

Women's Health Application: An Approach to Holistic Healthcare Using a Cross-Platform Framework

Maryzyrene Adao

Cigna Innovations and Partner Management

Abstract

The Women's Health Application is a personalized and comprehensive tool designed to help women gain a holistic view of their health. Features range from the body tracker, a preventative measure against skin cancer, to the trends, a visual indication of the user's health patterns. Because the application uses a cross-platform framework, the tool is consistent no matter what device the user may own.

1. Introduction

- Women take the role of Chief Medical Officer when it comes to healthcare decisions for themselves and their families.
- Ninety-four percent of women make decisions for themselves and 98% of working moms make decisions for others [1].
- Research shows that 58% of these decision-makers lack confidence in their choices [1].
- Women can lack time, trust, and knowledge when it comes to being healthy, resulting in gaps in both their own health and the health of their families.

2. Problem and Motivation

Consider these statistics:

- Breast cancer is the second highest killer of women [2].
- One in eight women will get breast cancer during their lifetime[2].
- 85% of breast cancer occurs in women with no family history at all [2].
- If caught in stage 1, breast cancer is 100% curable. That rate drops to 93% in stage 2 and continues to drop thereafter [2].
- For women ages 15-29, melanoma is the second most common form of cancer [3].
- This year, 39,260 women will be diagnosed with melanoma [3].

Through education and preventative care, women can take control of their own health. This led Cigna to create the Women's Health App, a holistic, personalized tool for women with an emphasis on preventive care. Considering that iOS and Android users combined make up over 96% of smartphone users [4][5], the use of a cross-platform framework can allow the Women's Health App to reach a wide audience regardless of phone preference.

3. Background and Related Work

Timeline of the Women's Health Application:

- **Early 2016** - Version 1.0 of the application was created by Cigna's Technology Early Career Development Program associates. Version 1.0 was solely developed in Android, with a focus on breast cancer prevention.
- **Late 2016** - An internal pilot was conducted with 30 Cigna employees. Users overall found the app helpful, as many wanted a "one-stop shop" for tracking health information.
- **2018** - Cigna's Software Engineering and Innovations Team began developing Version 2.0 of the application, bearing in mind the results of the initial pilot. Version 2.0 emphasized a more holistic view of women's health rather than focusing specifically on breast cancer and would be available on both Android and iOS platforms.

4. Development Decisions

To make the application available on both iOS and Android, the team considered different cross-platform frameworks.

React Native & NativeScript	Flutter
<ul style="list-style-type: none">• Draws elements using a bridging layer to call the underlying API's of the respective native system [6]• Applications tend to have a "website" feel• Capability for complex rendering such as 3D animation• Involves writing JavaScript	<ul style="list-style-type: none">• Draws elements directly using a rendering engine that draws to the screen with the OpenGL API or Vulkan API• Applications feel native to phone due to direct rendering• Complex rendering is more difficult due to direct drawing• Involves writing Dart

Ultimately, the team selected Flutter because the direct rendering increased performance, decreased overhead, and made the application feel more native. Plus, the application did not require complex rendering.

5. Design Decisions

After Version 1.0 of the application, the user interface was revamped with an entirely new visual design (see Figure 1 for original).

The design of Version 2.0 would:

- Involve new and engaging graphics and colors that align with Cigna's brand without being too overwhelming or overpowering.
- Prevent overuse of the color pink, to avoid too much association with only breast cancer initiatives.
- Focus on simplicity, such as with the more straightforward Health Log and simpler icons to better summarize health information.
- Promote representation and inclusion through a body avatar with customizable skin tone and body type.
- Include a new Trends page to allow the user to view Health Log data over time and notice any outstanding patterns.

