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MOMMYWELL: INNOVATIVE INTEGRATED HEALTH APPLICATION FOR IMPROVING MATERNAL AND CHILD HEALTHCARE IN THE DIGITAL ERA

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Abstract (English)
The urgent need to address the high maternal and infant mortality rates in Indonesia, emphasizing the imperative to bridge existing gaps in health information and education. It underscores the necessity for comprehensive strategies that encompass broad educational campaigns, accessible resources, and innovative platforms to empower mothers with the knowledge and resources needed to make informed healthcare decisions. The study also acknowledges the transformative potential of mobile applications in advancing maternal and child health, highlighting the challenges of technology accessibility and digital literacy that must be navigated for the widespread and effective utilization of health-related apps. The identified challenges underscore the necessity of ensuring that the benefits offered by mobile applications are accessible to all segments of the population, and efforts to enhance users' ability to navigate and comprehend health-related apps are crucial. In conclusion, the abstract emphasizes the substantial promise of mobile applications in healthcare and the paramount importance of addressing challenges related to technology accessibility and digital literacy through a holistic approach that prioritizes inclusivity, education, and support.

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1. INTRODUCTION

Stunting in Indonesia is a significant issue that affects the growth and development of children. Stunting is characterized by chronic malnutrition and recurrent infections, leading to impaired physical and cognitive development.

Stunting is a prevalent form of malnutrition, particularly in developing countries, and it affects the physical and cognitive development of children. Several studies have highlighted the impact of stunting on various aspects of health and well-being.

Stunting is the most common form of nutritional deficiency, affecting infants and young children. It is often associated with low family income and food insecurity, which can hinder a child's growth and development. Today, stunting is a global issue with long-term implications for individuals. It can lead to decreased academic performance, increased risk of obesity, and higher susceptibility to non-communicable and degenerative diseases.

Efforts to address stunting in Indonesia involve implementing convergent interventions, including identifying the distribution of stunting, program availability, and addressing challenges in integrating nutritional interventions. It is crucial for the government and various stakeholders to work together to achieve the targeted reduction in stunting prevalence and ensure the optimal growth and development of children in Indonesia.

Based on the available data, the majority of stunting cases in Indonesia are found in children aged 3-4 years (36-47 months). The prevalence of stunting in Indonesia is currently 21.6%, with a target to reduce it to 14% by 2024. Approximately 6.3 million young children in Indonesia are affected by stunting. Efforts to reduce childhood stunting in Indonesia have shown progress, with a goal to reach a stunting rate of 14% by 2024. However, challenges persist, including disruptions caused by the COVID-19 pandemic, which have the potential to hinder Indonesia's progress in reducing stunting rates.

Stunting needs to be prevented because this condition can have significant long-term impacts on the growth and development of children. Stunting is caused by chronic malnutrition over an extended period, affecting both the physical and cognitive growth of children. The adverse effects of stunting include cognitive impairment, learning difficulties, increased risk of non-communicable diseases such as hypertension, heart disease, and kidney failure, as well as a weakened immune system. Additionally, stunting can impact a child's intelligence and future health status. Therefore, preventing stunting is crucial to safeguard the quality of future human resources, ensuring that children grow up intelligent, healthy, and with strong immune systems. Efforts to prevent stunting involve ensuring adequate nutrition during the first 1000 days of a child's life, focusing on maternal health during pregnancy, and fostering collaboration across sectors and within communities to collectively reduce the prevalence of stunting.

To address these challenges, a holistic mobile application has been developed that focuses on maternal and child health while providing adequate education for mothers in managing pregnancy and child care called “MOMMYWELL”. The application includes various features such as health care scheduling, pregnancy guides, maternal and child health calculators, community forums, parenting education, child growth recording, online consultation, health tips, and emergency health features.

2. MATERIALS AND METHODS USED

2.1 Research Design

This research adopts a Research and Development (R&D) design approach. This design allows for a systematic and targeted development of the mobile application according to user needs. The method encompasses the stages of analysis, program design, development, and evaluation.

2.2 Data Collection Technique

Data for the development of this application is obtained through a combination of observation, interviews, and literature review. Observation is conducted to gain in-depth insights into user needs, while interviews are used to gather direct input from mothers who are the target users of the application. Literature review is employed to identify best practices and guidelines in the development of similar health applications.

2.3 Data Processing Technique

Collected data is processed using a combination of qualitative and quantitative analysis techniques. Qualitative analysis is used to understand user perspectives and preferences, while quantitative analysis is employed to identify dominant needs in application development.

2.4 Tools and Material

The development of this application involves various software and hardware components. Software includes Android Studio for Android application development, Java programming language, and SQLite database for data storage. Hardware encompasses personal computers for development and Android smartphones for application testing.

