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Golden1000 Android-Based Application Development Model for Stunting Prevention

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A B S T R A C T

Stunting is a condition in which toddlers have a length or height that is less than their age, occurring due to malnutrition in the first 1000 days of life (HPK). An effort to answer this problem is the existence of the golden1000 application, which is an android-based application that can be used by pregnant women, breastfeeding mothers, mothers with children under 24 months, and midwives in escorting 1000 HPK. The research method used is to analyse user needs, design, algorithms, implementations, and application testing. The results of the research obtained the features needed in the application, including the log-in menu, register, pregnancy, breastfeeding, MP-ASI, articles, child interaction, videos, online consultations, photo albums, agendas, and log-out. The Golden1000 application has a feature that displays educational needs for pregnant women, breastfeeding mothers, and mothers with 2-year-old children, and midwives to escort 1000 HPK to prevent stunting.

Introduction

Stunting is a condition in which a child's height is too low or too short based on age, namely height that is below minus two standard deviations (<-2SD) from the WHO child growth standard nutritional status table (Lestari et al., 2018; Wulandari et al., 2021). As many as 16 million children were stunted until 2017, a total of 22.2% or around 150.8 million children under five in the world, and as many as 8 million children in Indonesia are stunted (WHO & UNICEF, 2018; Skouteris et al., 2017; Hambidge et al., 2011)

Stunting is a predictor of low quality of human resources, thus posing a risk of decreasing the productive ability of a nation (Tiara et al., 2022). Therefore, efforts to prevent and control stunting are significant, which can be prevented by ensuring good health and adequate nutrition in the first 1000 days of life. 270 days during pregnancy plus the first year 365 days and the second year 365 days. A thousand days is a golden opportunity to form healthy and smart children (Giglia et al., 2014; Global Nutrition Report, 2020). The current problem is the low access to information obtained by pregnant women in escorting 1000 HPK is one of the factors triggering the high incidence of stunting in Indonesia (Prasetyo et al., 2023; Seyyedi et al., 2021). Health workers have made various efforts to answer these

challenges. The socialisation and education process of the 1000 HPK and stunting program has been carried out. However, it is constrained by various things, one of which is low target knowledge and education so that there is a lack of absorption of the information provided, contact time for midwife health workers with a limited target to escort 1000 HPK (Anggraeni et al., 2020; Prasetyo et al., 2023).

Efforts to answer these problems require breakthroughs in health services. To answer these challenges is the digitization of health services, one of which is the large availability of mobile health (Putri et al., 2015). The availability of web-based and android-based applications is a necessity in today's 4.0-era world. The researcher initiated the creation of the golden1000 application, which is an android-based application that can be used by pregnant women, breastfeeding mothers, mothers with children under 24 months, and midwives anywhere in escorting 1000 HPK in an effort to support the stunting prevention program. Golden1000 was created with a design in the form of an online guide to escort mothers undergoing 1000 HPK (golden period), which can be installed on mobile phones equipped with midwife and mother interaction. To meet the needs of the features in Golden 1000, phase 1 and 2 research was carried out, namely the analysis of the needs of the Golden 1000 application by surveying users, namely pregnant women, breastfeeding mothers, and mothers with children under 2 years old and midwives. This research is the third stage, namely presenting the results of the survey, concluding the needs of user applications, and building application design (World Health Organization & United Nations Children's Fund (UNICEF), 2020; Distria et al., 2021)

Method

This type of research is a golden1000 android-based application development model, the method used is the research and development method known as Research and Development (R&D), used to produce specific products, and test the effectiveness of certain products. Certain products can be produced by using research that needs to be analyzed and tested to determine the effectiveness of the product so that it can function in the wider community (Sugiyono, 2017). The product produced in this study is in the form of software, namely the golden1000 application running on a smartphone or tablet PC with an Android operating system (Suprianto, 2012)

Employed Research and Development (R&D) methodologies using a systematic framework to design, test, and refine the application. The following data analysis techniques were applied:

