



Child Health Screening Application with Body Mass Index Standard Assessment of Child Nutritional Status using Agile Development

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Abstract—Nutrition is a substance that influences the development of the human body so that the body's functions run as they should. Nutritional status is a condition where nutritional intake is balanced with the body's needs. If a child has excess nutritional intake, it is not good for the body. Posyandu officers record children's weighing data, detect the child's nutritional status and then provide a report on the child's nutritional data to the community health center. Data collection on children's nutritional status at the Posyandu is still manual in the form of data being recorded on paper, which can cause data to be lost, damaged, torn, and nutritional data. children are scattered, or piled up with other information. Therefore, we need a web-based application for checking children's nutritional status with the Body Mass Index (BMI) standard for assessing children's nutritional status, so that children know the ideal weight and height to prevent obesity or malnutrition so that children can adopt a healthy lifestyle. The research method used in this research is Agile Development Software which consists of requirements gathering, design, development, testing, implementation and evaluation. Then, in making this application, we also used the CodeIgniter 3 Framework. This application is expected to help Posyandu officers and parents in collecting data and detecting children's nutritional status based on Body Mass Index standards.

Keywords: Posyandu; Nutritional Status; Body Mass Index Standards; Agile Development Software; CodeIgniter 3 Framework

1. INTRODUCTION

Information today is a need that cannot be ruled out. This encourages humans to seek information from various sources to meet various needs and interests and expand their horizons of knowledge. One of the sources of information used by humans today is the website. Almost all fields have utilized products from information technology, one of which is the health sector.

Health is something important for a person's life, especially in the growth and development of a child. The role of parents greatly affects this, if all children's nutritional needs are ignored, it is feared that children will experience less than optimal growth and development. The nutritional needs of children, especially toddlers, are very susceptible to weight changes. Parents sometimes find it difficult to distinguish between children who are malnourished or who suffer from other symptoms of illness, so they ignore these physical changes according to Orina Fitri from the journal Shafira, Prajoko, & Pambud, (2023)[1].

Nutritional fulfillment in children under five is very important because it is a factor that needs to be considered in maintaining health. Because toddlerhood is a period of development that is vulnerable to nutrition. Toddlers are a group of people who experience a cycle of growth and development that requires greater nutrients than other age groups so that toddlers are most likely to suffer from nutritional disorders. Concern for the health of children under five, both in the form of counseling and services is one of the programs of the Integrated Service Post (Posyandu). Posyandu is a community-based service where one of the activities is monitoring the nutritional status of toddlers. This is done to reduce the number of diseases and malnutrition in toddlers by utilizing access to health services correctly and on time.

A healthy body is everyone's hope, obesity and malnutrition are important problems in supporting a healthy body. Obesity is a condition characterized by excess weight due to an imbalance in energy input and expenditure. While malnutrition is malnutrition due to lack of weight. This is due to the lack of intake of nutritious foods such as protein, carbohydrates, fats, and vitamins needed by the body. One way to prevent obesity and malnutrition is to pay attention to the body's ability to maintain an ideal body weight. Meanwhile, the ideal body is obtained from the intake of nutritious food in order to get a height and weight that is in accordance with the standards. This comparison between Weight and Height is called Body Mass Index (BMI)[2] Most tools to measure BMI are still calculated manually, namely measuring Height and Weight with the help of a measuring tool, then using a manual calculator as a calculation tool[3].

The problems that arise include that recording is still done manually, namely by recording data on toddlers such as weight, height, and vaccination, in this case the recording is still written in the KIA (Maternal and Child Health) book and the notebook on the posyandu report, errors when recording data for toddlers which makes it will take a long time[4]. This health data collection is very helpful in the data management process. In addition to being able to reduce data damage and loss, there are difficulties in searching for data. Therefore, it is necessary to have a website-based information system to facilitate the performance of Posyandu cadres in Rancagong Village in managing data.



