

Development and Evaluation of a Menstrual Monitoring Mobile Application for Barangay Health Workers Using the Rapid Application Development (RAD) Model and ISO/IEC 25010 Standards

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Abstract:

Menstrual health is a critical component of women's overall well-being, influencing reproductive health, early detection of irregularities, and community-level health interventions. In rural areas such as Barangay Bunakan, Madridejos, Cebu, menstrual monitoring is primarily conducted through manual record-keeping, which poses challenges in accuracy, privacy, and efficiency. This study aimed to design, develop, and evaluate a menstrual monitoring mobile application tailored for Barangay health workers using the Rapid Application Development (RAD) model and assessed through the ISO/IEC 25010:2011 software quality standards. A developmental research design was employed, incorporating iterative prototyping and stakeholder feedback. The system was evaluated by 25 respondents (Barangay health workers and selected female residents) using a 5-point Likert scale questionnaire. Results revealed high ratings in functionality (4.66), usability (4.86), security (5.00), and overall software quality (4.842), interpreted as Very Satisfactory to Excellent. The findings demonstrate that the application effectively enhances monitoring accuracy, ensures data privacy, and improves community-based reproductive health management. The study highlights the potential of digital health solutions in strengthening rural healthcare systems and recommends expansion to other barangays with integration into broader health information systems.

Keywords — Community health monitoring, ISO/IEC 25010, Menstrual health, Mobile application, RAD model, Reproductive health.

I. INTRODUCTION

Menstrual health plays a vital role in women's overall well-being, influencing reproductive health, family planning, and the management of conditions such as polycystic ovary syndrome (PCOS). Accurate monitoring of menstrual cycles is essential not only for individual health but also for

community-level interventions that support women's reproductive rights and health outcomes. However, conventional tracking methods—such as paper calendars and basic mobile applications—often lack precision, security, and actionable insights, limiting their effectiveness in community health settings [1][9].

In Barangay Bunakan, Madridejos, Cebu, health workers face significant challenges in monitoring female residents' menstrual health due to reliance on manual processes. These traditional methods are prone to errors, inefficiencies, and difficulties in maintaining secure records. Recognizing these limitations, this study introduces a menstrual monitoring mobile application designed specifically for Barangay Bunakan health workers. The system integrates menstrual cycle tracking, administrative functions, and secure data management, ensuring that health workers can efficiently monitor residents while safeguarding sensitive information.

The development process follows the Rapid Application Development (RAD) model, which emphasizes iterative prototyping and stakeholder feedback to ensure responsiveness to user needs [2]. Evaluation of the system is guided by ISO/IEC 25010:2011 standards, focusing on functionality, usability, security, and overall software quality [3]. By combining developmental research with international standards, this study aims to provide a reliable, user-friendly, and community-centered digital health tool. Ultimately, the project seeks to empower health workers and female residents, reduce inefficiencies in menstrual health monitoring, and contribute to broader reproductive health initiatives in rural communities.

Objective— The primary objective of this study is to design, develop, and evaluate a menstrual monitoring mobile application tailored for Barangay Bunakan health workers using the Rapid Application Development (RAD) model and guided by ISO/IEC 25010:2011 software quality standards. Specifically, the research seeks to:

1. Provide health workers with a secure and efficient tool for monitoring female residents' menstrual cycles.
2. Enhance usability and accessibility through a community based mobile platform.
3. Address limitations of manual monitoring methods by integrating digital solutions that improve accuracy, efficiency, and data management.
4. Evaluate the system's performance in terms of functionality, privacy, and user satisfaction based on ISO/IEC 25010 metrics[3].

• **System Features:**

- Dashboard displaying registered residents and their active/inactive status.
- (Create, Read, Update, Delete) CRUD functions for administrators.
- Menstrual cycle tracking (beginning and end dates).
- Online accessibility and Android mobile application.
- Data privacy and security compliance.

I. METHODOLOGY

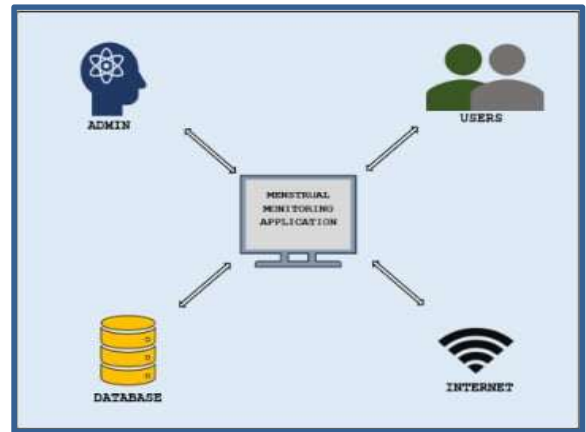


Figure 1. Architecture for Applications

The Menstrual Monitoring application architecture provides an illustration of the system's overall layout in terms of users, gadgets, and technological implementation. Figure 7. Application Architecture. The methods and strategies used in the design and development of an application are described in the application architecture. The architecture offers a road map and recommended practices to adhere to when building an organized application. An application architecture with more depth can be constructed by connecting patterns. The application includes both the front-end and back-end services (Red Hat, 2020). For the menstrual monitoring, there is an administrator and users. The system's data, which will be controlled by the administrator, will be accessible to all users. Practical and user-friendly online monitoring will be available for all operations.

