0,816	0.725

Based on Table 3, the results of the normality test show a p-value of 0.816 for elderly people with hypertension and 0.725 for elderly people with diabetes mellitus. All values are greater than 0.05 (p-value > 0.05), indicating a normal distribution of the data. This indicates that there is no significant difference between the data distribution and the normal distribution, thus meeting the assumption of normality. Therefore, the data are suitable for further analysis using a parametric paired t-test to examine the differences that occur.

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Table 4. The Impact of Implementing Information Technology Innovation (Gopos Kesehatan) for the Prevention and Management of Hypertension and Diabetes Mellitus in an Effort to Improve the Quality of Healthy Life of the Elderly

Elderly	P - Value
Hypertension	0.000
Diabetes Mellitus	0.000

Based on Table 4, the analysis results show that the p-value for the variables hypertension (p = 0.000) and diabetes mellitus (p = 0.000) is smaller than the significance level of α = 0.05. Thus, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_a) is accepted. Thus, it can be concluded that there is an influence of the application of information technology innovation for the prevention and treatment of hypertension and diabetes mellitus in an effort to improve the quality of healthy life of the elderly.

DISCUSSION

The main findings of this study indicate that interventions to improve the quality of life through the initial stage of system design require needs analysis through interviews to explore problems that can be addressed from system development. The second stage, namely system design, is carried out by designing a database design, then a database design is formed related to the innovation of information technology WhatsApp bot. Then the final stage in this study is the implementation and functional testing of the innovation system of information technology WhatsApp bot Gopos Health. Then the results of the trial on elderly people with hypertension and diabetes mellitus are then tested by screening. The trial by screening the elderly through the WhatsApp bot application after that the elderly are gathered to be given health education through a tricky card game. Before and after being given education through a tricky card game, quality of life measurements are carried out.

In the first stage of system modeling, a needs assessment is needed as a medium to understand user needs. This phase is done to describe the needs of users as users, limitations and objectivity of the system where it is created or improved (13). Information system requirements are the capabilities, requirements, or standards that the system must have and meet in order to realize what users expect from the information system to be realized (14).

In this stage, the method applied is a qualitative approach, as a result, in order to obtain data and descriptions, it is done through detailed questions and answers. In-depth interviews are conducted to investigate problems that can be addressed by system development and development (15). Based on the results of interviews with Puskesmas officers, the system requirements or data requirements expected by officers in whatsapp bot-based applications are to report NCD (non-communicable disease) risk factors that cannot be modified, namely gender and age.

WhatsApp bots are a modern technological tool, particularly on social media, widely used by young people and the elderly. This social media platform is highly effective due to its excellent understanding of health, particularly hypertension and diabetes, in terms of treatment and prevention. The Gopos Health WhatsApp bot application, developed by the Gorontalo Health Polytechnic research team, has a novel feature. It has no time limit and can be accessed daily or at any time. This application has a simple procedure, starting from collecting test results, then receiving feedback (results or responses) from patients, and informing patients of the test results. Functional requirements detail each process in the functions of the information system used to solve existing problems, namely the whatsapp bot number that will be given to the elderly. Home menu to select hypertension or diabetes mellitus as well as information related to hypertension and diabetes mellitus.

The second stage, system planning, is implemented, along with system architecture and database design. The goal of system design is to comprehensively complete all system architecture design activities while improving problem perception based on the output of the request analysis. In this process, the reviewer creates the entire program, including data collection and explanation of the software system as a whole (16).

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The application of system architecture in the development of information systems is a crucial aspect that needs to be the organization's attention, in order to ensure that the information systems used can function optimally, are well integrated with each other, and support the achievement of configuration goals effectively (17).

