Design of Android-based Posbindu Application as an Effort for Early Detection of Public Health

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ABSTRACT
The Posbindu in Ringinsari Village is one form of participatory community service for early detection and control of Non-Communicable Diseases (NCD) risk factors in an integrated manner, located in Ringinsari Village, Maguwoharjo, Depok District, Sleman Regency. In its service, Posbindu currently employs manual methods, including the use of paper or books as data storage media. However, this service has a weakness, namely the lack of data backup, making the data vulnerable to loss. Therefore, the idea emerged to address this issue by designing an android-based Integrated Development Post (Pos Pembinaan Terpadu) application. This application can assist officers in recording the results of community examinations to quickly prevent the spread of diseases and serve as a health service facility for Ringinsari Village. The research resulted in the design of the Integrated Development Post application as a means of recording health reports, thus facilitating healthcare services for the community in Ringinsari Village.

General Terms
Mobile Application, Android Studio, Kotlin, PHP

Keywords
Android, Health, NCD

1. INTRODUCTION
Posbindu PTM is a community activity aimed at early detection, monitoring, and follow-up of Non-Communicable Disease (PTM) risk factors independently and continuously [1]. Posbindu is a community health service unit suitable for all segments of society, including the upper, middle, and lower classes. This is because the cost of medical treatment at Posbindu is relatively affordable [2].

Pos Pembinaan Terpadu (Posbindu), commonly referred to as Integrated Development Post, is a community activity with the objective of monitoring and early detection of Non-Communicable Diseases (NCD) within the local population. The POSBINDU application serves as a tool to monitor and enhance public health through the Pos Pembinaan Terpadu (Posbindu) program. This application is designed to record the health data of Posbindu participants, including demographic information and test results.

Non-Communicable Diseases (NCDs) represent a serious issue and one of the leading causes of mortality. NCDs are degenerative and chronic illnesses caused by lifestyle choices, dietary patterns, genetics, and other factors. NCDs stand as a primary cause of death worldwide [3]. Non-Communicable Diseases (NCDs) are illnesses that cannot be transmitted from person to person and develop slowly over an extended period [4].

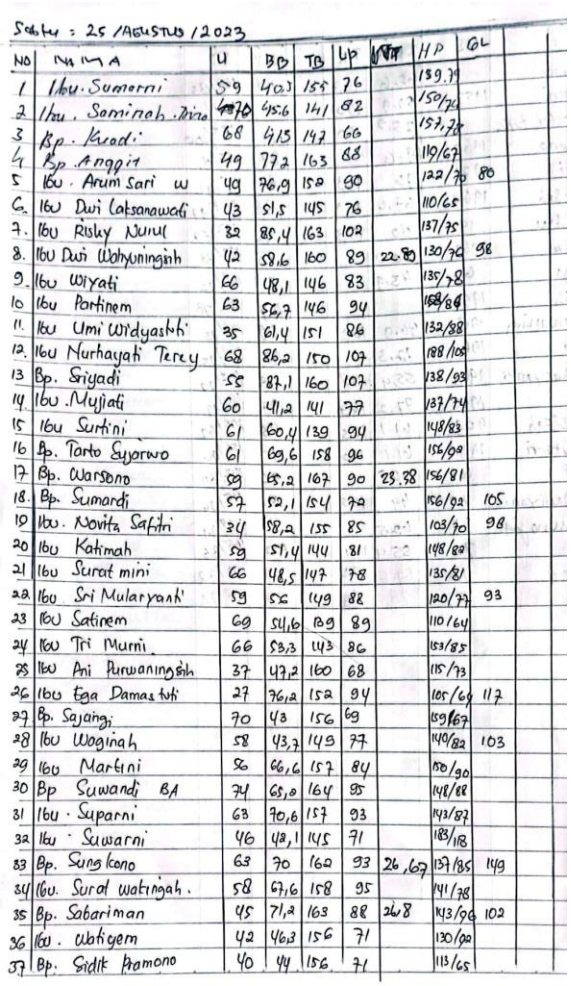
The Posbindu activities are carried out in an integrated, organized, and periodic manner by the village administration in collaboration with the local health center (Puskesmas). In Posbindu Kedondong 1, located in Ringinsari Village, Maguwoharjo, Sleman, the activities are conducted by the Women's Community Empowerment (PKK) officials and young women, in coordination with Depok 1 Health Center. Posbindu is held regularly every month, and the examination of residents is recorded during these sessions. In Posbindu Ringinsari Village, the recording process still relies on a simple method, namely manual handwriting in a book. Storing data in a book poses a risk, as it can easily be damaged, making the data vulnerable to loss.

