DESIGN OF CHILDHOOD ILLNESS SCREENING SYSTEM BASED ON CLASSIFICATION AND MANAGEMENT OF IMCI

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Abstract

Under-five mortality rate in Indonesia was 26.29 per 1000 live births in 2015. The SDG target by 2030 can reduce under-five mortality by 25 per 1000 births. Most of the causes of under-five mortality can be prevented by simple technology at the level of basic health services in the form of management tools for the management of sick toddlers, namely IMCI (Integrated Management of Illness Children). The purpose of this study was to design an Android-based sick toddler screening application. This research is an operational research, where researchers adopt the concept of IMCI to make early detection and management of sick toddlers based on Android. Application design is carried out in the computer laboratory of Jember State Polytechnic Medical Record Study Program. Application design is done by making flowcharts, data flow diagrams (DFD), entity relationship diagrams (ERD), and application interfaces. The results of the design of the sick toddler screening application allow the user to assess the condition of toddlers, classification of diseases and the provision of health efforts for sick toddlers automatically. The sick toddler screening application can be utilized by health cadres who are trained to find sick toddlers quickly and provide counseling for mothers related to the health of children under-five.

Password : Chilhood Illness, IMCI, Screening

I. INTRODUCTION

Under-five mortality rate in Indonesia amounted to 26.29 per 1000 live births in 2015.[1] The SDG's target in 2030 can reduce under-five mortality by 25 per 1000 births.[2] The causes of death for children under 5 years old include acute respiratory infections (ARI), fever, and diarrhea.[3] Most of the causes of under-five mortality can be prevented by simple technology at the level of basic health services. This simple technology is in the form of management tools that can be used to detect early childhood sickness and provide health measures to prevent the occurrence of under-five mortality, namely IMCI (Integrated Management of Childhood Illnesses).[4]

WHO (World Health Organization) socializes IMCI for the first time in Indonesia in 1996 and 2003 The Ministry of Health recommends IMCI to be implemented in all primary health services .[5] IMCI is an integrated or integrated approach in managing sick toddlers with a focus on healthy children aged 0-59 months or less than 5 years thoroughly. IMCI is implemented at first-level health care facilities.[6] MTBS is a management tool that seeks to improve the quality of health services in the management of sick toddlers in order to reduce infant mortality and illness.

The IMCI chart consists of assessing infants less than 2 months old and children aged 2-59 months, determining classification, determining treatment, counseling, follow-up services.[7] Based on Susilaningrum's research, et al in 2012 it was found

that the implementation of IMCI was not well done wrong the other is because the IMCI chart is too long and health workers do not have much time to complete IMCI forms. [8] Based on preliminary studies at the Jelbuk Health Center in Jember Regency, health workers need a tool that can accelerate IMCI implementation.

One way that can be done to facilitate the implementation of IMCI is to utilize information technology. If the concept of IMCI can be fully adopted into a computerized form, it can facilitate officers in implementing IMCI in first-level health services so that case finding and integrated health measures for sick toddlers can be carried out properly. Previous research has been conducted on making an expert diagnosis system for children under five years who take the concept of disease classification in the IMCI chart. The expert system that was built was to facilitate diagnosing diseases in toddlers.[9] Based on the description, the researcher was interested in adopting the concept of IMCI into an Android-based information system that was easy to use by health workers in screening and providing health efforts to sick toddlers.

This study aims to design a screening information system for sick toddlers by adopting 4 MTBS charts namely assessment of under-five conditions, classification of diseases, determination of health measures, and provision of information for maternal counseling. The design of information system for screening for sick toddlers can be used for early detection and management of sick toddlers quickly and accurately. An Android-based information system that is designed can also support the implementation of community-based IMCI programs where trained health cadres can use this information system to assist in finding cases of sick toddlers.