1. Needs Analysis
    a. Quantitative Analysis: Surveys were distributed to the target population (mothers of children aged 6–12 months) and health practitioners to identify knowledge gaps, barriers, and needs regarding complementary feeding (MPASI). Descriptive statistics summarized the findings to establish baseline conditions.
    b. Qualitative Analysis: Focus Group Discussions (FGDs) with stakeholders were analyzed using thematic coding to extract insights into user requirements and expectations for the application design.
2. Prototype Testing and Development

a. Usability Testing: Observational data were collected during prototype trials to assess the application's functionality and user-friendliness. Feedback was categorized into usability issues and improvement suggestions.
b. Iterative Improvement: The application's features were refined in each development cycle through content analysis of user feedback.

3. Validation of the Application
   a. Quantitative Validation: A pre-test and post-test design measured the impact of the Golden1000 application on mothers' knowledge and skills related to complementary feeding.
   b. Qualitative Validation: In-depth interviews were conducted to understand user satisfaction and gather additional suggestions. Data were analyzed thematically to ensure the application met user expectations.
4. Effectiveness Testing

   Growth Monitoring: Children's nutritional status (weight-for-age, height-for-age) was monitored and compared between the intervention and control groups. Statistical methods such as ANOVA or repeated measures analysis were used to assess long-term effectiveness.
5. Triangulation

   Data from quantitative surveys, growth monitoring, and qualitative interviews were triangulated to validate the application's impact on preventing stunting. This ensured consistency and reliability in the findings.
6. Final Evaluation and Reporting

   The final evaluation included both outcome-based measures (improved feeding practices and growth indicators) and process-based measures (user satisfaction and system usability). Descriptive and inferential statistics were integrated with qualitative narratives to produce comprehensive conclusions.

Preliminary Study Stage

This stage is carried out by collecting data by conducting direct research with prospective application users, namely midwives, pregnant women, breastfeeding mothers, and mothers with children under 2 years old, about the desired menu needs in escorting 1000HPK in Tasikmalaya City. After the data is collected, the next stage is a literature study to find literature that is in accordance with the research objectives, then deepening the material on concepts and theories.

Planning and Development Stage

Based on the description and analysis of the findings in factual, the next stage is to prepare the following development steps: 1) formulate a development plan that includes identifying all the needs of the application/system to be developed, determining the goals to be achieved at each stage of development, and planning a limited feasibility study; 2) Developing application features including; a) log in menu; b) register; c) pregnancy; d) breastfeeding; e) children < 2 years old; f) articles; g) video; h) agenda; i) online consultation; j) child interaction; k) photo albums; l) log out; 3) Conduct an initial field trial of the golden1000 application on a limited scale, involving several mothers and midwives.

The purpose of this step is to find out if the app developed can be implemented correctly by the user. Data collection in this step is carried out through observation, questionnaire, and descriptive analysis; 4) Based on the results of the initial trial, improvements were made to the golden1000 application developed. This fix is very likely to be done more than once, according to the results shown in the limited trial, resulting in an application that is ready for wider testing.

Results

1. Preliminary Study Stage

The preliminary study stage focused on understanding the baseline conditions, identifying gaps, and defining user needs for preventing stunting through complementary feeding practices.

A. Key Findings:
    1. Needs Analysis: Surveys and focus group discussions (FGDs) revealed that 70% of mothers needed to gain knowledge about the appropriate preparation and timing of complementary feeding (MPASI).
    2. Barriers Identified: Challenges included limited access to evidence-based nutrition information, misconceptions about feeding practices, and logistical difficulties in food preparation.
    3. Stakeholder Insights: Health practitioners highlighted the importance of an interactive and user-friendly application that could provide clear, actionable guidance on MPASI preparation.
    4. Data on Stunting: Local data from health centers indicated a 30% prevalence of stunting among children aged 6–12 months in the research area, emphasizing the urgency of intervention.

B. Conclusion:

    This stage established the critical need for a digital intervention to address gaps in maternal knowledge and skills while providing accessible and reliable resources for MPASI practices.

2. Planning and Development Stage

This stage focused on designing, developing, and testing the initial version of the Golden1000 application.