The issue at Posbindu Ringinsari Village lies in the vulnerability of data recording to damage and loss. Therefore, a solution is necessary to address this problem. The proposed solution is to develop a mobile application that supports electronic data recording to enhance data storage security and reduce the risk of data loss.

The outcomes from Posbindu will be transformed into information to support government decision-making and the handling of non-communicable disease cases in public health issues. The use of the Android application in Posbindu activities can serve as a tool to facilitate the operational aspects of these activities and transform data into information that will be utilized by decision-makers [5].

2. RESEARCH METHOD
The research method is a systematic technique for comprehensive data collection according to the research needs, involving observation and review to obtain relevant and accurate data. The research method employed includes data collection and software development [6].

2.1 Data Collection
To obtain the information needed for developing the application, a method is required to acquire such information. The method utilized involves direct observation and interviews at Posbindu located in Ringinsari Village, Depok District, Sleman Regency. The data collection period spans from August to September 2023. Observation is carried out by directly visiting the location of Posbindu activities and observing how Posbindu activities are conducted. Interviews are conducted by posing a series of questions to the operational staff of Posbindu. The results of the data collection are presented in Figure 1 below.



Selasa : 25 /AGUSTUS /2023

NO	NAMA	U	BB	TB	Lp	LILA	HP	GL	
1	Ibu. Sumarni	59	40,7	155	76		159,7		
2	Ibu. Saminah Rina	4970	45,6	141	82		150/74		
3	Bp. Kiradi	68	41,5	147	66		157,78		
4	Bp. Anggit	49	77,2	163	88		119/67		
5	Ibu. Arum sari w	49	76,9	150	90		122/70	80	
6	Ibu Dwi Laksanawati	43	51,5	145	76		110/65		
7	Ibu Risky Nurul	32	85,4	163	102		137/75		
8	Ibu Dwi Wahyuningsih	42	58,6	160	89	22,80	130/70	98	
9	Ibu Wiyati	66	48,1	146	83		135/78		
10	Ibu Partinem	63	56,7	146	94		168/84		
11	Ibu Umi Widyastuti	35	61,4	151	86		132/88		
12	Ibu Nurhayati Tercy	68	86,2	150	107		188/108		
13	Bp. Sriyadi	55	87,1	160	107		138/93		
14	Ibu Mujiati	60	41,2	141	77		137/74		
15	Ibu Surtini	61	60,4	139	94		148/83		
16	Bp. Tarto Suyarwo	61	69,6	158	96		156/90		
17	Bp. Warsono	59	65,2	167	90	23,38	156/81		
18	Bp. Sumardi	57	52,1	154	72		156/92	105	
19	Ibu. Novita Saftri	34	58,2	155	85		103/70	98	
20	Ibu Katimah	59	51,4	144	81		148/80		
21	Ibu Surat mini	66	48,5	147	78		135/81		
22	Ibu Sri Mularyanti	59	56	149	88		120/77	93	
23	Ibu Satirem	69	51,6	149	89		110/64		
24	Ibu Tri Murni	66	53,3	143	86		153/85		
25	Ibu Ani Purwaningsih	37	47,2	160	68		115/73		
26	Ibu Tiga Damastuti	27	76,2	152	94		105/69	117	
27	Bp. Sayangi	70	43	156	69		159/67		
28	Ibu Waginah	58	43,7	149	77		140/82	103	
29	Ibu Martini	56	66,6	157	84		150/90		
30	Bp Suwandi BA	74	65,0	164	95		148/88		
31	Ibu. Suparni	63	70,6	157	93		143/87		
32	Ibu. Suwarni	46	48,1	145	71		183/118		
33	Bp. Sungkono	63	70	160	93	26,67	157/85	149	
34	Ibu. Surat watingah	58	67,6	158	95		141/78		
35	Bp. Sabariman	45	71,2	163	88	26,8	143/96	102	
36	Ibu. Watigem	42	46,3	156	71		130/90		
37	Bp. Sidik Pamono	40	44	156	71		113/65		

