

INFORMATION SYSTEM FOR MONITORING THE GROWTH AND DEVELOPMENT OF TODDLERS

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ABSTRACT

The development of information technology has had a significant impact across various sectors, including the health sector, particularly at community health posts (Posyandu). At Posyandu Sakura VII Manang Grogol Sukoharjo, the process of recording and monitoring toddlers' growth and development is still carried out manually, leading to several challenges such as frequent errors in information delivery among staff due to crowded conditions, ineffective and inefficient recording processes, and difficulties in communicating growth and development results to parents. Furthermore, retrieving data from large record books is time-consuming due to the high volume of toddler records. This study aims to develop a web-based information system for monitoring toddlers' growth and development to improve efficiency and accuracy in data management and reporting. The system was developed using PHP and JavaScript with MySQL as the database, employing the System Development Life Cycle (SDLC) method, which includes planning, analysis, design, implementation, and maintenance stages. It manages data on toddlers, parents, village midwives, cadres, types of immunization, immunization records, weighing records, and health examinations. The system generates various outputs such as toddler data reports, village midwife data reports, cadre data reports, immunization type reports, immunization reports, examination reports, growth and development reports, and growth charts. A key feature is the automatic determination of toddlers' nutritional status based on height, weight, head circumference, arm circumference, and age, following the Indonesian Ministry of Health Regulation No. 2 of 2020 on Child Anthropometric Standards. Implementation of the system requires ongoing socialization and training for Posyandu cadres, village midwives, and parents to address technical challenges, improve understanding, and enhance participation.

Keywords: information system; monitoring; nutrition; posyandu; toddler

INTRODUCTION

Posyandu (Integrated Health Post) is a form of community-based health effort that is managed and implemented by, for, and with the community in the context of health development, aiming to empower the community and provide easier access to basic health services in order to accelerate the reduction of maternal and infant mortality rates, Putri. (2023). The activities at Posyandu are not limited to providing immunizations but also include monitoring the growth and development of infants and toddlers through weighing activities and the provision of supplementary food. The role of Posyandu also covers efforts in preventing and managing malnutrition, which can be carried out promptly if optimal monitoring is conducted, Kemenkes RI. (2016).

Growth and development monitoring of toddlers, as stipulated in the Indonesian Ministry of Health Regulation No. 66 of 2014, is carried out to improve the quality of early childhood development and is aimed at enhancing children's health, nutrition, cognitive, mental, and psychosocial status, Permenkes RI. (2014). Monitoring must be conducted comprehensively and with high quality through adequate stimulation activities, early intervention for growth and development disorders, and early detection. Such early detection can be optimally achieved when growth and development monitoring is supported by effective and efficient data monitoring processes.

The research partner in this study is the Posyandu in Manang Village, located in Grogol Subdistrict, Sukoharjo Regency. Based on observations and interviews, one of the main challenges faced is that staff have difficulty finding data in the large record books due to the substantial number of toddler records, which ultimately hampers the growth and development monitoring process.

The toddler growth and development monitoring information system features automatic measurement of children's nutritional status using standard child anthropometric indices, including: Weight-for-Age (W/A), Length-for-Age or Height-for-Age (L/A or H/A), Weight-for-Length/Height (W/L or W/H), and Body Mass Index-for-Age (BMI/A) Permenkes RI. (2014). The system is designed to assist stakeholders in making more accurate nutritional status determinations. System users include Posyandu cadres and parents, enabling parents to monitor their toddlers' growth and development regularly and accurately.

METHOD

Determining Nutritional Thresholds

According to the Indonesian Ministry of Health Regulation No. 2 of 2020 on Child Anthropometric Standards, the nutritional status of children is assessed or determined by comparing the measurements of body weight and length/height against the Child Anthropometric Standards, Permenkes RI. (2020).

Table 1.