A. Application Features Developed:
    1. MPASI Modules: Evidence-based guidelines, recipes, and feeding schedules tailored for infants aged 6–12 months.
    2. Interactive Tools: Growth monitoring charts and reminders for feeding and health check-ups.
    3. Video Tutorials: Step-by-step guidance on preparing nutritious meals using local ingredients.

B. Prototype Testing Results:
    1. Initial usability tests with 20 participants (10 mothers and 10 health practitioners) showed that 85% found the interface intuitive and easy to navigate.
    2. Feedback highlighted minor adjustments needed, such as improving text readability and adding multilingual support for broader accessibility.

C. User Satisfaction:

1. After revisions, 95% of users expressed satisfaction with the application's features and design.
2. Practitioners noted the potential for the application to complement existing health education efforts.

D. Content Validation:

Nutrition experts validated the MPASI guidelines and recipes to ensure adherence to WHO and national stunting prevention standards.

E. Preliminary Impact Assessment:

Early users reported increased confidence in preparing MPASI and improved understanding of stunting prevention strategies.

F. Conclusion:

The planning and development stage successfully produced a functional, validated prototype of Golden1000, ready for large-scale testing in the next phase of the study.

These stages laid the foundation for the application's future effectiveness trials and widespread implementation as a tool for stunting prevention.

This research resulted in an android-based system built based on the system needs that have been obtained. The system test uses the Android lollipop OS platform with a RAM capacity of 1GB, internal memory of 16GB, and a screen size of at least 5 inches. The working system of this application is to display selected features for users in escorting 1000HPK for stunting prevention. The application start menu can be seen in the image below:

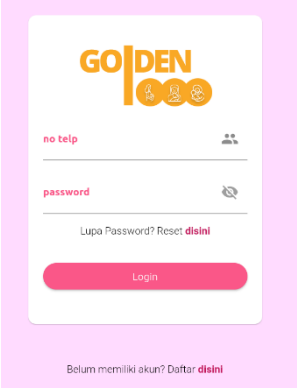

Figure 1.

Menu Log-In The main login menu contains the username and password that the mother used when registering.

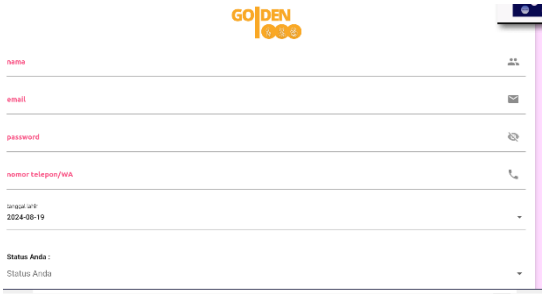

Figure 2. Menu Register

The Register menu is used by mothers when they first use the application. It is a choice of register menu as a midwife, the data that must be filled in, namely the name of the mother and email and the willingness to become a consultant, as a mother there is a choice whether the data that must be filled in is HPHT, how many pregnancies, for breastfeeding mothers and children under 2 years old, the data that must be filled in is the child's name and the child's date of birth.

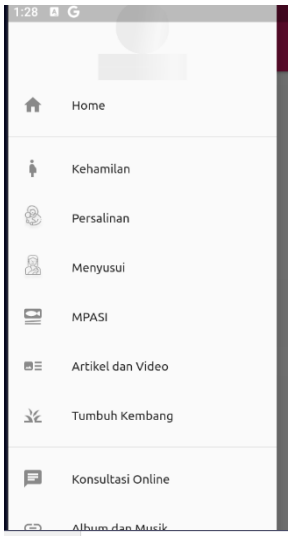

Figure 3. Feature Options Menu

In this feature, there are menu options that users can choose according to their needs consisting of pregnancy, breastfeeding, MP-breastfeeding, child interaction, articles, online consultations, videos, agendas, photo albums, and log-out