A web-based application is an application that is created by utilizing mechanisms that already exist in the web system (WWW)[5] A web system is an application that has a client-server architecture and uses the HTTP (Hyper Text Transfer Protocol) protocol in communicating between the server and the client which has the function of retrieving or displaying the client side and executing the contents of the document file[6].

Nowadays, the development of a web-based information system is easier if you use the right PHP framework[6]. A framework is a collection of instructions that are collected in classes and functions with their respective functions to make it easier for developers to call them without having to write the same program syntax over and over again and can save time. The selection of CodeIgniter 3 to build a child health screening application with standard body mass index assessment of children's nutritional status[7]. Because of the lightweight and open-source PHP framework. This framework makes it possible to develop full-featured web applications faster and support diverse libraries according to Putra, Jampur & Santjojo, in the journal *Atmaja, R. D., Faizah, N., & Kambry, M. A. (2023)*[8]. CodeIgniter 3 has now been transformed into a modern PHP framework with the inclusion of the CLI feature. This feature exists to make it easier for developers to build applications[9].

Research related to this research was carried out by Jejen Jaenudin, Fety Fatimah, and Fitria Rachmawati (2021) with the title "Designing Smart Mirrors for Health Recommendations Based on Body Mass Index with the Body Surface Area Method". The research method used is the research and development method of the Body Surface Area (BSA) method through Smart Mirror. This research aims to design a technology that can determine Body Mass Index (BMI) using the Body Surface Area (BSA) method through Smart Mirror so that a person knows the ideal weight in preventing obesity or malnutrition. The results of this research show that a person gets an insight displayed by Smart Mirror in the form of the best recommendations from experts, this has a positive impact so that a person can live a healthy lifestyle [10].

2. RESEARCH METHODOLOGY

2.1 Research methods

This research was conducted using the following data collection methods and system development methods:

2.1.1 Metode Pengumpulan Data

The data collection method used to obtain the information required in this research is as follows:

1. Observation
Researchers conducted direct observations of child health checks at Posyandu.
2. Interview
Interviews were conducted by asking questions to several Posyandu cadres and midwives on duty to obtain a general overview of the problems that occur in child health checks, especially regarding nutritional standards.
3. Literature Study
Collecting data from several sources such as journals and books related to the creation of a Child Health Examination Application with Body Mass Index Standards for Child Nutritional Status Assessment.

2.1.2 System Development Methods

The system development method used in the Child Health Examination Application with Body Mass Index Standards for Web-Based Child Nutritional Status Assessment Using the Codeigniter 3 Framework is the Agile Software Development Method. The Agile Software Development Method is a software development method that is used repeatedly[11]. The agile method provides flexibility and focuses on collaboration between teams to produce better products. The agile method emphasizes rapid adaptation to changes that occur in the development process, through the stages of gathering requirements, Design, Development, Testing and handing over the system to users (Deployment), which ends with support for the complete software produced by Evaluation (Review). The stages of the agile method are as follows:

1. Requirements
In this step, the development team and users work together to identify and gather the needs that must be met by the software to be developed.
2. Design
This step involves creating the information architecture and visual design of the software to be created, including the user interface and other important elements.
3. Development
In the third step, the software coding process is carried out based on the agreed-upon design. Development proceeds in a literal manner, with results demonstrable at each cycle.
4. Testing
In the fourth step, the software is thoroughly tested to ensure its quality and detect potential errors or bugs.
5. Deploy
In the fifth step, the software that has been tested and declared ready to use will be implemented or distributed to users.

2.2 Proposal System

The following is an analysis of the proposed system in the Child Health Examination Application with the Standard Body Mass Index for Assessing Children's Nutritional Status Using the Agile Development Software Method [12] [9].