Figure 1 : The Results of Data Collection

2.2 Software Development

The software development method employed is the waterfall method. The waterfall model is one of the System Development Life Cycle (SDLC) models commonly used in information systems and software development. This model utilizes a systematic and sequential approach [7]. The waterfall model follows a linear sequence of stages, starting with requirements analysis, design, coding, and testing. Requirements analysis involves a deep understanding of user needs, while design produces the technical blueprint of the system. The coding phase involves translating the design into program code, and testing is conducted to ensure the functionality of the system. While this model provides clarity in its stages, it lacks flexibility in adapting to changes in project requirements during development.

3. RESULTS AND DISCUSSION

3.1 Software Requirement Analysis

Software refers to a set of instructions that enables a computer to perform specific tasks and manage its operations [8]. The software used includes:

3.1.1 Android Studio

Android Studio is a newly developed integrated development environment (IDE) by Google specifically for the Android operating system. This tool is designed as a comprehensive platform to facilitate application development [9].

3.1.2 Visual Studio Code

Visual Studio Code is a code editor application designed by Microsoft for use on the Windows, Linux, and MacOS operating systems. The primary function of Visual Studio Code is to assist in code writing, with support for various programming languages such as C++, C#, Java, Python, PHP, and GO [10].

3.1.3 XAMPP

XAMPP is software that supports various operating systems, designed as a compilation of several programs. Its main function is as a standalone server (localhost), and it consists of several programs such as the Apache HTTP Server, MySQL database, as well as interpreters for programming languages like PHP and Perl [11].

3.2 Design

3.2.1 Database Design

Database design involves the process of designing the structure and organization within a database, including the creation of tables, determination of columns, and specification of data types. In the context of this research, the goal is to create a simple and efficient structure for the Android-based Posbindu management system. The focus of this design is on maintaining the accuracy of stored information and prioritizing data security. The database design can be seen in tables 1-4 below.

Table 1. Officer

Attribute	Data type
id	Integer
name	String
age	Integer
gender	String
phone_number	Integer

Table 2. Citizens

Attribute	Data type
id	Integer
name	String
age	Integer
gender	String

Table 3. Free Measurement

Attribute	Data type
id	Integer
name_citizen	String
height	Integer
weight	Integer
wast_size	Integer
blood_pressure	String
date	Date Time

Table 4. Paid Measurement

Attribute	Data type
id	Integer
name_citizen	String
measurement	String
cost	Integer
date	Date Time

3.2.2 Entity-Relationship Diagram

Entity-Relationship Diagram (ERD) is a technique used as a fundamental step in creating a database. It is one of the most commonly used techniques in database design. The ERD technique is based on the entity-relationship model [12]. Entity Relationship Diagram (ERD) is a visual representation of the relationships between tables in a database. The ERD used in the study can be seen in Figure 2 below.

