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CYCLE CARE: A FLUTTER-BASED MENSTRUAL CYCLE TRACKING AND HEALTH MANAGEMENT APPLICATION

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Abstract: Cycle Care is a cross-platform mobile application developed using Flutter that provides women with a comprehensive menstrual cycle tracking and personal health management system. The application integrates cycle prediction using historical data, daily health logging, water intake tracking with scheduled reminders, dietary insight logging, and multilingual support. Built with a local SQLite database for privacy-first data storage and using shared preferences for user settings, Cycle Care aims to give users meaningful insights into their reproductive health without relying on cloud services. This paper describes the motivation, system architecture, module design, technical implementation, and future scope of the Cycle Care application.

Keywords: Menstrual Cycle Tracker, Flutter, Mobile Health App, Cycle Prediction, Water Reminder, SQLite, Health Logging.

I. INTRODUCTION

Menstrual health is a critical aspect of overall women's wellness, yet many women lack accessible and private tools to monitor their reproductive cycle effectively. Existing applications often require cloud accounts, raise privacy concerns, or provide limited functionality for day-to-day health tracking. There is a growing demand for a mobile application that combines period prediction, symptom logging, hydration tracking, and dietary insights in a single offline-capable platform.

Cycle Care is designed as a privacy-first Flutter application that stores all user data locally on the device using SQLite. The app supports cycle prediction based on the user's historical period data, daily health logging including mood, flow, BBT, and symptoms, as well as customizable water intake reminders. The application also supports multiple languages, making it accessible to a broader audience.

This paper presents the design decisions, module structure, and technical implementation of the Cycle Care application. The goal is to demonstrate how modern cross-platform mobile development tools can be applied to create meaningful health management solutions for women.

II. LITERATURE SURVEY

Research in digital health applications has consistently highlighted the importance of period tracking tools in supporting women's awareness of their reproductive health. Existing studies on menstrual health apps show that regular self-monitoring of cycle data, symptoms, and lifestyle factors enables users to identify patterns and seek medical attention earlier when needed.

Prior work on mobile health applications emphasizes the value of local data storage over cloud-based approaches, especially when handling sensitive health information. Users are more likely to engage consistently with an app they trust to keep their data private. Flutter, Google's cross-platform framework, has emerged as a strong choice for health apps due to its single codebase supporting both Android and iOS, its rich widget library, and its performance characteristics.

The Cycle Care application aligns with these research directions by combining offline-first data storage, user-friendly design, and a modular architecture that supports future expansion into additional health domains such as fertility tracking, nutrition analysis, and integration with wearable devices.

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III. OBJECTIVES

The primary objective of the Cycle Care application is to provide women with an accessible, private, and feature-rich menstrual cycle tracking tool that works entirely offline. The application aims to remove the barrier of cloud dependency and offer a comprehensive health companion on the user's own device.

Specific objectives of the Cycle Care application include:

- Accurate period and ovulation prediction using historical cycle data
- Daily health log tracking including mood, flow intensity, symptoms, BBT, stress, sleep, hydration, and activity
- Customizable water intake goal with scheduled daily notifications
- Dietary and nutrition insight logging for holistic health monitoring
- Multilingual support to make the app accessible to non-English speakers
- A clean and intuitive user interface that supports users with varying levels of technical experience

IV. PROPOSED SYSTEM

The proposed system is a Flutter-based mobile application structured around a local SQLite database and a modular screen architecture. The application is organized into distinct functional areas: a home screen with cycle summary and predictions, a calendar screen for historical log review, a daily logging screen, a water tracker, a diet insights screen, and a settings screen for user preferences and notification configuration.

All sensitive health data is stored locally on the device using the sqflite package. User preferences such as water goals, reminder intervals, and language selection are persisted using shared_preferences. Scheduled water reminders are implemented using the flutter_local_notifications package combined with the timezone package to ensure accurate daily notification delivery regardless of the user's time zone.

