Design and Build Applications for Maternal and Child Health Promotion and Services to Overcome Stunting in NTT Province

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ABSTRACT

A good level of health enables everyone to live socially and economically productive lives. The government has determined the acceleration of stunting reduction as the main project because the proportion of stunted children under five is a very important parameter for the development of human and national capital. Based on data, the Province of East Nusa Tenggara (NTT) is the area with the highest prevalence of stunting in Indonesia but the second lowest Information Technology Development Index in Indonesia. Therefore, the purpose of this research is to design and build applications for promotion and services for maternal and child health to overcome stunting in the province of NTT, so that improving the quality of health promotions and services, can have an impact on changes in public health services. The design and development of this application use a spiral model so that the application can later be adopted for use within the scope of the NTT Province and continue to be improved and developed in the future. This application is built using Code Igniter 4 framework and MySQL database. In this web-based application for promotion and maternal and child health services, it will be easier for people in NTT Province to get information about immunization schedules, location of health facilities, learning articles, and local government publications related to maternal and child health within the scope of NTT Province.

Keywords: Application, Web, Promotion, Health, Stunting, NTT

1. Introduction

Health is a state of health physically, mentally, spiritually, and socially that enables everyone to live socially and economically productive lives (Law No.36 Concerning Health, 2009). To support the Vision of the President of the Republic of Indonesia (RI) for 2020 – 2024, the Ministry of Health (Kemenkes) of the Republic of Indonesia has set strategic targets for carrying out health development, some of which are as follows: (1) improving maternal and child health and community nutrition, (2) increasing the effectiveness of management health research and development and health information systems (Report of the Ministry of Health of the Republic of Indonesia Year 2020, 2021).

The proportion of stunting toddlers is very important as a parameter of human capital development. The government has also determined the acceleration of stunting reduction as a major project that must be worked on with strategic, effective, and efficient steps. The province in Indonesia
with the lowest percentage of stunting under five is Bangka Belitung at 4.6%, while East Nusa Tenggara (NTT) is the area with the highest prevalence of stunting, at 24.2%. (Report of the Ministry of Health of the Republic of Indonesia Year 2020, 2021).

Health promotion is an effort of providing health information to the public so that people are willing and able to maintain and improve their health[3], the purpose of health promotion is to trigger changes in public health behavior for the better, then have an impact on the health status of the community. The use of communication for health promotion must always be improved for the success of public health. Communication science has an important role in analyzes of efforts to improve the quality of human life, especially communication strategies for overcoming health crises in disseminating health information. [4]. Health promotion includes the use of communication techniques used in conveying and changing the cognitive, affective, and psychomotor of the community regarding the health of the individual. This can be seen through health promotion which seeks to change and encourage healthy behavior, raise awareness, and change behavior in a positive direction(Yulia, 2021).

The 2020 Information and Communication Technology (ICT) Development Index (IP) in Indonesia with a scale of 0-10, the highest is DKI Jakarta with 7.46 while Papua is the lowest at 3.35 while NTT is the second lowest with a percentage of 4.49%[6]. The role of ICT can overcome obstacles in health promotion and manual data processing related to input, data processing, output, and reporting by developing information systems[7]. Product innovation and creativity of the NTT millennial generation that synergizes with the local government to promote progress and regional development in an interactive, contemporary and latest manner and support the "NTT Rise, Towards Prosperity" program includes the development of applications to promote maternal and child health to overcome stunting in NTT[8].

To overcome the problems based on the description above, the researchers are interested in researching "Design and Development of Maternal and Child Health Promotion and Services Application to Overcome Stunting in NTT Province".

Based on the discussion of the background, problems can be identified, and conclude the formulation of the problem in the form of "How to build an application to overcome stunting in NTT Province?".

The purpose of this study was to "Design and Build Applications for Maternal and Child Health Promotion and Services to Overcome Stunting in NTT Province".

2. Methodology

The design of this research is descriptive qualitative analysis. The research method used to obtain data and information is the literature study method, namely collecting data and information by reading reference books, e-books, and websites. The flow of the research itself can be seen in the following figure (Figure 1):

![Figure 1. Research Flow](image)

Based on the problems that occur, the software development method used is a spiral model. The spiral model is an improvement from the waterfall and prototype models by combining the advantages of both models. In addition, the spiral model is designed in a revolutionary manner with clear stages and is open to the participation of the customer to participate in determining the system modeling[9]. In this model there are several stages in the design of the application as shown below:
Figure 2. Spiral Model Stages

Based on the picture of the stages of the spiral model in software development, the following is an explanation of the stages of the spiral model, namely:

1. Customer Communication
   In this stage, the research is carried out by communicating effectively between developers and users to identify problems and determine work needs. Communication is carried out to obtain and collect research materials and data following what is needed.