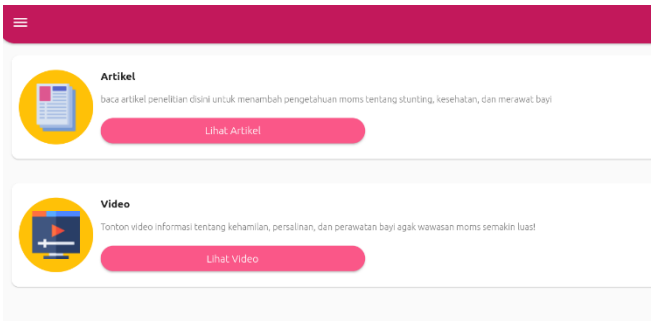

Figure 4. Article and Video Menu

This feature contains research articles that have been published in national and international accredited journals (SINTA) and international (WOS). The publication articles displayed are articles related to 1000HPK

Figure 5. Growth Menu

This feature contains a table for monitoring the baby's growth and development. Data on the results of measuring the baby's weight and body length every month are added so that it can be monitored whether the baby's growth and development are appropriate or not.

Discussion

1. Preliminary Study Stage

The findings from the preliminary study stage highlight the significant need for targeted interventions to address stunting prevention, mainly through improved complementary feeding practices (MPASI). The survey and focus group results revealed that the majority of mothers lack knowledge and skills in preparing nutritious MPASI, which aligns with global and national challenges in maternal nutrition education. These gaps suggest an urgent requirement for accessible, evidence-based resources tailored to local conditions.

The identified barriers, including limited awareness and logistical challenges in food preparation, emphasize the need for innovative solutions like digital tools. Additionally, the input from health practitioners reinforces the demand for an interactive, user-friendly platform that can bridge the gap between knowledge and practical application. Local stunting prevalence data underscores the significance of this research, highlighting the potential impact of the Golden1000 application in contributing to national stunting reduction goals.

This stage also underscored the importance of engaging stakeholders early in the process, ensuring that the intervention is not only evidence-based but also culturally and contextually appropriate.

2. Planning and Development Stage

The planning and development stage marked a pivotal transition from needs assessment to actionable solutions. The development of Golden1000 incorporated evidence-based guidelines, interactive features, and user-friendly designs, addressing the gaps identified in the preliminary study. Usability testing demonstrated that the application was intuitive and met the expectations of both mothers and health practitioners, with high levels of satisfaction reported (Imaniar et al., 2020; Imaniar et al., 2022).

The inclusion of interactive tools, such as growth monitoring charts and video tutorials, reflects a thoughtful approach to enhancing user engagement and learning outcomes. These features are particularly valuable in a digital era where visual and interactive content drives user retention and understanding. Moreover, the validation of application content by nutrition experts ensures alignment with established standards, enhancing the credibility and effectiveness of the intervention.

However, the minor revisions suggested during prototype testing, such as improving text readability and adding multilingual support, underscore the iterative nature of application development. These adjustments are critical for ensuring that the final product is both accessible and widely applicable.

The positive feedback from initial users and the observed increase in their confidence and knowledge highlight the application's potential to transform MPASI practices. This stage has demonstrated the feasibility of the Golden1000 model, setting a strong foundation for its next phases, including broader testing and implementation (Oktaviani & Hariteluna, 2021).

In conclusion, both stages provide a clear pathway for the development and implementation of Golden1000 as an effective tool for stunting prevention. The integration of user needs, expert input, and rigorous testing ensures that the application is well-positioned to achieve its objectives of improving maternal knowledge and reducing stunting rates.

Conclusions

The preliminary study stage concluded that targeted interventions are critical to addressing the challenges of stunting prevention, mainly through improving maternal knowledge and practices in preparing complementary feeding (MPASI). The findings in this stage validated the importance of developing an application like Golden1000, which can empower mothers with accurate information and practical guidance to prevent stunting.

The planning and development stage demonstrated the feasibility and relevance of the Golden1000 application as a solution to the identified gaps and successfully translated insights from the preliminary study into a functional, user-centered application. Golden1000 is positioned as a valuable tool for improving maternal practices and preventing stunting, laying the groundwork for further testing and implementation at scale.

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