The cycle prediction module analyzes the user's three most recent period start dates and cycle lengths to calculate the expected next period date, fertile window, and ovulation date. This data is displayed prominently on the home screen to give users actionable health information at a glance.

V. MODULE DESCRIPTION

The Cycle Care application is organized into the following functional modules:

Cycle Prediction Module: Analyzes historical period data stored in the local database to predict the next period start date, estimated ovulation day, and fertile window. Predictions are recalculated whenever new period data is entered.

Daily Health Log Module: Allows users to log daily health metrics including menstrual flow intensity, mood, physical symptoms, basal body temperature (BBT), stress level, sleep quality, physical activity, and hydration. All logs are stored in the cycle_logs SQLite table.

Water Tracker Module: Tracks daily water intake against a user-defined goal in liters. Users can log water intake in increments and view progress toward their daily goal. Integrates with the notification module to deliver scheduled reminders.

Notification and Reminder Module: Uses flutter_local_notifications and timezone packages to schedule daily water reminders at user-defined intervals within a configurable active hour window. Notifications persist across app restarts through exact alarm scheduling.

Settings and Preferences Module: Allows users to configure their daily water goal, reminder interval, active notification hours, reminder message, and to input previous cycle history for improved predictions. All preferences are persisted using shared_preferences.

Multilingual Support Module: Implements Flutter's localization system with ARB files to support multiple languages. Users can switch the application language from settings, making Cycle Care accessible to non-English speaking users.

VI. SYSTEM DESIGN

The Cycle Care application follows a layered architecture with clear separation between the UI layer, service layer, and data layer. The UI layer consists of Flutter screens built with Material Design components and custom theming using the Google Fonts and fl_chart packages. The service layer contains the NotificationService singleton that manages all scheduled reminders. The data layer consists of the DatabaseHelper singleton built on sqflite, which manages two primary tables: cycle_logs for daily health entries and period_records for period history.

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The application uses a pink-themed design system defined in a central theme file, ensuring visual consistency across all screens. Typography uses the Fraunces serif font for headings to create a warm and approachable aesthetic, combined with DM Sans for body text for readability.

The calendar screen uses the table_calendar package to display a monthly view with color-coded markers for logged days, predicted period days, and fertile windows. The insights screen uses the fl_chart package to visualize health trends such as mood, stress, and BBT over time, helping users identify patterns in their data.

VII. ADVANTAGES OF THE SYSTEM

The Cycle Care application provides several practical advantages over existing menstrual tracking solutions. First, all data is stored locally on the device, ensuring complete user privacy without any cloud dependency or account requirement. Users retain full control of their health data at all times.

Second, the cycle prediction algorithm improves with each cycle entered, providing increasingly accurate forecasts of the next period, ovulation, and fertile window as more historical data becomes available.

Third, the integration of water tracking with scheduled notifications addresses a commonly overlooked aspect of women's health — hydration — within the same application ecosystem, reducing the need for multiple separate apps.

Fourth, the multilingual support makes the application accessible to a global audience, supporting women in regions where health literacy tools in local languages are limited.

VIII. LIMITATIONS

The current implementation of the cycle prediction model uses a simple average-based algorithm that may not account for irregular cycles or medical conditions such as PCOS or endometriosis. Users with highly irregular cycles may find predictions less accurate.

Additionally, the application currently supports Android as the primary platform. While Flutter supports iOS compilation, some notification-related configurations require additional setup for iOS deployment. The water reminder system using exact alarms may also be subject to battery optimization restrictions on certain Android devices, which could delay or suppress scheduled notifications.

IX. FUTURE SCOPE

The future scope of the Cycle Care application is extensive. The cycle prediction module can be enhanced with machine learning models trained on larger datasets to provide more accurate predictions for users with irregular cycles. Integration with wearable devices could enable automatic BBT and heart rate logging.

Cloud backup with end-to-end encryption could be introduced as an optional feature for users who wish to preserve their data across devices. A fertility mode with detailed ovulation tracking and intercourse logging could be added for users planning a pregnancy.