II. Literature Review

A. *Integrated Management Childhood Illness (IMCI)*

Integrated management of sick toddlers (IMCI) is an integrated approach in the management of sick toddlers with a focus on the overall health of children aged 0-59 months in the primary health care unit.[6] IMCI is a standard of care for sick children at the primary health care level primarily by nurses and midwives. The IMCI aims to improve the knowledge and skills of health workers in dealing with sick toddlers, improve the health care system and improve the knowledge and skills of mothers and caregivers in child care and the search for health assistance.[4] IMCI is introduced by WHO as a health care effort that aims to reduce mortality, illness, and disability of infants and toddlers in developing countries.[10]

IMCI implementation is assisted by using an IMCI chart book that explains the following steps:[4]

1. Assessing infants less than 2 months old and children aged 2-59 months
2. Determine the classification
3. Determine actions / treatment
4. Providing counseling for mothers
5. Providing follow-up services

B. *System Design*

System design according to John Burch & Gary Grudnitski is a process of drawing, planning, and making sketches or arrangements of several elements that are separated into one unit that is complete and functioning. Meanwhile, according to George M. Scott, system design determines how a system will solve what must be completed, this stage involves configuring the software components and hardware of a system so that after installation of the system it will really satisfy the design that has been set at the end of the system analysis phase.[11]

Design steps result in data design, architectural design, interface design, and procedural design. Data design transforms the domain model of information created during the analysis into the data structure that will be needed to implement the software. Architectural design determines the relationship between the main structural elements of the program. The interface design describes how the software communicates in itself, with the system that interoperates with it and with humans who use it. Procedural design transforms structural elements of the program architecture into a structural description of software components.

1. Flowchart

Flowcharts are charts that show the flow in a program or system procedure logically. There are five types of flowcharts, namely the system flowchart, document flowchart, schematic flowchart, program flowchart, process flowcharts. The system flowchart is

a chart that shows the overall flow of work from the system. This chart explains the sequences of procedures in the system. The system flowchart shows what is done on the system.[11]

2. Contex Diagram

   Context Diagram is a top-level diagram, that is a global diagram of an information system that describes the flows of data into and out from inside and outside an external entity. DFD Level 0 is usually called a core system diagram (fundamental system model) or core system model or called a context diagram (context diagram) or context model. [12]

3. Data Flow Diagram

   DFD can be used to present a system or software at several levels of abstraction. DFD can be divided into several more detailed levels to present more detailed information flow or function. DFD provides a mechanism for functional modeling or information flow modeling. Therefore, DFD is more suitable to be used to model software functions that will be implemented using structured programming to divide its parts with functions and procedures.

4. Entity Relationship Diagram

   Entity Relationship Diagram (ERD) is the most widely used initial modeling database. ERD was developed based on set theory in the field of mathematics. ERD is used for relational database modeling so that if database storage uses OODBMS (Object Oriented Database Management System) or object-oriented database management systems, the database design does not need to use ERD.[12]

III. METHODE

This research is a type of operational research, where the research resulted in an Android-based sickness screening information system design. The design of information system for screening for sick toddlers is designed by adopting the concept of an IMCI chart in the form of an assessment of under-five conditions, classification of diseases, provision of toddler health care efforts, and counseling. The system design produced in this research is procedural design in the form of the flowchart, architectural design in the form of DFD level 0 and DFD level 1, database design in the form of ERD, and interface design of sick toddler based screening information system based on android.[13]

IV. RESULT

The results of the design of the screening system for sick toddlers in the form of procedural design, architectural design, database design, and interface design. Procedural design in this study by designing a document flowchart and system flowchart. Document flowchart is a form flow chart of a sick toddler screening information system. Users of the information screening system for toddlers consist of health workers (midwives and nurses), administrators at Puskesmas, and mothers of infants. Trained health cadres can be users with the same access rights as health workers. Document flowcharts are shown in Figure 1.

Figure 1 shows the role of the admin in the information system for screening for sick toddlers is to input data from health workers and provide a username password to health workers as access rights to the information system. Admin obtains information on toddler data, health worker data, and disease information that can be processed into reports. Health officers with a username and password that has been given by the admin can enter the screening system for sick toddlers. The role of health workers is to input toddlers' data, namely the general condition of toddlers and the results of examinations to find out the classification of diseases and health service actions. Users, in this case, mother toddlers can get information about toddler care on the consultation menu.

The second procedural design is the flowchart system from the sick toddler screening application. The Flowchart system or system flowchart is designed to find out the overall flow of work from the system. This chart explains the sequences of procedures in the system. The system flowchart shows what is done in the system.[11] This toddler screening application is designed to be able to automatically classify and administer health service actions.

Figure 2 shows the flowchart of a sick toddler screening system in this study. The system flow chart of the sick toddler screening application starts from the health officer entering the application using the username and password that has been given by the admin. Then health workers enter the toddler's general data, then health workers input the toddler's data from the examination of the symptoms of the disease. Data

on toddlers' symptoms that have been inputted will be processed by an application which then results in the classification of toddler diseases and health efforts that must be given.