Categories and Thresholds of Child Nutritional Status

Index	Nutritional	Threshold (Z-Score)
Weight-for-Age (W/A) for children aged 0-60 months	Severely underweight	< -3 SD
	Underweight	-3 SD sd < -2SD
	Normal weight	-2 SD sd +1 SD
	At risk of overweight	> +1 SD
Length/Height-for-Age (L/H-for-Age) for children aged 0-60 months	Severely stunted	< -3 SD
	Stunted	- 3 SD sd < - 2 SD
	Normal	-2 SD sd +3 SD
	Tall	> +3 SD
Weight-for-Length/Height (W/L or W/H) for children aged 0-60 months	Severely wasted (malnourished)	< -3 SD
	Wasted (malnourished)	-3 SD sd < - 2 SD
	Normal (well-nourished)	-2 SD sd +1 SD
	At risk of overweight	> + 1 SD sd + 2 SD
	overweight	> + 2 SD sd + 3 SD
Body Mass Index-for-Age (BMI/A) for children aged 0-60 months	Obese	> + 3 SD
	Severely malnourished	< -3 SD
	Malnourished	-3 SD sd < - 2 SD
	Normal (well-nourished)	-2 SD sd +1 SD
	At risk of overweight	> + 1 SD sd + 2 SD
	Overweight	> + 2 SD sd + 3 SD
	Obese	> + 3 SD

System Development Method

The system development methodology used in this study is the Systems Development Life Cycle (SDLC). SDLC consists of several stages: Planning, Analysis, Design, Implementation, and Maintenance. The explanation of each stage is as follows, Susanti. (2021):

Planning

The planning phase is the initial stage required to develop an information system. At this stage, the information system project is described and the rationale for continuing the project is presented. Based on preliminary surveys, the researcher planned to develop a toddler growth and development monitoring information system at Posyandu Sakura VII Manang Grogol Sukoharjo.

Analysis

The analysis phase is the second stage involving investigation or examination of the current system to understand how users operate the system and how the system works. This stage studies the old system by collecting information. The researcher gathered information through observation and interviews. Observation was conducted to understand the procedural flow and challenges occurring at Posyandu. Interviews were held with village midwives and Posyandu cadres regarding the system used and the procedural flow of toddler data recording.

Design

After identifying the software or information system requirements, the next stage is design. At this phase, the researcher designed the database schema and developed the user interface design to be used by Posyandu cadres and parent

Implementation

The implementation phase is the fourth stage where all previous designs are implemented and the system undergoes testing. At this stage, the researcher created the database according to the planned schema and developed the program code based on the design, then implemented it into the toddler growth and development monitoring information system, Andriani. (2020).

Maintenance

The maintenance phase is the final stage aimed at ensuring the system continues to operate well and functions optimally. It is expected that the system can meet the users' needs. At this stage, the system is improved or enhanced according to user requirements. The outcome is a toddler growth and development monitoring information system that can be used according to the needs of Posyandu cadres, village midwives, and parents.

Operational Definition of Variables

The purpose of defining variables operationally is to limit the scope or meaning of the variables observed or studied, Sarwono. (2018). The operational definitions in this study include: Toddler Data, Posyandu Cadre Data, Immunization Type Data, Toddler Weighing Data, Toddler Weighing History Data, Immunization Data, and Examination Data.

RESULT AND DISCUSSION

A. System Design

Context diagram of the Toddler Growth and Development Monitoring Information System at Posyandu. The system has three types of users: Posyandu cadres, toddler parents, and village midwives. The access rights of each user can be seen in the following context diagram:

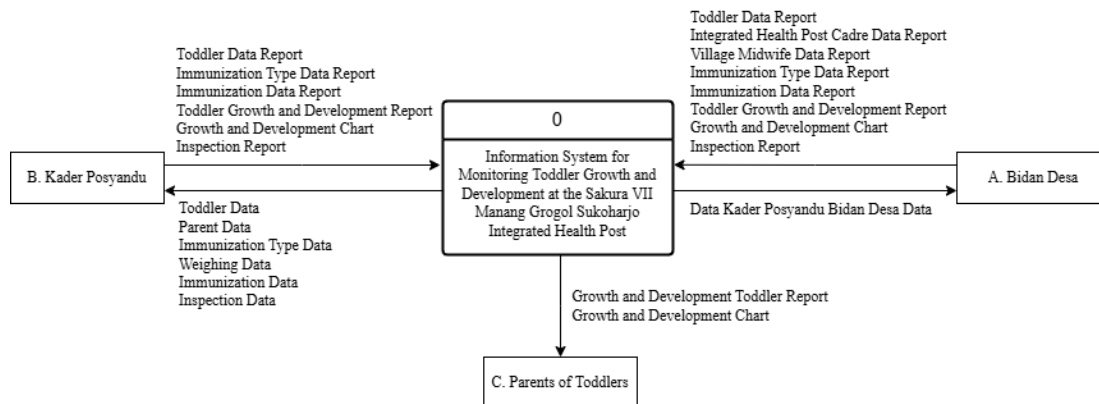


Figure 1 Context Diagram of the Toddler Growth and Development Monitoring Information System at Posyandu Sakura VII

Based on Figure 1, the Context Diagram of the Toddler Growth and Development Monitoring Information System at Posyandu Sakura VII Manang Grogol Sukoharjo shows that Posyandu cadres provide toddler data, parent data, immunization types, weighing records, immunization records, and examination data. Village midwives provide cadre data and village midwife data. These data are then sent to the toddler growth and development monitoring system database. After all data is collected, the system generates reports for the Posyandu cadres and village midwives. Additionally, toddler parents can monitor their child's weighing results through the developed system.

Table Relationships

The design of table relationships in the system's database can be seen in Figure 2 below:

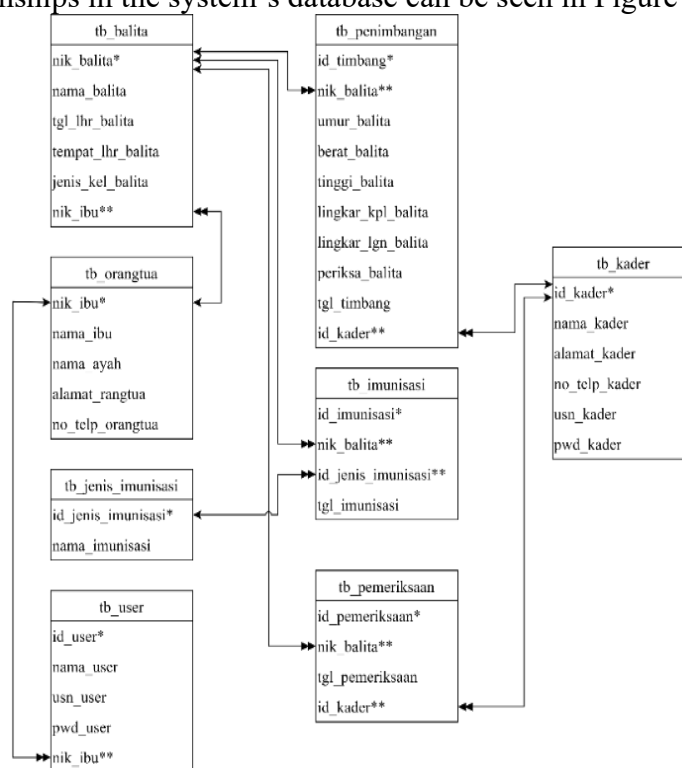


Figure 2. Table Relationships

Interface Design

Each system interface must have a design before being implemented into the program code. Below are several system designs for the toddler growth and development monitoring system at Posyandu. The design for toddler data input can be seen in the following figure:

Figure 3. Design of Toddler Data and Immunization Input

System users can log in with their respective accounts. After logging in, users are directed to the dashboard, which presents a summary of basic information. This facilitates quick and efficient access to the needed information. At this section, Posyandu cadres can set the Posyandu schedule dates, which will then be displayed on the parents' dashboard. This feature is designed to ensure that toddler parents always receive the latest information regarding Posyandu schedules. Consequently, collaboration between Posyandu cadres and parents can be more effective. According to the Indonesian Ministry of Health Regulation No. 2 of 2020 on Child Anthropometric Standards, the data required for recording toddlers' growth and development to determine nutritional status include height, weight, head circumference, arm circumference, and age. An advantage of this monitoring system is its ability to determine the child's nutritional status along with input forms and recording results of the growth and development data. Additionally, growth charts and toddler growth and development reports can be viewed by cadres, midwives, and parents.

Figure 4. Toddler Growth and Development Data

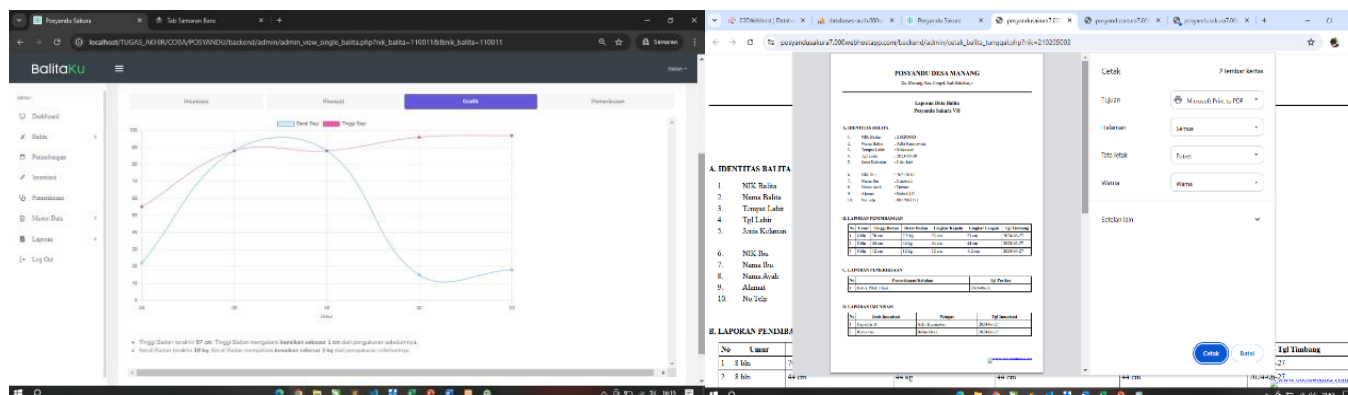


Figure 5. Output of Toddler Growth and Development Charts and Reports

CONCLUSION

The toddler growth and development monitoring information system at Posyandu is a web-based application developed using PHP and JavaScript programming languages, with MySQL as the database. It manages input data including toddlers, parents, village midwives, cadres, immunization types, immunization records, weighing records, and examinations.

The system development method applied is the System Development Life Cycle (SDLC), which encompasses planning, analysis, design, implementation, and maintenance stages. The system produces outputs such as toddler data reports, village midwife data reports, cadre data reports, immunization type reports, immunization reports, examination reports, growth and development reports, and growth charts. A key advantage of this system is its ability to automatically determine toddlers' nutritional status. The data required for determining the child's nutritional status include height, weight, head circumference, arm circumference, and age. The nutritional status determination is based on the Indonesian Ministry of Health Regulation No. 2 of 2020 concerning Child Anthropometric Standards. The system features automatic measurement of nutritional status using standard anthropometric indices including Weight-for-Age, Length/Height-for-Age, Weight-for-Length/Height, and Body Mass Index-for-Age. The system is designed to assist stakeholders in making more accurate decisions regarding nutritional status. System users include cadres and parents, aiming to enable parents to monitor their toddlers' growth and development regularly and accurately.

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