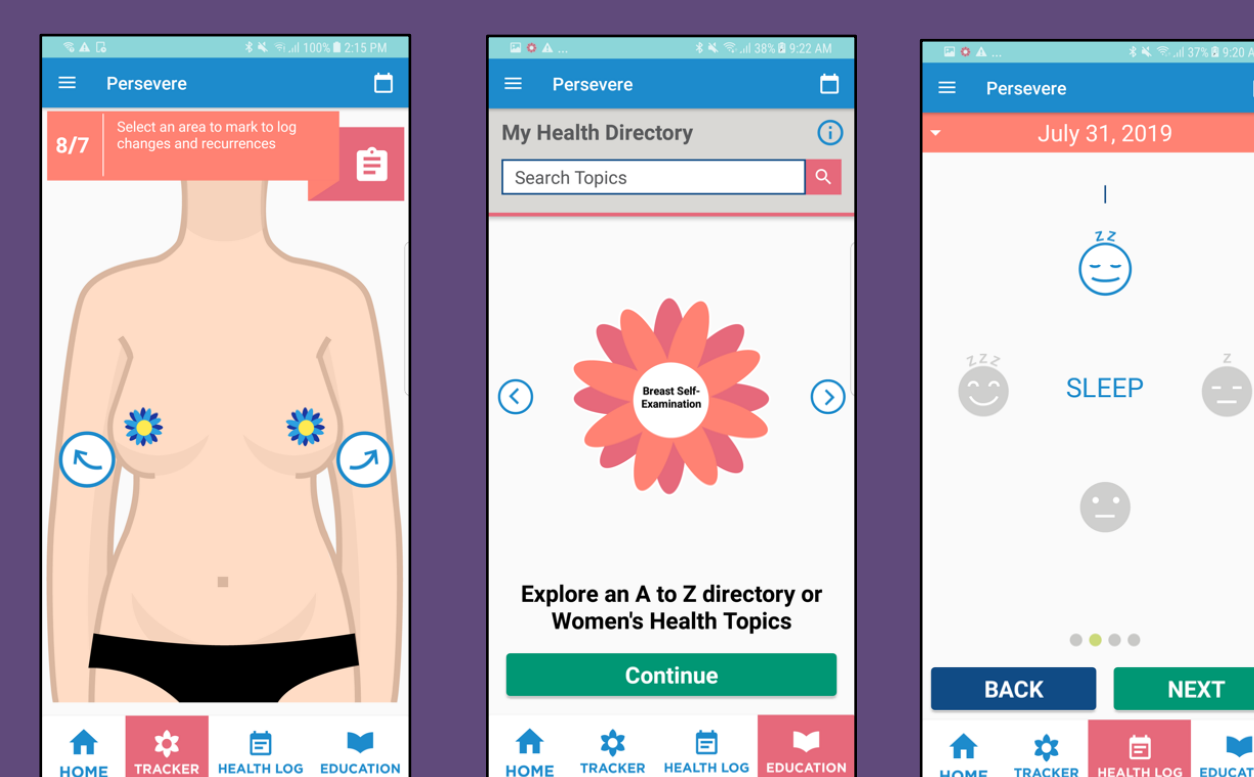


Figure 1. Version 1.0 design of the Women's Health Application.

6. Features

Health Log – For any given day, users can enter or retrieve:

- Whether or not they were menstruating (Figure 2)
- The number of hours of sleep they had
- Their general mood
- Their stress level
- Any additional notes on their current health

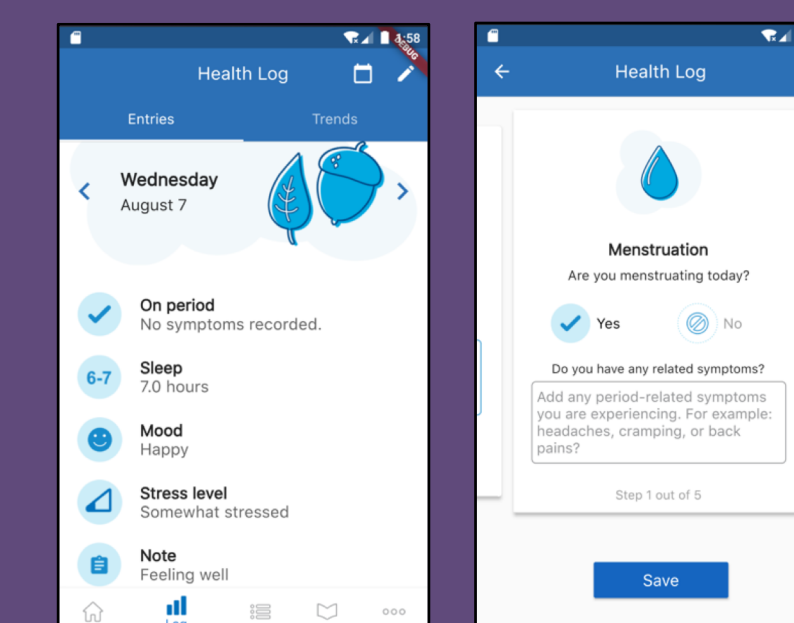


Figure 2. Health Log entry screens.