The system architecture design in this study is in the form of a developed WhatsApp bot application flow. Starting from the admin inputting data such as gender, age, information along with the classification of hypertension and diabetes mellitus. Next, the user starts sending a message to WhatsApp starting with a dot (.). WhatsApp interacts with the business meta API for messages sent by the user. Business meta sends user message information to the server/hosting. The server/hosting sends a home to select which submenu the user will choose. After the user inputs biodata such as age, gender, and blood pressure or blood glucose test results, as well as complaints based on the signs and symptoms experienced by the user, WhatsApp forwards the user input data to the meta API. The meta API forwards the user input data to the server. The server processes the data based on the user input and sends the results to the user. The results sent by the server are the results based on user input sent to WhatsApp regarding the classification of hypertension, normal or abnormal blood glucose levels of users with diabetes mellitus, and the prevention, treatment and control of NCDs (non-communicable diseases).

Next, a database design is developed related to the WhatsApp bot information technology innovation to be developed. Database design is a component of the system architecture. A database is a crucial component that provides system users with options for building an architecture capable of storing, managing, and manipulating data effectively. The security aspect of this component is crucial, given its direct connection to the critical data stored in the system. Several security measures that can be implemented include verifying and authenticating anyone accessing the data, as well as encrypting the information stored in the database. In addition to security, the ability to integrate databases between computers within an organization is also crucial for efficient and smooth information exchange. Furthermore, the database design must be tailored to the needs of the system being developed, ensuring it can support user needs and the overall system's work processes, thus optimally improving its performance (17).

The last stage of this research is the implementation and function testing of the health whatsapp bot gopos information technology innovation system. Implementation and function testing. This stage indicates a place where the system can be built. Construction not only includes the process of building the system, but also includes the testing stage to ensure that the system functions as it should (18).

a computer program is appropriate to the design that has been compiled in the previous stage (19). The purpose of implementation is to build a scheme for using programming methods according to the analysis of system requirements described by the database implementation phase. The database implementation sets the scope of software implementation, database preparation, programming, along with the creation of function displays. Operation testing is carried out to understand the performance of the information system even though basically by finding damage or interference with the system before use, ensuring the superiority of the application made, and finding possible dangers for users when used. The purpose of testing is to check the function of the system that has been developed, ensuring that the program code functions in accordance with the planned design (20).

Information technology innovation whatsapp bot gopos health has been implemented and tested on Puskesmas officers and testing on elderly people with hypertension and diabetes mellitus. The findings of this study prove that community health center officers stated that there is feasibility regarding the use of a mobile health application based on WhatsApp bot Gopos Kesehatan for the elderly. This application was created by Poltekkes Gorontalo which is very easy to operate and helps in screening 30 respondents with hypertension and 30 with diabetes mellitus so that this disease does not spread to areas that are not affected by the disease. This is in line with previous research by (21) regarding mHealth interventions in type II diabetes, namely the Mobile Diabetic Foot Personal Care System (m-DAKBAS). In this study, education and follow-up through mobile applications and verbal instructions alone were able to improve the knowledge, behavior, and self-efficacy scores of type II diabetes mellitus patients.

Not only that, previous research from (22) also stated that m-Health for hypertension management

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based on CPG was considered effective in increasing medication adherence, thereby helping users to comply with medication management.

The results of the trial on elderly people with hypertension and diabetes mellitus were then tested statistically. The trial at this stage begins with screening elderly people with hypertension and diabetes mellitus through the whatsapp bot application, then the elderly are collected to be given health education through tricky card games. This card game is highly effective among the elderly because its novelty can improve cognitive function, particularly in reading and visualizing the text. This ability can be strengthened by providing socialization and a healthy lifestyle guidebook through a counseling method for the elderly. This card game's positive impact on the quality of life has been shown to increase patient and elderly motivation to learn and understand their illnesses through an interactive and fun approach. This makes important information easier to absorb and remember, and supports patients in adopting a healthy lifestyle and adhering to their medications for hypertension and diabetes mellitus (23).

Before and after being given health education through tricky card games, the quality of healthy life was measured. The results were then subjected to statistical tests. The statistical test results state that the H_a hypothesis is accepted and H_0 is rejected ($P < 0.05$), therefore, it can be concluded that there is an effect of applying information technology innovations for the prevention and treatment of hypertension and diabetes mellitus in an effort to improve the quality of healthy life of the elderly.