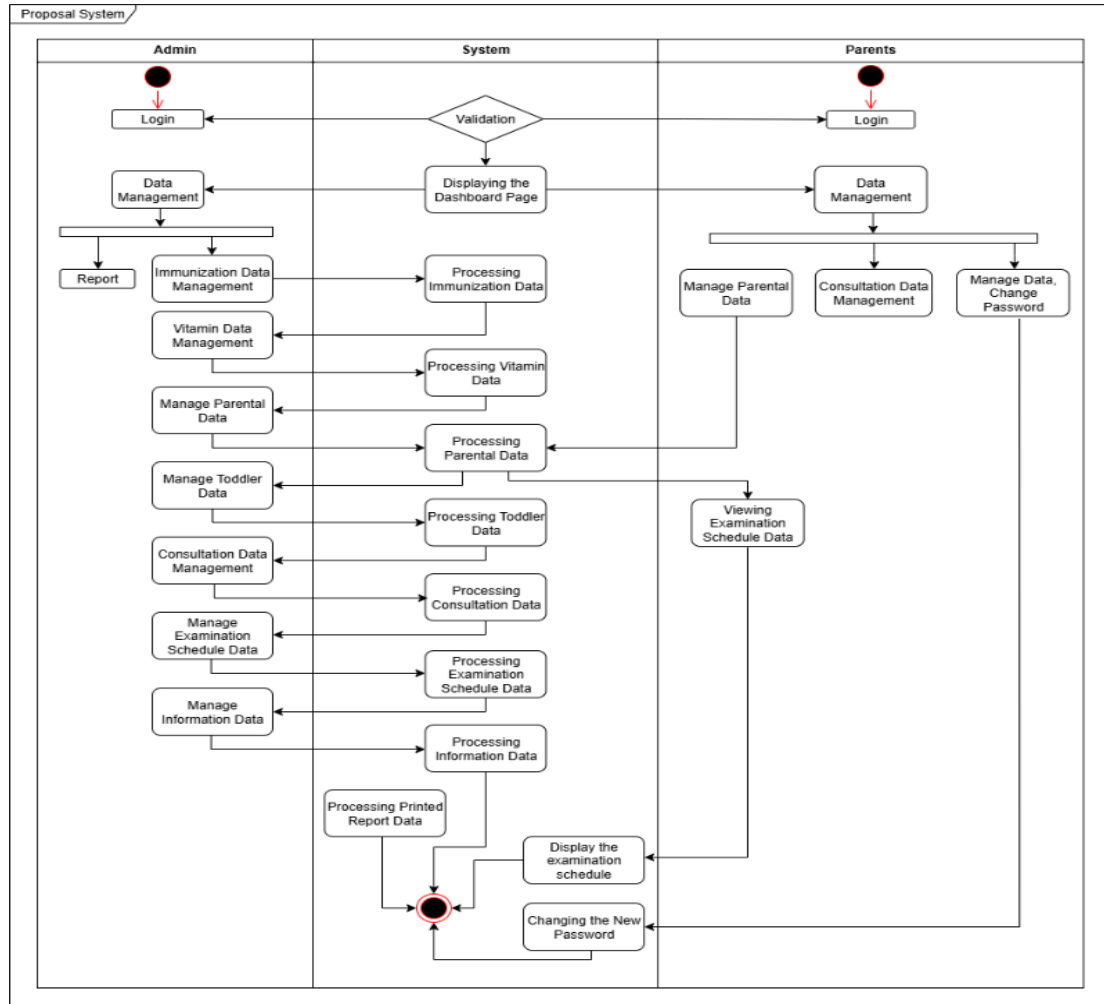


Figure 1. Proposed System

In Figure 1, the system proposed by the researcher can be used by 2 users, namely posyandu officers and parents. Each user can run the system as follows[13]:

- a. Posyandu officers can log in to the system by logging in using username and password. If the login is successful, the system will display the home page[14]. Then posyandu officers can do 2 data management, the first starts with the admin managing immunization data, then the system processes immunization data, then the admin manages vitamin data, then the system processes vitamin data, then the admin manages parental data, then the system processes parental data, the admin manages the data of toddlers, then the system processes data for toddlers, the admin manages the consultation data, then the system processes the consultation data, admin manages the next inspection schedule data the system processes the inspection schedule data, the admin manages the information data and then the system processes the information data. Admins can manage report data and then the system processes print report data[15].
- b. Parents can log in to the system by logging in using a username and password. If the login is successful, the system will display the home page[13]. Then the admin can manage the parent's data, then the system processes the parent's data, then the parents can see the data of the examination schedule, the admin can manage the data, change the password, then the system changes the new password[16].