Additional health modules such as medication reminders, gynecologist appointment scheduling, and menopause tracking could expand the application into a complete women's health platform. Push notification support for period start predictions could also improve user engagement and preparedness.

X. CONCLUSION

Cycle Care represents a meaningful application of modern cross-platform mobile development to the domain of women's health. By combining cycle tracking, daily health logging, water intake monitoring, and scheduled notifications in a privacy-first offline application, Cycle Care addresses real health management needs for a wide audience of users.

The Flutter framework proved well-suited for this application due to its performance, rich widget ecosystem, and single-codebase cross-platform support. The local SQLite database architecture ensures that sensitive health data remains entirely under the user's control. With planned enhancements to the prediction algorithm and additional health modules, Cycle Care has strong potential to evolve into a comprehensive women's health companion application.

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XI. SCREENSHOTS OF THE PROPOSED SYSTEM

Fig. 1: Cycle Care Application — User Authentication Screen

The login screen provides secure access to the application with email and password authentication. A guest mode option allows users to explore the app without creating an account, lowering the barrier to entry for first-time users.

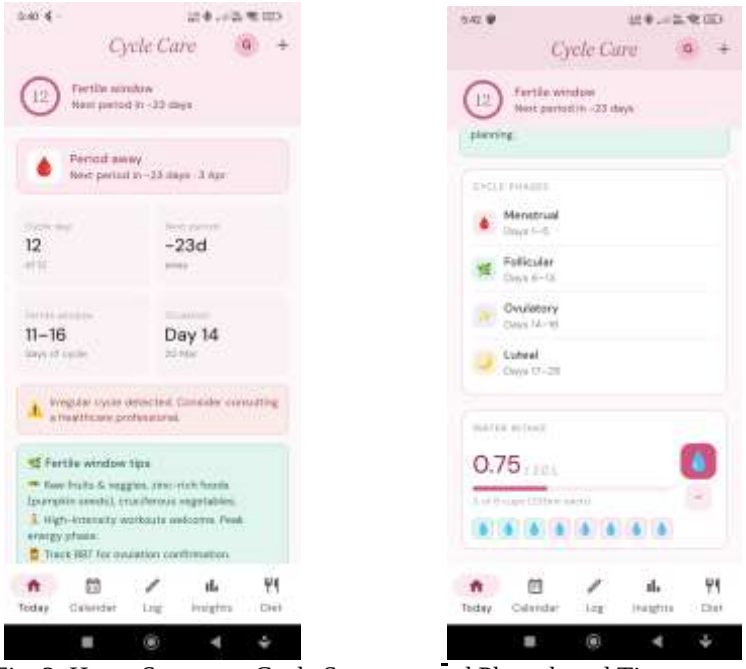

Fig. 2: Home Screen — Cycle Summary and Phase-based Tips

The home screen displays the current cycle day, active phase (Follicular, Ovulatory, Luteal, or Menstrual), and a countdown to the next predicted period. Phase-specific tips for diet, exercise, and self-care are shown dynamically based on the user's cycle position, providing actionable daily health guidance.

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Fig. 3: Calendar View — Color-coded Menstrual Cycle Visualization

The calendar screen provides a monthly overview with color-coded markers distinguishing logged period days (pink), ovulation days (dark green), fertile window days (light green), and predicted future days (light pink). This visual representation helps users understand and anticipate their cycle at a glance