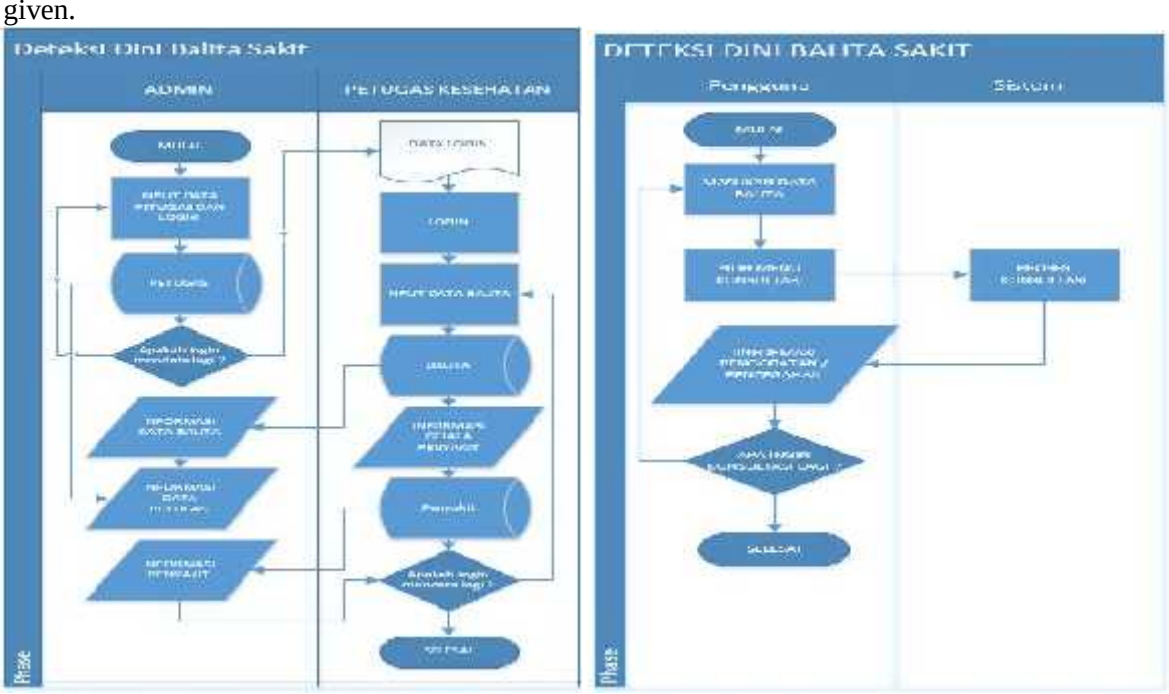

Figure 1 Document Flowchart Screening System for Sick Toddler

The architectural design in this study is the design of data flow diagrams (DFD) level 0 and level 1. DFD Level 0 is usually called a core system diagram (fundamental system model) and is also called a context diagram or context model. DFD level 0 from an information system is able to describe the data streams into and out from inside and outside of external entities.

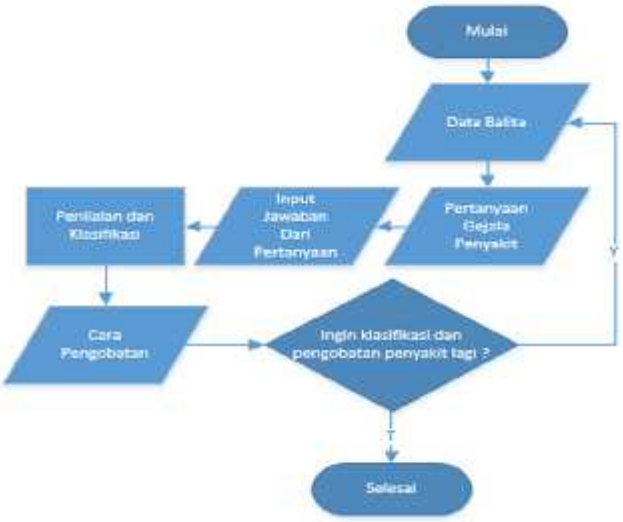

Figure 2 Flowchart Screening System for Sick Toddlers

Figure 3 is a flowchart of level 0 data that can describe the flow of data or information from inside and outside the screening system for sick toddlers. The screening application for sick toddlers is designed to

have access rights namely midwives and nurses at the Puskesmas. Access rights can also be given to trained health cadres to help screen sick children. Previously admin entered health worker data to determine application permissions. Health workers who have obtained a username and password from the admin can do the login process. Furthermore, health workers can enter general data on toddlers and examination results. Admin obtained general data on toddlers, data on health workers, and data on under-five children.