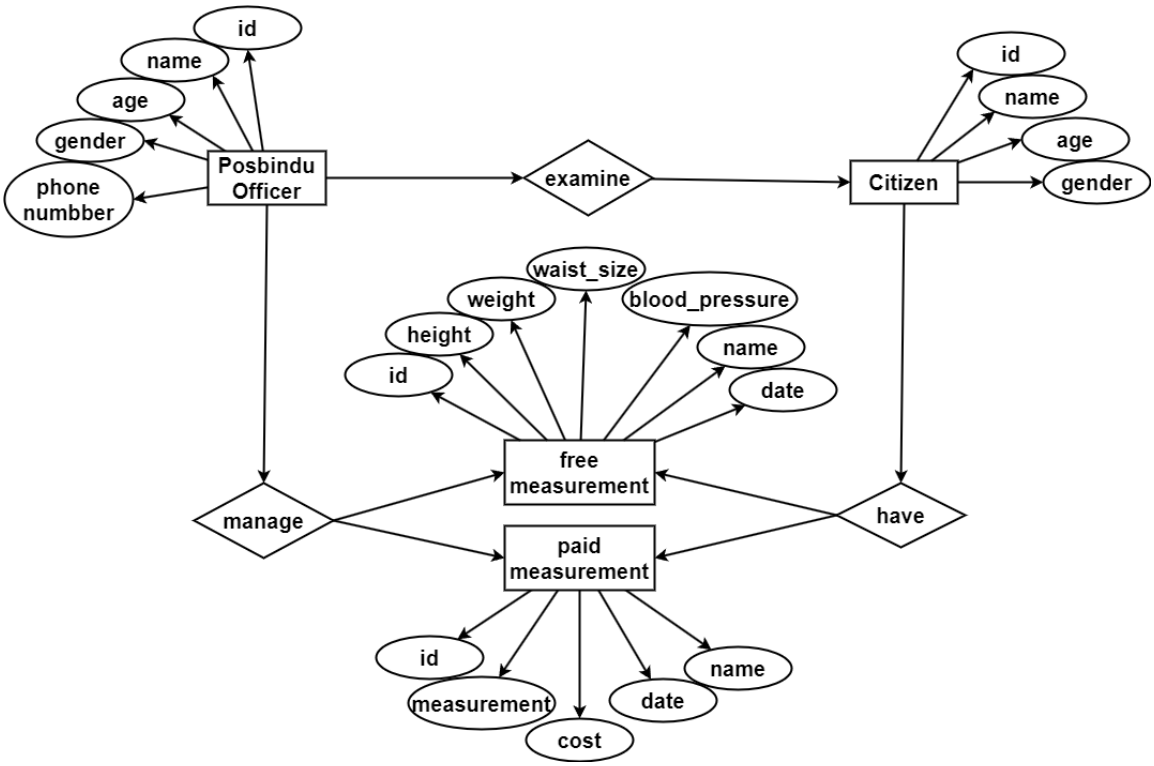


Figure 2 : Entity-Relationship Diagram

3.2.3 Use Case Diagram

A use case diagram is beneficial for illustrating the desired functionality of a system. Use cases aim to demonstrate the interaction between actors and the system. In this context, actors are human entities or other elements that interact with the system to perform specific tasks [13]. The use case diagram illustrates the interaction between users and the system in the usage of the application. In this research, the application created is represented using a use case diagram, as depicted in Figure 3 below.