Various studies related to information technology have proven and developed to monitor and provide education so as to increase client compliance in preventing, controlling hypertension and diabetes mellitus and are expected to improve the quality of healthy life of the elderly. Information technology that has been developed includes National Health Insurance services and Healthy Indonesia Cards available through digital platforms that can be accessed via websites and Android devices (8). Applications such as mobile health have been carried out in various countries and have shown to be effective in improving blood pressure control in hypertensive patients and glycemic index control in patients with diabetes mellitus (9).

Other research in the form of applications developed by (24), applications for screening non-communicable diseases that cause death, namely the SI-IMUT application, appear to be effective in reducing premature mortality due to NCDs in Taman Sari District. Chatbot-based applications developed by (25), related to the design of online mental health chatbots that are relevant to the expectations and satisfaction of Generation Z.

This study has several limitations that need to be acknowledged. First, the study design used a pre-post approach without any control treatment for the influence of factors other than the intervention. Second, the sample size was relatively small and came from only one health center located in the Tilongkabila area, so these findings cannot be generalized broadly or to other areas such as districts, sub-districts, or the city of Gorontalo. Third, the relatively short-term nature of the study's follow-up limits the ability to assess the long-term impact of the intervention.

CONCLUSION

The results of the information technology innovation based on the WhatsApp Bot Gopos Kesehatan concluded that this research was implemented effectively through a multi-stage process, starting from system design, database development, integration with WhatsApp Bot, to the implementation and testing stages. The trial results demonstrated that this application was highly beneficial for community health center officers in identifying areas at risk of non-communicable diseases (NCDs) and was easy to operate without any issues. Furthermore, interventions in the form of health education using interactive card media for elderly people with hypertension and diabetes mellitus have been proven to have a significant effect on improving the quality of life, as shown by the results of statistical tests ($p < 0.05$). which means that there is an effect of implementing information technology innovations for the prevention and treatment of hypertension and diabetes mellitus, to improve the quality of life for the elderly. This type of technological tool is highly recommended for elderly people in areas or regions with limited technological access, thereby facilitating efforts to manage chronic diseases such as diabetes mellitus and hypertension.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. Statistik BP. Statistik Penduduk Lanjut Usia 2021. 2021.
2. Khaerati K, Widodo A. Peningkatan Kualitas Hidup Lansia Melalui Pencegahan dan Pengendalian Penyakit Degeneratif. J Pengabdi Kpd Masy. 2018;4(2):60–4.
3. Widaningsih I, Ibrahim K, Nursiswati N. Factors Affecting Vascular Complications in Patients with Diabetes Mellitus: A Literature Review. J Heal Nutr Res. 2025;4(1):186–99.
4. Agustiawan, Adnyana MDMI, Ashriady, Asrianti T, Silalahi LE, Ulfa M, et al. Epidemiologi penyakit menular. Bandung: CV. MEDIA SAINS INDONESIA; 2024. 248 p.
5. Kemenkes. Kota Kediri Dalam Angka. 2023. p. 965 Survei Kesehatan Indonesia, Dalam Angka, Data Akurat Kebijakan Tepat.
6. Gorontalo DP. Laporan Hasil Skrining Penyakit Tidak Menular (PTM) Provinsi Gorontalo. Gorontalo; 2023.
7. Anitasari. Hari Hipertensi Dunia 2019: "Know Your Number, Kendalikan Tekanan Darahmu dengan CERDIK." 2019.
8. Suyoto, Agushybana F, Suryoputro A. Increasing drug compliance to hypertension patients through android applications in Wonosobo regency province of Central Java Indonesia. Int J Community Med Public Heal. 2020;7(1):16–21.
9. Marcolino MS, Oliveira JAQ, Agostino MD, Ribeiro AL, Akmim MBM, Ortiz DN. The Impact of mHealth Interventions : Systematic Review of Systematic Reviews. JMIR MHEALTH UHEALTH. 2018;6(1):1–11.
10. Aryatika K, Antika RB, Wicaksono DB. Efektivitas Metode Edukasi Tricky Card Game Dalam Meningkatkan Pengetahuan Lansia Terhadap Pencegahan Hipertensi Di Sekolah Eyang-Eyang Kabupaten Jember. Ikesma J Ilmu Kesehat Masy. 2021;17(1):33–8.
11. Rahmaniasari AF, Hendrati LY, Khoiri AU, Kharisma D, Azelia Z, Hakim SR, et al. Efektivitas Program LATHI "Dolanan Anti Hipertensi" dalam Meningkatkan Pengetahuan Masyarakat Lansia Desa Prambatan. Media Publ Promosi Kesehat Indones. 2024;7(4):927–32.
12. Adhyanti A, Nurjaya N, Rezkiana F. Knowledge and Skills of Community Health Workers in Filling of Towards Health Card (Kartu Menuju Sehat). J Heal Nutr Res. 2023;2(2):79–85.
13. Marentek B, Lumenta AS., Lantang OA. Rancang Bangun Web Service Sistem Informasi Keuangan GMIM Wilayah Tomohon 3. E-Journal Tek Inform. 2017;12(1):1–7.
14. Allan GDS. Analisa Kebutuhan Kebutuhan Sistem Informasi Manajemen Perusahaan Dagang. KURAWAL J Teknol Inf dan Ind. 2021;4(1):17–30.
15. Setiyani L, Rostiani Y, Ratnasari T. Analisis Kebutuhan Fungsional Sistem Informasi Persediaan Barang Perusahaan General Trading (Studi Kasus : PT . Amco Multitech). Own Ris J Akunt. 2020;4(1):288–95.
16. Putri MP, Effendi H. Implementasi Metode Rapid Application Development Pada Website Service Guide " Waterfall Tour South Sumatera ." J SISFOKOM. 2018;7(2):130–6.