Level 1 DFD is able to present more detailed information flow or function. Figure 4 shows the relationship between users, data flow, and data storage in a sick toddler screening application. Health worker data that has been inputted by admins is included in the officer database. Based on this officer database, health workers will get application access rights in the form of a username and password that can be used to enter the sick toddler screening application. Health workers who successfully log in to the next application can input the toddler general data that will be stored in the toddler database. In addition, health workers also input examination results in data that will be stored in the disease database.

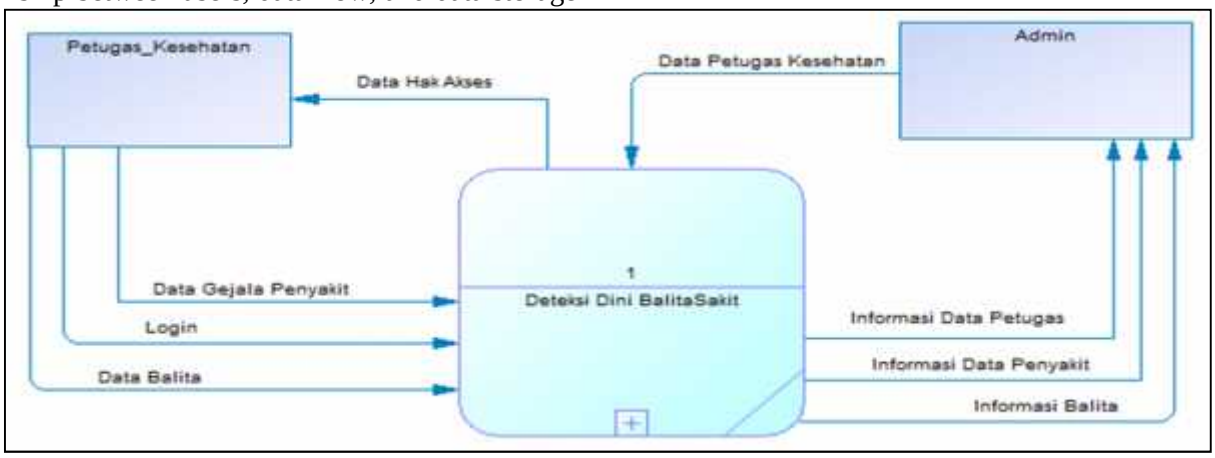

Figure 3 Data Flow Diagram Level 0

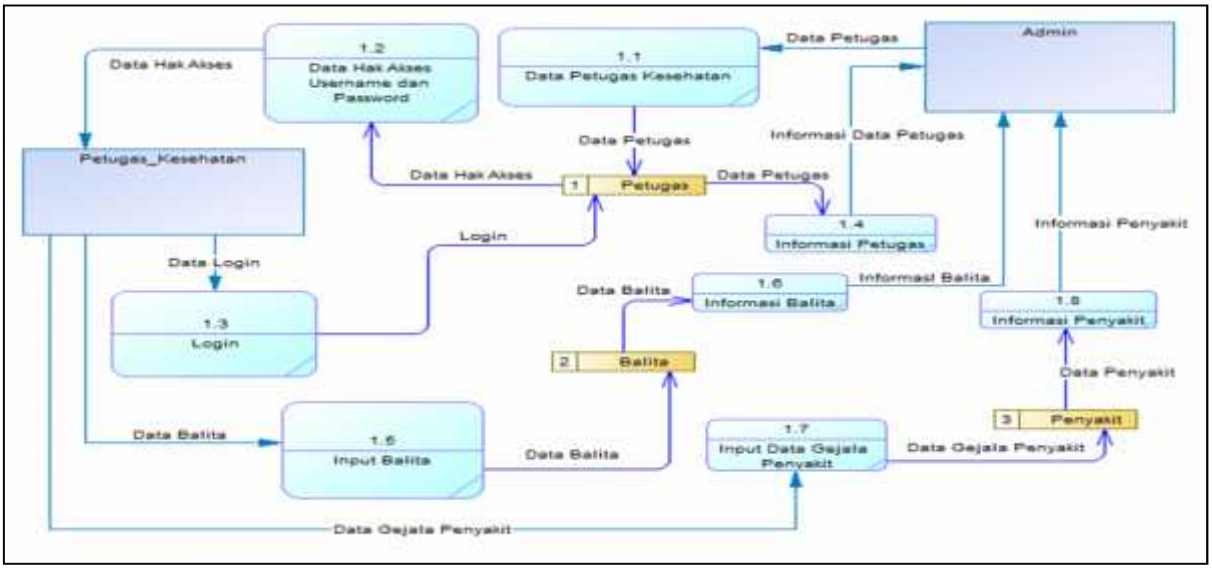

Figure 4 Data Flow Diagram Level 1

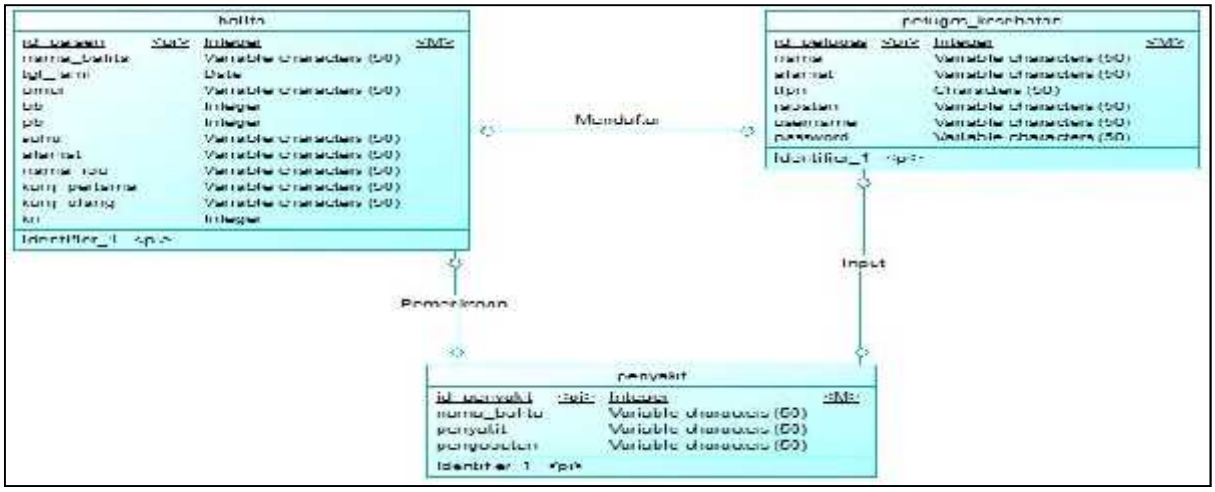

Figure 5 Entity Relationship Diagram

The database design in this study refers to the relational data model using the Entity Relationship Diagram (ERD). Entity Relationship Diagrams can be seen in Figure 5. Entity relationship diagrams are designed to determine database design and relationships between entities in the system. There are three tables that become the basis for designing databases, namely the toddler database, disease database, and health worker database. The health officer database contains the identity of the health worker, username, and password used to log into the sick toddler screening application. The toddler database contains general data on toddlers. The results of the classification of under-five illnesses and treatment measures are included in the database of diseases.

Interface design is a display design for Android-based sick toddler screening application that will be created. Figure 6 is the initial display menu containing the login menu, recording form, and consultation menu. Figure 7 shows the appearance of the toddler general data recording form. Figure 8 is a display menu for assessing a baby's condition based on the results of an examination by a health worker. The assessment results are in the form of the classification of diseases and the provision of health efforts can be seen in Figure 9.

Figure 6 Main Menu

Figure 7 Registration Form

Figure 8 Childhood Assessment

Figure 9 Classification and Treatment

V. CONCLUSION

1. The design of the screening application for sick toddlers is designed to be able to automatically classify the disease based on the examination data.
2. The design of screening applications for sick toddlers is designed to be able to provide health efforts based on the results of the classification of diseases.
3. The design of a sick toddler screening application is designed to produce reports of types of diseases in infants.

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