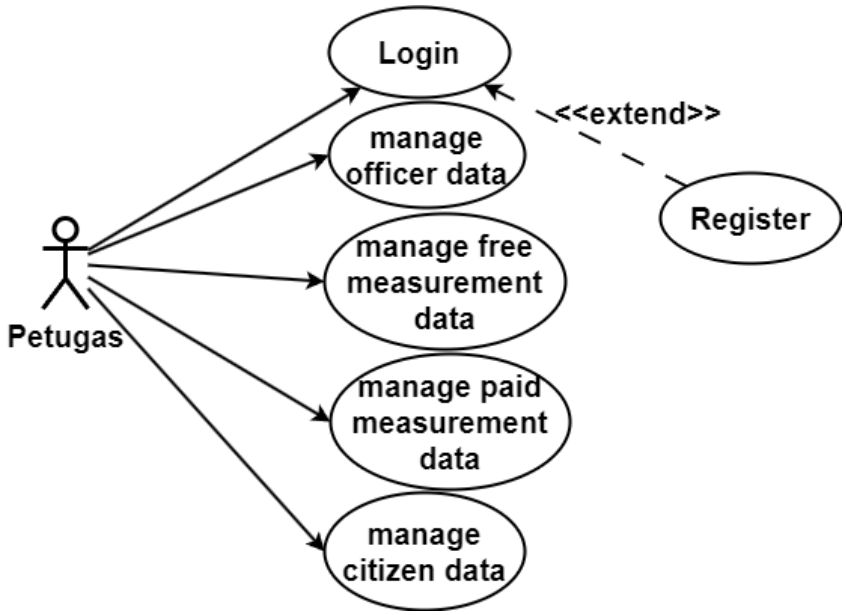


Figure 3 : Use Case Diagram

3.3 User Interface

3.3.1 Login & Register Interface

On this page, officers have the option to log in by entering their phone number and password to access the application's homepage. For officers who do not have an account yet, there is an option to create a new account through the registration page. In the registration page, officers need to fill in information such as name, age, gender, phone number, and create a password to set up a new account.

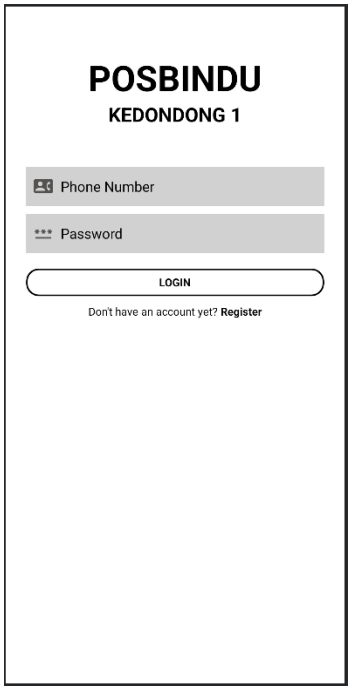


Figure 4 : Login Interface

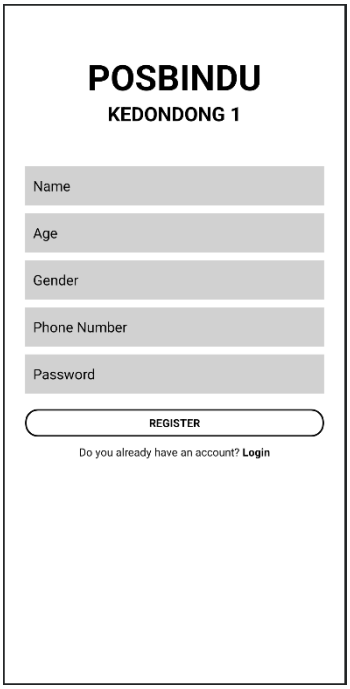


Figure 5 : Register Interface

3.3.2 Home Page

On the homepage, officers have the option to choose various menus available in the application. There are four menu options, namely free measurement, paid measurement, officer data, and citizens data.

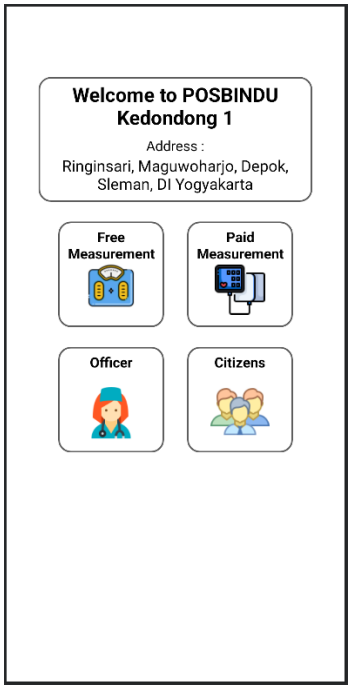


Figure 6 : Home Page

3.3.3 Free Measurement & Add Data Interface

On the free measurement page, officers are shown data from the examination results of residents who participated in Posbindu activities. Officers can add data from residents' measurement results by pressing the add button, and that data will be saved in the database.