https://doi.org/10.56303/jhnresearch.v4i3.627

17. Kurniawan E, Winata FL, Rianky, Widjaja SA, Mailangkay A. Binus University. 2023. Definisi, Komponen, Contoh, dan Diagram System Architecture dalam Konteks Sistem Informasi.
18. Putra IGNAC, Kusuma ATAP. Implementasi dan pengujian sistem informasi pengaduan inventaris kelas. J Teknol Inf dan Komput. 2019;5(1):35–9.
19. Wahyuni HP, Daniati E, Wardani AS. Sistem Informasi Penjualan Online Berbasis Website Pada Toko Andalan Tani. JATI (Jurnal Mhs Tek Inform. 2024;8(5):8745–52.
20. Kumara YDDAS, Wahyuni SN. Perancangan Sistem Informasi Berbasis Web Pada D'lofa Laundry Menggunakan Metode Waterfall. Indones J Comput Sci Res. 2024;3(1):10–7.
21. Juliani E, Yari Y, Rosliany N. Efektivitas Penggunaan Mobile Health Pada Manajemen Mandiri Diabetes Melitus Tipe II : A Scoping Review. J Ilm Kesehat Diagnosis. 2024;19(1):29–41.
22. Kurniawan N, Sukihananto. Penggunaan Mobile Health Dalam Manajemen Pengelolaan Perawatan Pasien Hipertensi : Studi Literatur. JHCN J Heal Cardiovasc Nurs. 2022;2(2):108–19.
23. Tresnawan T. Stress, Dietary Habits, and Their Relationship with Hypertension among the Elderly in Sukabumi, Indonesia: A Cross-Sectional Study. J Heal Nutr Res. 2025;4(2):822–31.
24. Holid M. Inovasi Layanan Skrining Penyakit Tidak Menular Penyebab Kematian (SI-IMUT). SWATANTRA. 2023;XXI(2):133–48.
25. Kelana B, Qodri AR, Muruliza S. Desain Chatbot Layanan Daring Kesehatan Mental yang Sesuai Persepsi dan Kepuasan Generasi Z. J Sist Komput dan Kecerdasan Buatan. 2024;8(1):18–26.

https://doi.org/10.56303/jhnresearch.v4i3.627