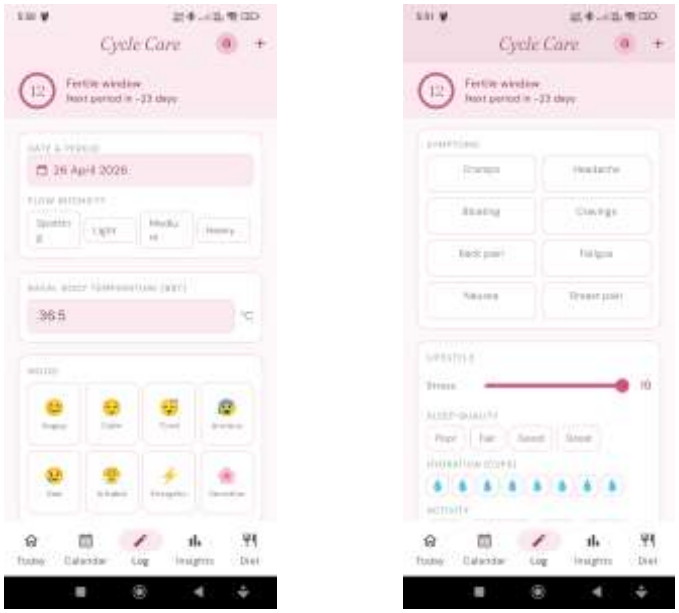

Fig. 4: Daily Health Log — Flow Intensity, BBT and Mood Entry

The daily log screen allows users to record menstrual flow intensity across four levels (spotting, light, medium, heavy), basal body temperature in degrees Celsius, and current mood from eight options including happy, calm, tired, anxious, sad, irritable, energetic, and sensitive. All entries are timestamped and stored locally in the SQLite database.

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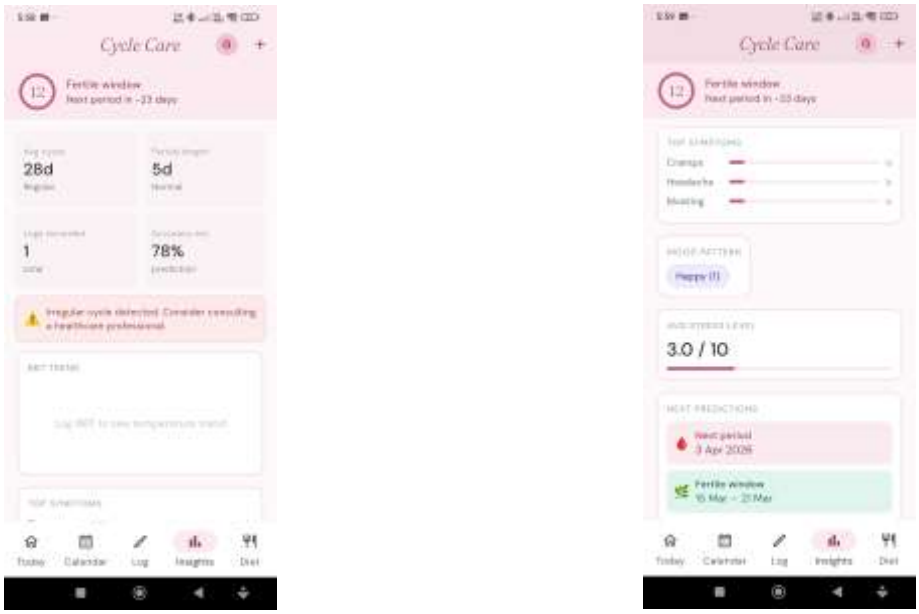

Fig. 5: Insights Dashboard — Cycle Analytics and Health Metrics

The insights screen presents key cycle statistics including average cycle length (28 days), period duration (5 days), total logs recorded, and prediction accuracy (78%). An irregular cycle alert notifies the user to consult a healthcare professional when anomalies are detected. The BBT trend chart visualizes temperature patterns over time using the fl_chart package.

Fig. 6: Diet & Nutrition Guide — Phase-based Dietary Recommendations

The diet screen provides phase-specific nutritional guidance across all four menstrual phases. During the menstrual phase (Days 1–5), iron-rich and anti-inflammatory foods are recommended. The follicular phase (Days 6–13) emphasizes fermented foods, lean protein, and complex carbohydrates to support rising energy levels. Each phase also includes tailored exercise recommendations aligned with hormonal changes.