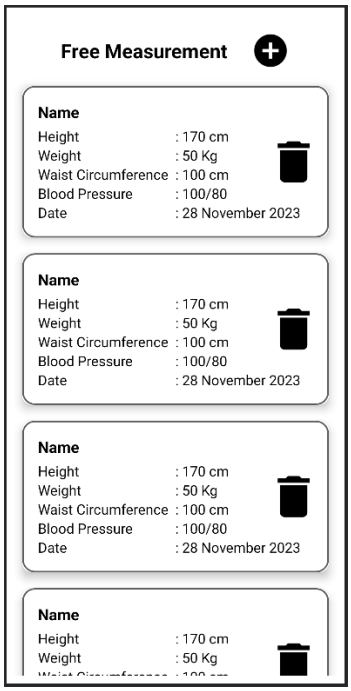


Figure 7 : Free Measurement Interface

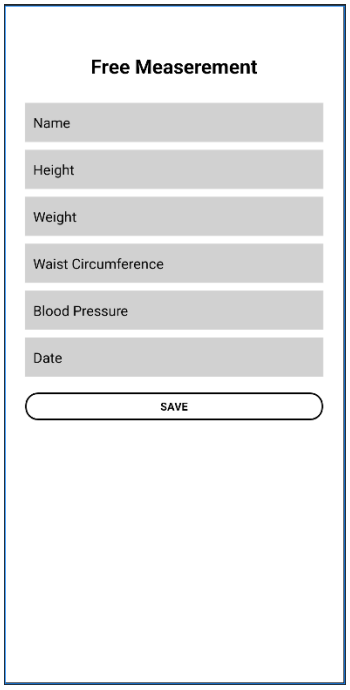


Figure 8 : Add Data Interface

3.3.4 Paid Measurement & Add Data Interface

On the paid measurement page, officers are presented with additional examination results that require payment. Residents are not obligated to undergo additional measurements. However, if conducted, officers can add the data from the additional examination results by pressing the add button.

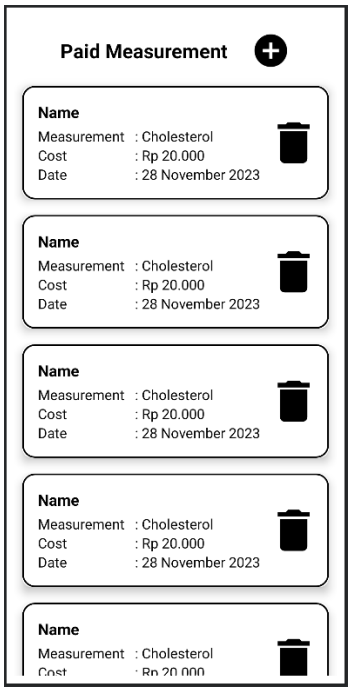


Figure 9 : Paid Measurement Interface

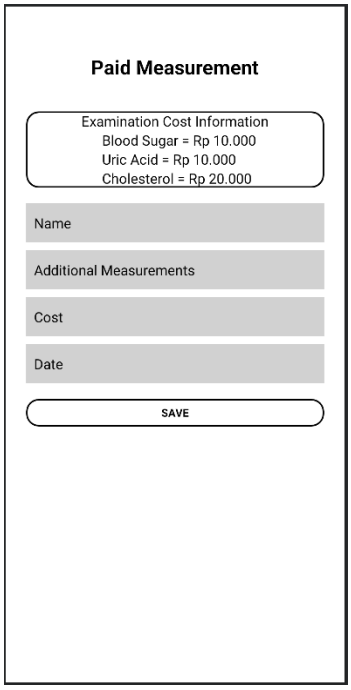


Figure 10 : Add Data Interface

3.3.5 Officer Interface

On the officer page, there is information about the registered officers in Posbindu. This data is obtained from the officer's information during the registration process.