2.5 Implementation Method

The ideal implementation method utilized in this research is the analysis – design – development – implementation – evaluation (ADDIE) framework. However, because this research is currently in the form of a literature study, the implementation stage cannot be executed yet. This method was introduced by Reiser and Molenda in 1990. It was chosen for its practicality, which enhances the quality of the system. The research will be continued due to the creation of a structured and supervised program.

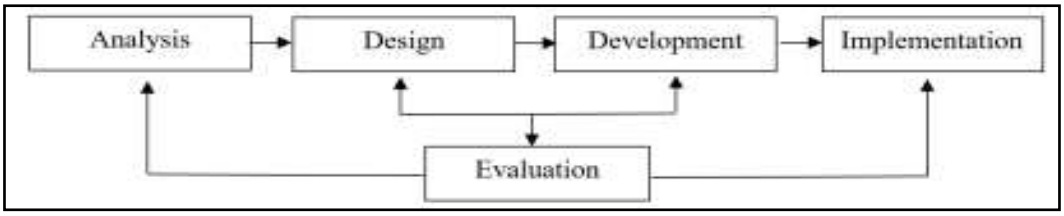

Figure 1. Implementation Method Flowchart

2.5.1 Analysis Stage

During the analysis stage, user needs are identified, competitor analysis is conducted, and the main features of the application are determined. The outcomes of this stage form the basis for subsequent design and development.

2.5.2 Design Program Stage

The program design involves creating the application layout, user interface, and database structure. This design considers user needs, user-friendly design principles, and sustainable development.

2.5.3 Development Stage

In the development stage, the design is implemented into a tangible application using Android Studio and the Java programming language. Application features are integrated, and initial testing is performed to ensure basic functionality.

2.5.4 Evaluation Stage

The evaluation stage involves thorough testing of the application to ensure quality, security, and reliability. Field trials are conducted involving the target user group, and the results are used for further improvement and refinement of the application.

3. RESULT AND DISCUSSION

3.1 Application Design

3.1.1 Application System Design

MOMMYWELL was created to help maintain and manage the health of mother and child and has also been integrated with several existing technologies such as Google and GPS which are already available on Android and iOS smartphones. Data and information obtained through the MOMMYWELL application comes from doctors, journals, the internet and books. With this, there is no need to doubt the sources used by this application.

3.1.2 Designing the Interface Design

At this stage, a design will be carried out for the interface that will later appear on the user's smartphone screen.

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Figure 2. MOMMYWELL Design Interface

Figure 3. Feature Design Interface

3.2 Application Features

This application has various features that can be used to help monitor maternal and child health, including:

a. Health Care Scheduling

Features to set health care schedules for mother and child based on the child's age and development as well as reminders for immunizations, routine check-ups and doctor's appointments.

b. Maternal and Child Health Calculator

Nutrition calculator to ensure mother and child receive proper nutrition and calculate ideal body weight during pregnancy and after birth.

c. Community Forums

A community platform that allows mothers to share experiences, tips and support with each other, notifications about events and meetings related to maternal and child health around the user's location.

d. Parenting Education

Training modules on baby care, breastfeeding, nutrition, and the importance of early stimulation for child development and interestingly presented educational articles and videos on topics related to maternal and child health.

e. Online Consultation

Online medical consultation service with doctors or related health experts to provide direct advice and assistance in dealing with maternal and child health problems.

f. Health and Lifestyle Tips

Daily health tips and a healthy lifestyle for mothers and children. Healthy and nutritious food recipes adapted for pregnant, breastfeeding and children.

g. Health Emergency Feature

Emergency contact information and first aid guidance for health emergencies involving the mother or child.

3.3 Effectiveness of Technology in Maternal and Child Health Improvement

The highlighted studies underscore the profound impact of technology, particularly the integration of e-health applications, in fostering advancements in maternal and child health within the Indonesian healthcare landscape. The strategic utilization of SMS, WhatsApp, and e-health applications has yielded tangible improvements, notably enhancing the precision and reliability of maternal and child health data within healthcare centers.

This technological integration has not only facilitated a marked enhancement in the quality of healthcare data but has also showcased commendable outcomes in the meticulous oversight of crucial healthcare aspects. Specifically, the integration of e-health applications has played a pivotal role in streamlining the administration of immunization programs and ensuring the systematic and effective distribution of essential vitamins to children. These outcomes emphasize the transformative potential of technology in optimizing various dimensions of healthcare services.

The demonstrated success in leveraging e-health applications underscores their potential as dynamic tools capable of enhancing the overall healthcare experience for mothers and children. By addressing data accuracy concerns and streamlining essential healthcare processes, technology emerges as a valuable ally in the pursuit of comprehensive and efficient healthcare services. The findings affirm the significance of technology in augmenting the effectiveness of healthcare interventions, particularly in the context of maternal and child health in Indonesia.