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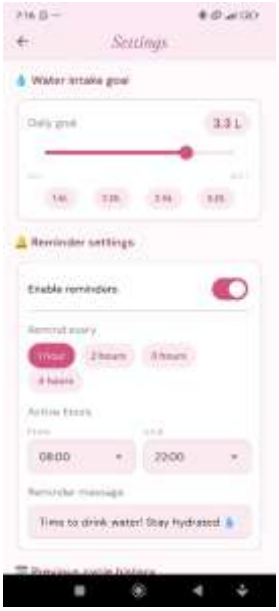

Fig. 7: Water Tracker — Daily Hydration Monitoring and Goal Progress

The water tracker module allows users to set a personalized daily hydration goal and log intake in increments throughout the day. A visual progress indicator displays current intake versus the target. Scheduled notifications remind users to drink water at configurable intervals within user-defined active hours, ensuring consistent hydration.

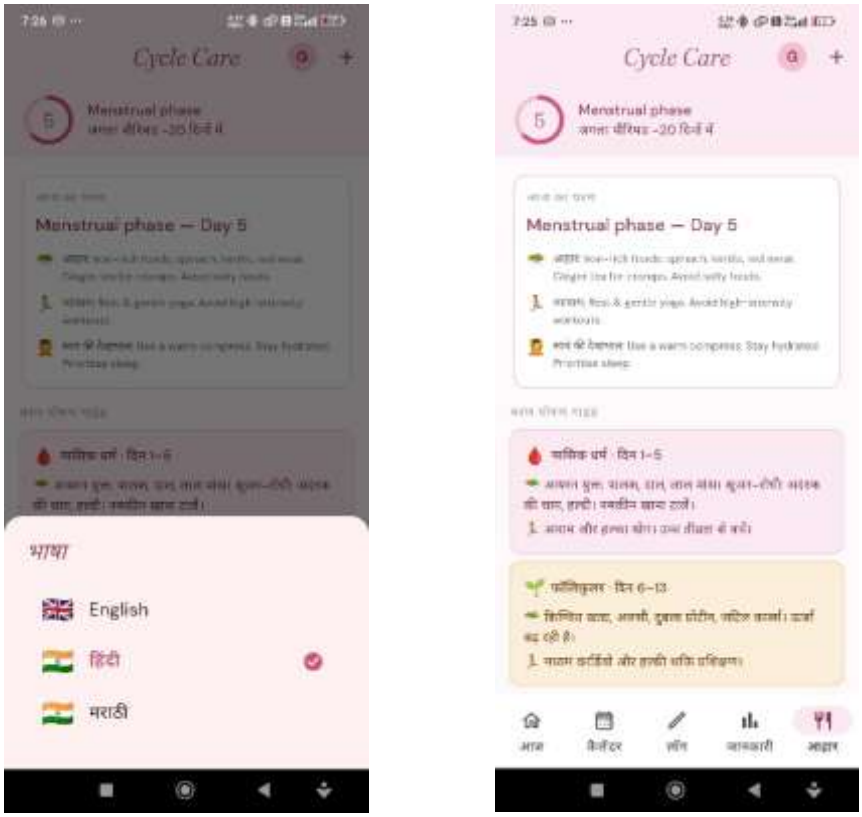

Fig. 8: Multilingual Support — Language Selection Interface

Cycle Care implements Flutter's ARB-based localization system to support multiple languages. Users can switch the application language directly from settings, making the app accessible to non-English speaking users. This feature broadens Cycle Care's reach to women in regions where reproductive health tools in local languages are scarce

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TABLE I. MODULES OF CYCLE CARE APPLICATION

Module	Purpose	Primary Users
Cycle Prediction	Predicts next period, ovulation and fertile window from historical data	All Users
Daily Health Log	Records mood, flow, symptoms, BBT, stress, sleep and activity	All Users
Water Tracker	Tracks hydration progress against daily goal	All Users
Notifications	Schedules daily water reminders at user-defined intervals	All Users
Settings	Configures goals, reminders, language and cycle history	All Users
Multilingual	Supports multiple languages via Flutter localization	All Users

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