- **Research Design:** Developmental research guided by the **Rapid Application Development (RAD)** model [2][8][12].

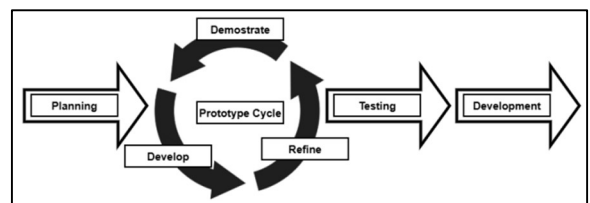


Figure 2. Rapid Application Development Model

• **Phases:**

- *Planning and Design:* Identified problems in manual monitoring and outlined objectives.
- *Prototype Cycles:* Iterative development with stakeholder feedback.
- *Testing:* Continuous refinement to ensure quality and reliability.
- *Deployment:* Training and implementation for health workers and residents.

• **Evaluation Tools:**

The system was evaluated using a structured questionnaire based on the ISO/IEC 25010:2011 software quality model[3]. A total of 25 respondents, consisting of Barangay health workers and selected female residents, participated in the evaluation. Responses were measured using a 5-point Likert scale (1 – Poor, 2 – Fair, 3 – Satisfactory, 4 – Very Satisfactory, 5 – Excellent). Mean scores were computed to determine the system’s performance across functionality, usability, security, and overall quality characteristics.

III. RESULT

TABLE 1.1
Dashboard Display: Rated *Excellent* by users.

Dashboard	Mean	Verbal Interpretation
Number of the females who registered	5.00	Excellent
Status of users Active or Inactive	5.00	Excellent
Total	5.00	Excellent

The dashboard functionality received an overall mean score of 5.00, interpreted as Excellent, indicating that users found the system effective in displaying registered female residents and their activity status. Administrative functions (CRUD operations) obtained a mean score of 4.66 (Very Satisfactory), demonstrating reliable data management capabilities.

TABLE 1.2
Admin Functions (CRUD): Mean score 4.66 (*Very Satisfactory*).

CRUD	Mean	Verbal Interpretation
Update users information	4.66	Very Satisfactory
Delete users information	5.00	Excellent
Read menstrual info for residents	4.33	Very Satisfactory
Total	4.66	Very Satisfactory

security obtained the highest rating (Mean = 5.00), reflecting strong user confidence in data protection mechanisms.

TABLE 1.3
 In terms of the characteristic set in ISO25010 Software Quality Model.

	Mean	Verbal Interpretation
Functionality Suitability	4.88	Goog
Performance Efficiency	4.88	Good
Compatibility	4.54	Good
Reliability	4.91	Good
Security	5.00	Very Good
Total	4.842	Good

achieved a mean score of 4.842, interpreted as Good to Very Good.

TABLE 1.4
 In terms of usefulness, satisfaction, and ease of use and learning.

Usefulness	4.80	Agree
Ease of use	4.81	Agree
Ease of learning	4.83	Agree
Satisfaction	5.00	Strongly Agree
Total	4.86	Agree

Usability indicators showed high ratings in usefulness (4.80), ease of use (4.81), ease of learning (4.83), and user satisfaction (5.00), demonstrating strong acceptance among users.

IV. DISCUSSION

The findings indicate that the application successfully addressed inefficiencies associated with manual menstrual monitoring practices. By digitizing records and centralizing data access, health workers experienced reduced workload and improved monitoring efficiency. The strong usability scores align with previous studies emphasizing the importance of user-centered design in reproductive health applications [4] [5][11].The perfect score in security (5.00) is particularly noteworthy, as data privacy remains the most significant barrier to the adoption of menstrual tracking technologies globally [14].

The system’s high security rating demonstrates the importance of privacy compliance in handling sensitive reproductive health information. According to recent literature, secure digital health tools significantly increase user trust and adoption in rural communities [6]. The use of the RAD model further contributed to system success, as iterative prototyping allowed direct incorporation of stakeholder feedback throughout development.

However, limitations include reliance on internet connectivity and restriction of implementation to a single barangay. These factors may affect scalability without infrastructure improvements.This digital transition aligns with the Philippine National Unified Health Research Agenda, which prioritizes the automation of primary care records in rural barangays [10] [13].

V. ETHICAL CONSIDERATIONS

This study ensured ethical compliance in handling sensitive reproductive health information. Informed consent was obtained from all participants prior to system evaluation. Data collected during testing were anonymized and used solely for research purposes. The system was designed with privacy safeguards, including controlled access and secure data storage mechanisms. Approval and cooperation were secured from Barangay Bunakan officials and health workers before system deployment.

LIMITATIONS

This includes restricted access to female residents of Barangay Bunakan and dependence on internet connectivity. Future Directions involve expanding the system to other barangays, integrating predictive analytics for reproductive health, and linking with broader health information systems.

VI. CONCLUSION

The menstrual monitoring mobile application proved to be an effective digital solution for improving reproductive health monitoring in Barangay Bunakan. Guided by the RAD model and evaluated using ISO/IEC 25010 standards, the system demonstrated strong performance in functionality, usability, security, and overall quality. The results confirm that digital health interventions can enhance community healthcare delivery, particularly in rural settings. Future work should focus on predictive analytics integration, offline functionality, and expansion to other barangays to strengthen regional reproductive health management systems.

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