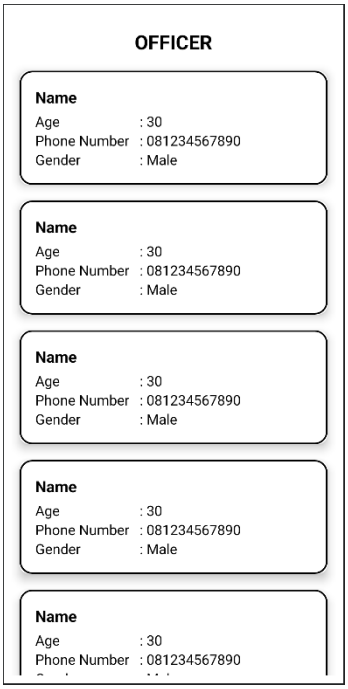


Figure 11 : Officer Interface

3.3.6 Citizens & Add Citizens Interface

On the citizens page, officers can view information about citizens who regularly participate in Posbindu activities. Additionally, there is an option to add new citizen data by pressing the add button. The process of adding citizen data involves filling in several pieces of information such as name, age, and gender.

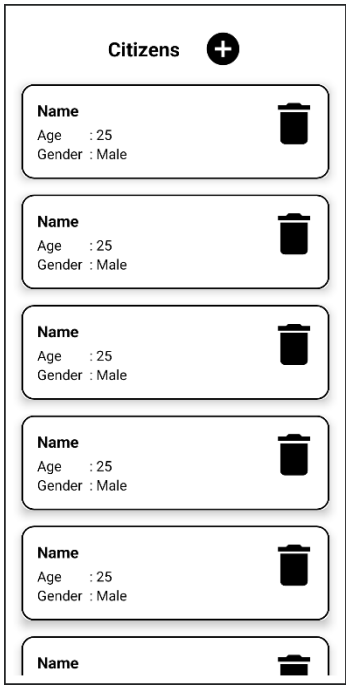


Figure 12 : Citizens Interface

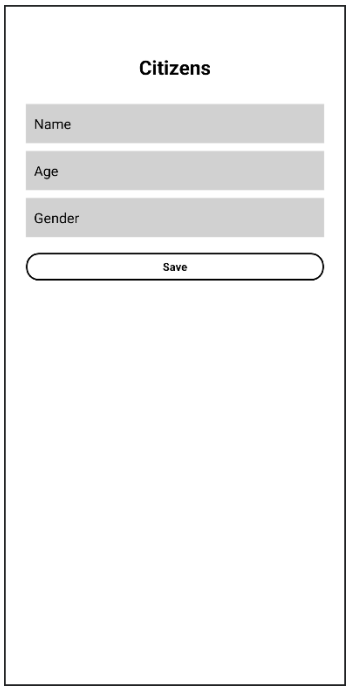


Figure 13 : Add Citizens Interface

4. CONCLUSION

This research has resulted in the design of an application for Posbindu with the aim of facilitating officers in recording data during Posbindu activities. Previously, Posbindu officers were compelled to carry a notebook for manual data recording and storage during each activity. However, with the use of this application, recording can be easily done using the Android smartphones owned by the officers. This eliminates the need to carry a physical notebook every time a Posbindu activity takes place.

With the implementation of this application, the recording process becomes more efficient and organized. Additionally, the application also reduces the risk of data loss and enhances the security of the data. This innovation brings significant

benefits to Posbindu officers, transforming the traditional recording methods into a more modern and effective approach. The conclusion of this research provides a positive outlook on the potential improvement of efficiency in Posbindu activities through the application of technology.

In addition to providing an effective solution for current Posbindu data recording, this idea opens the door to future innovations, creating the potential to enhance Posbindu's operational efficiency, expand healthcare service coverage, and support better decision-making efforts to improve public health.

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