3.3 Key Role of Computerized Health Data Management

The in-depth exploration conducted in the study published in the Journal of Public Health accentuates the pivotal role that computerized health data management plays in fortifying and elevating the overall quality of health services delivered within health centers. This critical finding underscores the compelling need for the systematic integration of information technology at the health center level, with a specific emphasis on streamlining data management processes to bolster the broader landscape of healthcare quality.

The study underscores that the adoption of computerized health data management systems is not merely a technological upgrade but a strategic imperative. This integration addresses inherent challenges within traditional data management approaches, offering a transformative pathway to optimize the efficiency and effectiveness of health services. By harnessing technology, health centers can achieve enhanced precision, accessibility, and

comprehensiveness in managing healthcare information, thereby significantly contributing to an elevated standard of healthcare quality.

The emphasis on information technology integration at the health center level transcends a mere modernization of data management; it signifies a paradigm shift toward a more interconnected, responsive, and technologically adept healthcare ecosystem. The study positions computerized health data management as a cornerstone, reshaping the fundamental infrastructure of health services. It serves as a catalyst for a more efficient, data-driven, and patient-centric healthcare provision model.

3.4 Community-Based Health Services Impact

The comprehensive examination presented in the study featured in the Journal of Health reveals a noteworthy trend of high satisfaction among respondents regarding community-based health services in an Indonesian village. This observation underscores the positive and affirming impact of locally provided health services on the realms of maternal and child health. Recognizing the potential synergy between community-based services and technology, further integration could amplify their effectiveness, offering a more holistic and responsive healthcare approach.

Moreover, the prospect of integrating technology into these community-based services emerges as a strategic avenue for improvement. By leveraging technological tools, such as mobile applications or telehealth solutions, community health workers can enhance their outreach, information dissemination, and coordination efforts.

The reported high maternal mortality rate of 177 per 100,000 live births and infant mortality rate of 20 per 1,000 live births underscore the formidable challenges that need to be tackled head-on. These alarming figures underscore the imperative to bridge existing gaps in health information and education. The urgency lies not only in addressing current healthcare deficiencies but also in laying the groundwork for a sustainable and impactful improvement in maternal and child health.

The identified gaps in health information and education indicate a need for comprehensive strategies that go beyond immediate interventions. Initiatives should encompass broad educational campaigns, accessible resources, and innovative platforms that empower mothers with the knowledge and resources needed to make informed healthcare decisions. This urgency is not just a statistical concern; it translates into a call for concerted efforts, policy changes, and community engagement to bring about a tangible and lasting transformation in maternal and child healthcare in Indonesia.

3.5 Challenges in Mobile Applications for Maternal and Child Health

Acknowledging the transformative potential of mobile applications in advancing maternal and child health, it is essential to confront and navigate challenges inherent in their implementation. A notable hurdle is posed by issues of technology accessibility and digital literacy, factors that demand focused attention for the widespread and effective utilization of health-related apps.

The identified challenges underscore the necessity of ensuring that the benefits offered by mobile applications are accessible to all segments of the population. Disparities in technology access must be addressed through strategic initiatives that prioritize inclusivity. This involves not only providing access to smartphones but also considering factors such as network connectivity and the availability of affordable data plans.

Digital literacy emerges as a parallel challenge that demands consideration. Efforts to enhance users' ability to navigate and comprehend health-related apps are crucial. This entails educational initiatives, user-friendly interfaces, and comprehensive support systems to

empower individuals, especially mothers, in leveraging the full potential of these applications. Bridging the digital literacy gap is integral to fostering a user base that can confidently and effectively utilize maternal and child health apps.

4 CONCLUSION

The available information emphasizes the critical importance of addressing stunting in Indonesia due to its significant long-term impacts on the growth and development of children. Stunting, caused by chronic malnutrition, can lead to cognitive impairment, learning difficulties, increased risk of non-communicable diseases, and a weakened immune system. Efforts to prevent stunting involve ensuring adequate nutrition during the first 1000 days of a child's life, focusing on maternal health during pregnancy, and fostering collaboration across sectors and within communities to collectively reduce the prevalence of stunting.

Furthermore, the development of the "MOMMYWELL" mobile application, focusing on maternal and child health, demonstrates a proactive approach to addressing healthcare challenges. The application integrates various technologies and aims to provide education and support for mothers in managing pregnancy and child care. The research and development process for the application involves a systematic approach, including analysis, program design, development, and evaluation.

The comprehensive approach to addressing stunting and improving maternal and child health in Indonesia involves leveraging technology, enhancing health information and education, and developing innovative solutions such as the "MOMMYWELL" application. These efforts are crucial for achieving sustainable and impactful improvements in healthcare outcomes for mothers and children in Indonesia.

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