2. Planning
   In this stage, the research is carried out by defining resources, time limits, and plans for designing the application that will be carried out.

3. Analysis
   In this stage, it is done by analyzing data from the results of interviews and observations that have been made to determine the need for tools and materials in the design of the application, such as:
   a. Laptops

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laptops</td>
<td>Processor AMD Ryzen 3 3200U 8GB DDR3 RAM</td>
</tr>
<tr>
<td></td>
<td>AMD Radeon™ Vega 3 Graphics 500GB SSD</td>
</tr>
</tbody>
</table>

b. Smartphone

Table 2. Specification of Smartphone Hardware

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smartphone</td>
<td>Processor 2.0 GHz Octa-Core</td>
</tr>
<tr>
<td></td>
<td>3GB RAM</td>
</tr>
<tr>
<td></td>
<td>ROM 32GB</td>
</tr>
</tbody>
</table>

Software (Software)

Table 3. Specification of Smartphone Hardware

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</tr>
</tbody>
</table>

2. Software (Software)

To research the Design of Maternal and Child Health Promotion Applications and Services to Overcome Stunting in NTT, some software on laptops and smartphones is needed, namely:
a. Laptops  
The laptop software specifications needed are as follows:

Table 4. Specification of Laptop Software

<table>
<thead>
<tr>
<th>No.</th>
<th>Software</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Operating system</td>
<td>Windows 10 Home</td>
</tr>
<tr>
<td>2</td>
<td>TextEditor</td>
<td>Visual Studio Code 1.6.42</td>
</tr>
<tr>
<td>3</td>
<td>Database</td>
<td>MySQL</td>
</tr>
<tr>
<td>4</td>
<td>Programming language</td>
<td>PHP</td>
</tr>
<tr>
<td>5</td>
<td>Framework</td>
<td>Code Igniter 4</td>
</tr>
<tr>
<td>6</td>
<td>Local Server</td>
<td>XAMPP</td>
</tr>
<tr>
<td>7</td>
<td>Interfaces and Mockup Design</td>
<td>Photoshop Portable and Canva</td>
</tr>
<tr>
<td>8</td>
<td>Web Browser</td>
<td>Google Chrome</td>
</tr>
</tbody>
</table>

b. Smartphone  
The smartphone software specifications needed are as follows:

Table 5. Specification of Smartphone Software

<table>
<thead>
<tr>
<th>No.</th>
<th>Software</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Operating system</td>
<td>Android 9 Pie</td>
</tr>
<tr>
<td>2</td>
<td>Web Browser</td>
<td>Google Chrome</td>
</tr>
</tbody>
</table>

Data Needs  
Sourced from elements of the NTT Provincial Government, especially the NTT Provincial Health Office.

4. Engineering  
In this stage, the research is carried out by making or designing applications following the identification of problems and the analysis that has been carried out. Data modeling will be made using Data Flow Diagrams (DFD) to explain in detail and detail about the design of the application that will be carried out.

5. Construction and Release  
In this stage, it is done by testing the system and applications that have been built to find out whether the application is running as expected.

6. Customer Evaluation  
This stage is the evaluation stage of the application that has been built and tested as a reference to determine the application flow that runs according to the procedures in the application design that have been carried out.

3. Results and Discussion  
A. System Analysis  
System analysis is one of the stages in system development after communicating with customers and the information is summarized to determine the identification process regarding things that will be needed and must exist in the system so that the system can run according to the expected goals. System analysis is done by determining what is the input of the system, data processing, and output of the system.

B. System Design  
The design aims to provide an overview of the system that will run for each stakeholder (Hidayatulloh, 2020). System design includes several parts, namely:

1. Use Case Diagram Design  
The use case diagram is divided into two parts, which are described as general users/parents and admin users. The following is a use case diagram for the Design and Development of Maternal and Child Health Promotion and Service Applications to Overcome Stunting in NTT Province:
2. Activity Diagram Design
Activities in the system are divided into two sides, namely the general user/parent side and the admin user, which can be described as follows:

Figure 4. Activity Diagram User Admin

3. Sequence of Diagram Design
A sequence of diagrams describes the interaction between objects in the system in a stage or time series[11]. The sequence diagram is divided into two, namely general users/parents and admin users as follows:

Figure 5. General User/Parent Sequence Diagram

4. System Flowchart Design
The system flowchart shows the workflow systematically. The system has two parts, namely a web landing page for general users/parents and an admin application for promotions and maternal and child health services, as follows:
5. DFD Design
DFD (data flow diagram) is a tool for describing or explaining a system that runs logically[12]. In designing the system using two DFD, namely context diagrams or level 0 diagrams and level 1 diagrams, as follows:

![Figure 7. DFD Level 0]

6. ERD Design
ERD (entity relationship diagram) is a model to be made to compile a database along with relationships or relationships in the system, as follows:

![Figure 8. ERD Maternal and Child Health Information System]

7. Database Design
The database development process consists of two main stages, namely: the design analysis stage and the implementation stage[13]. The database was created with the name sinka.sql which has
nineteen (19) main tables that are connected to produce accurate and specific information following the expected design, as follows:

![Child Table](image)

Figure 9. Child Table

8. Interface Design
The design of the interface or interface is a face-to-face depiction between the application and the user, aiming to facilitate the development of the system by coding[14]. The system interface is divided into two, namely the general user/parents view and the admin user, as follows:

![General User/Parent Display Design](image)

Figure 10. General User/Parent Display Design

C. Implementation
Implementation of the design is carried out after the analysis, design, and interface display stages of the system using a web-based system. The design implementation itself is an application development process by coding using HTML, CSS, PHP, JavaScript, and SQL languages using the VS Code text editor. The implementation is divided into two main views, namely the general/parent user view and the admin user.

1. General User Display
The general user or parent display is the display that first appears when general users and admin users access web-based applications for promotion and maternal and child health services in the Province of NTT.

![General User/Parent Display](image)

Figure 11. General User/Parent Display
2. User Admin Dashboard View
The dashboard page view is the first page that appears after successfully logging in from the system admin web login menu. This page contains a summary report in the form of the amount of data in the application features, as follows:

![Dashboard View](image)

Figure 12. Admin User Dashboard View

D. Test Results
Testing is done by testing each process and the possible errors that occur for each process. The tests carried out are structural tests involving detailed technical knowledge[15]. Here are the test results:
a. General User or Parent Landing Page Web Testing

Table 6. Web Test for General User or Parent

<table>
<thead>
<tr>
<th>Input Data</th>
<th>Expected</th>
<th>Observation</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select a menu in the navbar</td>
<td>Will be directed to the selected content from the navbar menu</td>
<td>Successfully displaying information from the selected menu</td>
<td>Received</td>
</tr>
<tr>
<td>Choose one of the article/news cards in the article/news content</td>
<td>Will open detailed information on the selected article/news</td>
<td>Successfully displaying information from the selected article/news</td>
<td>Received</td>
</tr>
</tbody>
</table>

b. Web User Admin Test

Table 7. Web Test for Admin User

<table>
<thead>
<tr>
<th>Input Data</th>
<th>Expected</th>
<th>Observation</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log in by entering data on the auth login page from the footer entry menu</td>
<td>Open the login page, can enter username and password data, and successfully entered the web user admin</td>
<td>Successfully logged in and entered the web user admin</td>
<td>Received</td>
</tr>
<tr>
<td>Register by entering data on the auth login registration page</td>
<td>Open the registration page, can enter new user data, and successfully register a new user</td>
<td>Successfully registered, and returned to the auth login page</td>
<td>Received</td>
</tr>
<tr>
<td>Selecting one of the menus in the web user admin sidebar</td>
<td>The data selected from the sidebar menu will open on the admin user web content page</td>
<td>Show information from the selected menu on the admin user web content page</td>
<td>Received</td>
</tr>
</tbody>
</table>
c. Testing Entering Data

Table 8. Testing Entering Data

<table>
<thead>
<tr>
<th>Input Data</th>
<th>Expected</th>
<th>Observation</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adding information according to the selected add data menu</td>
<td>The input function works well and can store data in the database</td>
<td>Successfully perform the function of entering data and stored in the database</td>
<td>Received</td>
</tr>
</tbody>
</table>

4. Conclusion

Applications for promotion and maternal and child health services to tackle stunting in NTT Province have been designed and built. Application development using Code Igniter 4 framework, MySQL database. Application development uses the following additional libraries, for login and registration using Myth Auth, maps using Leaflet Java Script, custom options using Select2 Java Script, and charts using Chart Java Script. The benefits of the application for general users are to get information on immunization schedules, locations of health facilities, health articles/news, and local government publications from the application. Admins at health facilities and regional agency leaders can be helped by collecting data on the history of child development and publishing information using applications.

Suggestions for developing applications for Maternal and Child Health Promotion and Services to Overcome Stunting in NTT Province are the parent registration and login features, the report saves feature in the form of a pdf file, and the report print feature so that it can be used as data for the benefit of the local government and learning, and developed become a mobile application so that it can be published on the Playstore making it easier to access applications from both general users/parents and admins.

Reference

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N. Hidayati, Modul Sistem Basis Data, Universitas Bina Sarana Informatika, 2019.