3. RESULT AND DISCUSSION

3.1 Running System Analysis

The following is an application for child health checks with standard Body Mass Index Assessment of Children's nutritional status using the Agile Development Software method and Codeigniter 3 Framework[17].

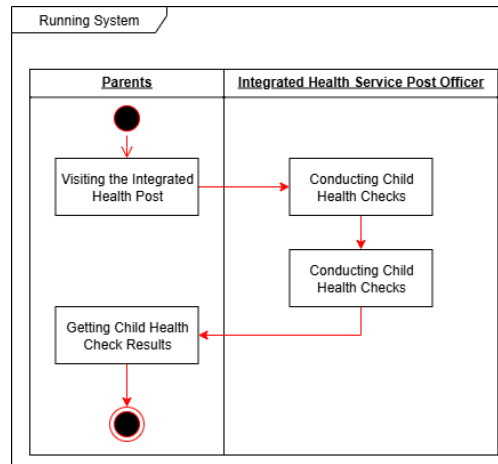


Figure 2. Runing System

In Figure 2, The current system in child health checks in Rancagong Village begins with parents visiting the posyandu[18]. Then the Posyandu Officer conducts a children's health examination and records the results of the child's health examination. After that, parents get the results of the child's health check[19]

3.2 Use Case

The following is an analysis of the proposed system in the Application of Child Health Checks with Standard Body Mass Index Assessment of Children's Nutritional Status Using the Agile Development Software Method and Codeigniter Framework 3[20]. In Figure 3:



Figure 3. Use Case

Use Case:

1. Admin

- a. Admins can log in.
- b. Admins can manage immunization data by adding, editing, and deleting immunization data.
- c. Admins can manage vitamin data by adding, editing, and deleting vitamin data.

- d. Admins can manage parental data by adding, editing, removing, resetting passwords and adding toddlers to parental data.
 - e. Admins can manage toddler data by adding, editing, deleting and viewing inspection data on toddler data.
 - f. Admins can manage their inspection data by adding, editing, and deleting inspection data.
 - g. Admins can manage consultation data by answering questions from parents.
 - h. Admins can manage report data by printing toddler data and examination data.
 - i. Admins can manage their inspection schedule data by adding, editing, and deleting inspection schedule data.
 - j. Admins can manage information data by adding, editing and deleting information data.
 - k. Admins can manage password change data by changing new password data.
 - l. Admins can log out.
2. Parents
- a. Parents can log in.
 - b. Parents can see the data of the examination results.
 - c. Parents can view the test schedule data.
 - d. Parents can manage the consultation by chatting on the consultation form.
 - e. Parents can manage their data by changing new password data.
 - f. Parents can log out.

3.3 Program Implementation

The following is the implementation of the program from the Child Health Examination Application with Standard Body Mass Index Assessment of Children's Nutritional Status Using the Agile Development Software Method and Codeigniter Framework 3[21]. If more than 1 level of numbering use numbering for the next list[22]:

3.3.1 Login Page

Posyandu Cempaka 10

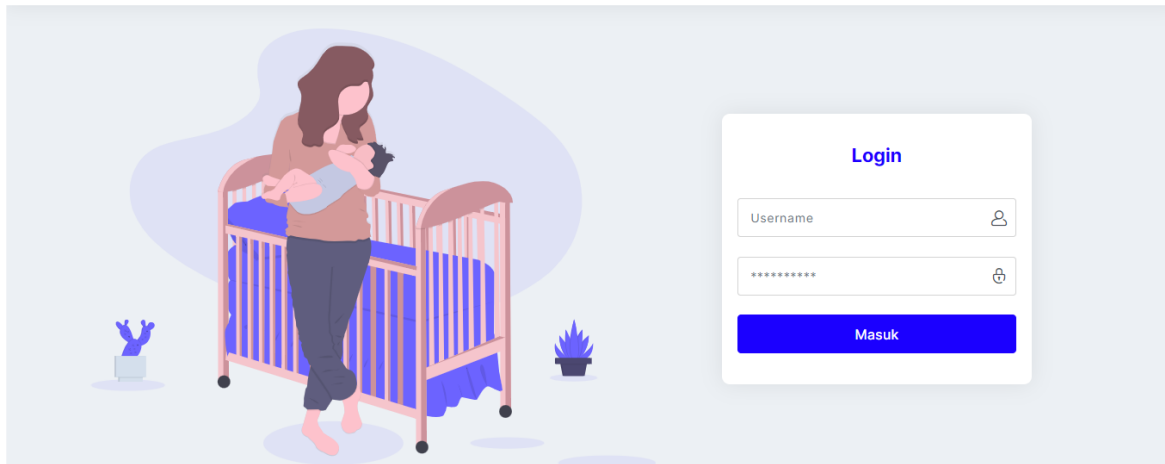


Figure 4. Page Login

In Figure 4, The login page above is a login page for admins and parents. To be able to log in to the system, the admin or parents must enter their respective username and password then click Login. If the username and password are correct, the admin or parents will successfully enter the system to the home page. If the username and password are incorrect, the admin or user cannot log in to the system[23].

3.3.2 Home Admin Page

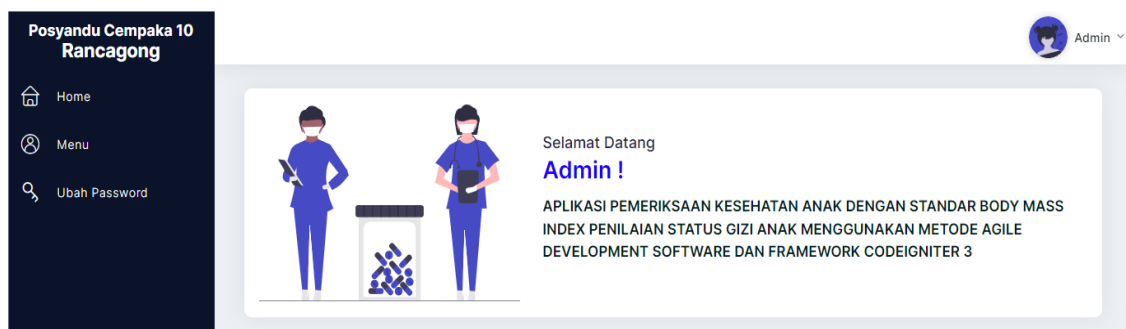


Figure 5. Home Admin

In Figure 5, The home admin page contains about the application information.

