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# Expert System for Detecting Malnutrition in Toddlers Using the WEB-Based Certainty Factor Method

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**ABSTRACT**

Malnutrition is based on the nutritional status indexes Weight Loss by Age (W / A) <-3 SD is severely underweight equivalent term. Where there are two types of malnutrition are kwashiorkor, marasmus. if the lack of nutrition the infants are susceptible to malnutrition because of the growth and development of this cycle requires nutrients were greater than the age of the other so easily suffer from nutritional disorders, if not treated immediately will cause death and chronic infection. In the current system there are some drawbacks such as the absence of security following safety features such as anti-virus as a means to protect the database on these weaknesses then designed and built an expert system Identifying Malnutrition In Toddlers with certainty factor method designed web- based using program based on Macromedia Dreamweaver 8, especially PHP and using MySQL as database. The report is designed using iReport and the modeling system is done with UML 2.0. design aims to build an expert system to identify symptoms of malnutrition using the method of Certainty Factor (CF) and to build an expert system that will generate information from experts (books, as well as references that support) accurately.



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## 1. INTRODUCTION

Malnutrition is a nutritional status based on the index Weight for Age (BB/U) < -3 SD which is the equivalent of the term severely underweight. Where there are two types of malnutrition, namely kwashiorkor, marasmus (Ichwan et al., 2020). If malnourished, toddlers are vulnerable to malnutrition because in this growth and development cycle requires nutrients that are greater than other ages so that they are prone to suffering from nutritional disorders, if not treated immediately it will cause death and chronic infection (Central Bureau of Statistics, 2020).

Malnutrition in Indonesia is still high where there are around 39,080 cases/toddler affected by malnutrition. With the recent return of news coverage in the mass media regarding malnourished toddlers who were found and died, it shows that the surveillance and response system from various related agencies is not optimal (Regina & Wahyuni, 2020).

An expert system is a computer system that is intended to emulate all aspects of an expert's decision making ability. Expert systems make maximum use of specific knowledge like an expert to solve problems (Karim & Drajana, 2022).

Expert system application programs are currently highly developed into web-based expert systems with the reach of providing a wider range of information to the public and can be used by all people around the world (Ardianto et al., 2012).

To identify the following problems, an expert system application has not yet been developed in determining malnutrition in toddlers so that further treatment can be carried out, there is no implementation of the Certainty Factor method (Sundari et al., 2021). In the application of an expert system for malnutrition in toddlers to get solutions to problems, it cannot be implemented outside the computer system, there is no security in the form of antivirus features as a medium to protect databases (Sianturi et al., 2021).

## 2. RESEARCH METHOD

In completing this study the authors used 2 (two) study methods, namely:

a. Observation
   Is one method of data collection that is quite effective for studying a system. Activities by direct observation of ongoing activities.
b. Sample
   Take examples of data needed, especially information on detecting Malnutrition in toddlers.
c. Library Studies (Library Search)
   The author conducted a literature study to obtain data related to thesis writing from various reading sources such as: books on information systems and PHP applications, the internet and others.

### 2.1 Design Procedure

Is the procedures and steps needed to achieve the design objectives carried out. The activities carried out at each stage are as follows:

a. Research Target/Purpose
   The target of the research being conducted is to create an application to detect malnutrition in toddlers to facilitate the work of assistants or doctors in processing data and producing more accurate information.
b. Needs analysis
   After going through the stages of the design procedure, the next stage is needs analysis, namely things needed for system design in the form of PHP, MySQL, Macromedia Dreamweaver software, and data from symptoms that cause malnutrition.
d. Specifications and Design
   At this stage, the specification and design of the software that will be realized is to build an expert system application to diagnose the symptoms of this disease using PHP programming with MySQL database and designed using Macromedia Dreamweaver [2].

## 3. RESULTS AND DISCUSSIONS

The following describes the display of the results of the design of the Expert System for Detecting Malnutrition in Toddlers which can be seen as follows:

a. Home Menu Display
   The initial menu display is the display of the opening menu or the main menu of the application. In this view, there is a home that contains an explanation of malnutrition, information men to identify the causes of malnutrition, a consultation menu to access the application for consultation questions, as well as an expert login menu to access the application as an expert. The initial menu display image is shown in Figure 1 below:


**Figure 14.** Home Menu Display

b. Expert Login View
This view is a login display as an expert before accessing the expert's initial menu. In this menu, before logging in, the expert must enter a valid username and password. The expert Login display image is shown in Figure 2 below:


**Figure 15.** Expert Login View

c. User List Menu Display
This view is a full access display for experts to manipulate disease data, symptoms, questions, solutions, patients, results reports and logout. To run it, just click on one of the menus. An image of the expert's initial menu display is shown in Figure 3 below:

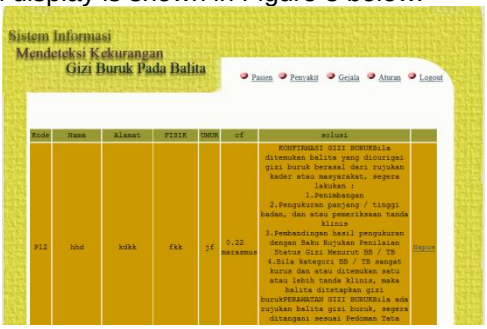


**Figure 16.** User List Menu Display

d. Disease Menu Display
This view is a display for manipulating disease data such as adding new disease data, editing existing disease data or deleting existing data. The disease menu display image is shown in Figure 4 below:


**Figure 17.** Disease Menu Display

e. Symptoms Menu Display
This view is a display for manipulating symptom data such as adding new symptom data, editing existing symptom data or deleting existing data. The question menu display image is shown in Figure 5 below:


**Figure 18.** Symptoms Menu Display

f. Consultation Menu Display
This view is a view to access the application as a patient. Before conducting a consultation, patient data cannot be empty. The Consultation display image is shown in Figure 6 below:


**Figure 19.** Consultation Menu Display

g. FAQ Menu display
This display is a display to start the consultation by answering the questions posed by the system after pressing the consultation button, then the system will provide output in the form of the results of the consultation based on the patient's answers to the questions posed by the application. The Question and Answer display image for answering questions asked by the system is shown in Figure 7 below:


**Figure 20.**FAQ Menu display

## 4. CONCLUSION

Based on the results of the discussion and trials that have been carried out, it can be concluded that the results of the test "Information System for Detecting Malnutrition in Toddlers using the Certainty Factor Method" shows that this expert system can detect malnutrition in toddlers according to the answers given by patients accurately. The expert system created will provide solutions in the form of initial treatment and patterns of handling malnutrition. The decision-making Certainty Factor that has been implemented in this thesis has given satisfactory results because it has used a method that is in accordance with the needs of the system that groups disease values based on symptoms which will be selected by the patient.

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