3.3.3 Menu Admin Page

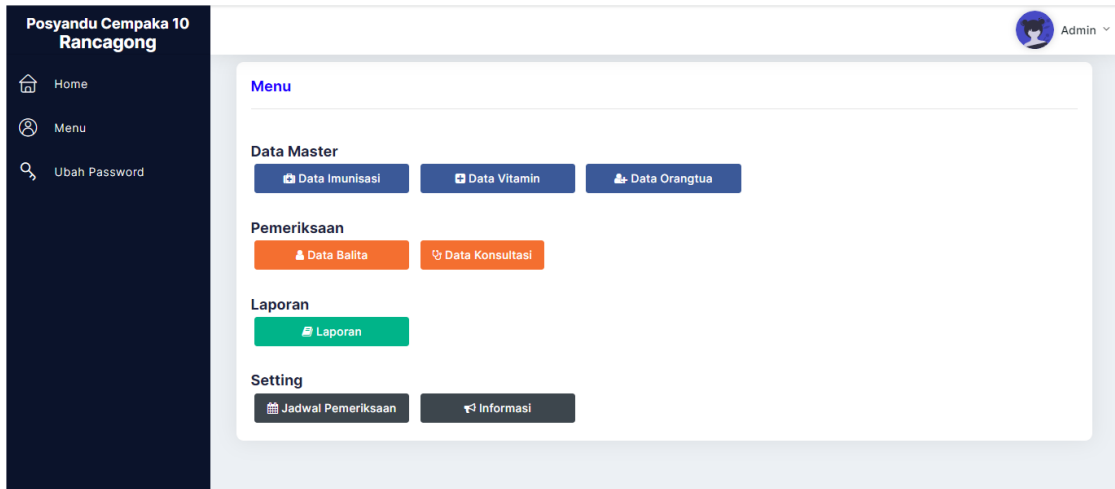


Figure 6. Menu Admin

In Figure 6, the immunization data menu, vitamin data menu, parent data menu, toddler data menu, consultation data menu, report data menu, examination schedule data menu, information data menu that can be selected or clicked to display the desired data[24].

3.3.4 Parent Menu Page

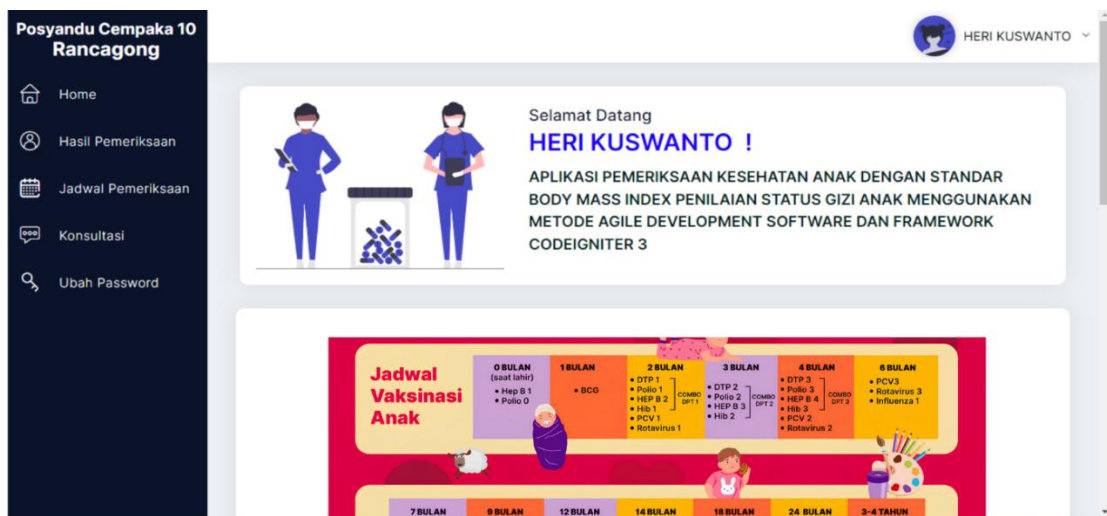


Figure 7. Parents Menu

In Figure 7, the parents' home page contains application information, immunization information, and scheduling of posyandu examinations.

4. CONCLUSION

Based on the research conducted on the Application of Child Health Checks with Standard Body Mass Index Assessment of Children's Nutritional Status Using the Agile Development Software Method and Codeigniter Framework 3, it can be concluded that the implementation of this application at the Posyandu in Rancagong Village is necessary to improve the effectiveness and efficiency of child health examinations. The application enables the assessment of children's nutritional status by calculating the Body Mass Index (BMI) using height and weight data of toddlers. Furthermore, the integration of the Codeigniter 3 Framework into the application simplifies and accelerates the examination process, particularly at Posyandu Cempaka 10 in Rancagong Village.

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