Trends Page – Based on the health log, the trends page includes:

- A graph showing an overview of a user's sleep and stress entries for the week, with days during menstruation highlighted (Figure 3)
- Individual graphs for sleep, stress level, and mood

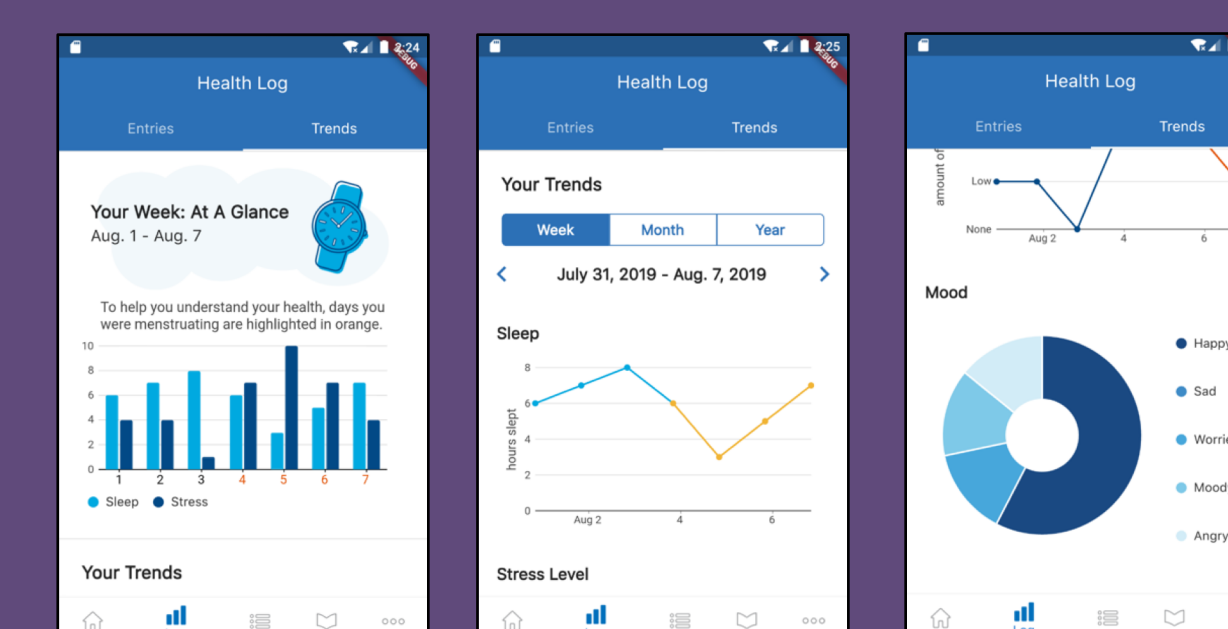


Figure 3. Health Log Trends, a new addition to the application.

Body Tracker – After noticing a mole or lump, users are able to:

- Select an area on the avatar corresponding to the skin irregularity and add information about the mark (Figure 4)
- Set a reminder to check back on the mark at an upcoming date
- View information and past notes about marks on the body tracker
- Edit the avatar to have a more representative skin tone or body shape

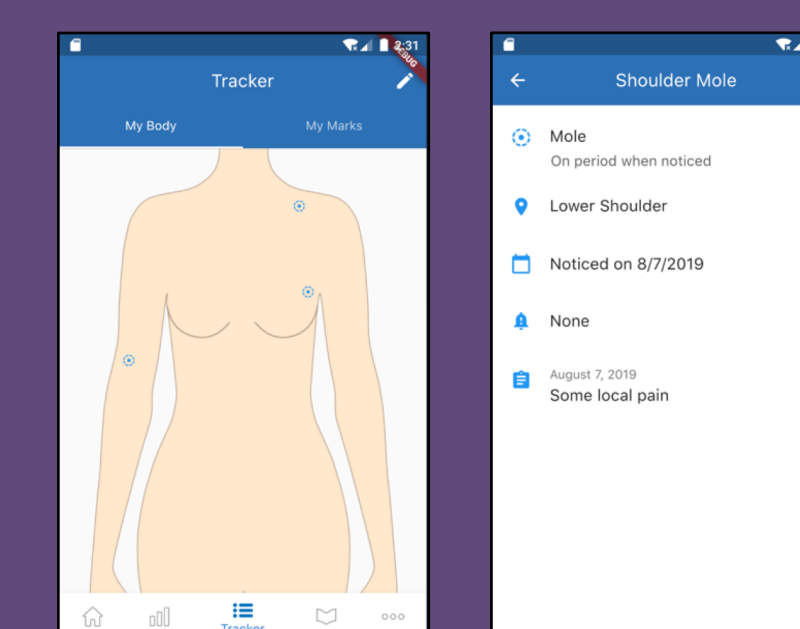


Figure 4. Body Tracker screens.

Education Page – To learn more about women's health topics, users can:

- Search or scroll through the various health topics (Figure 5)
- Save topic to be viewed under the "Saved" page
- Tap on a topic to open a web view with a Cigna page detailing information and advice concerning that subject

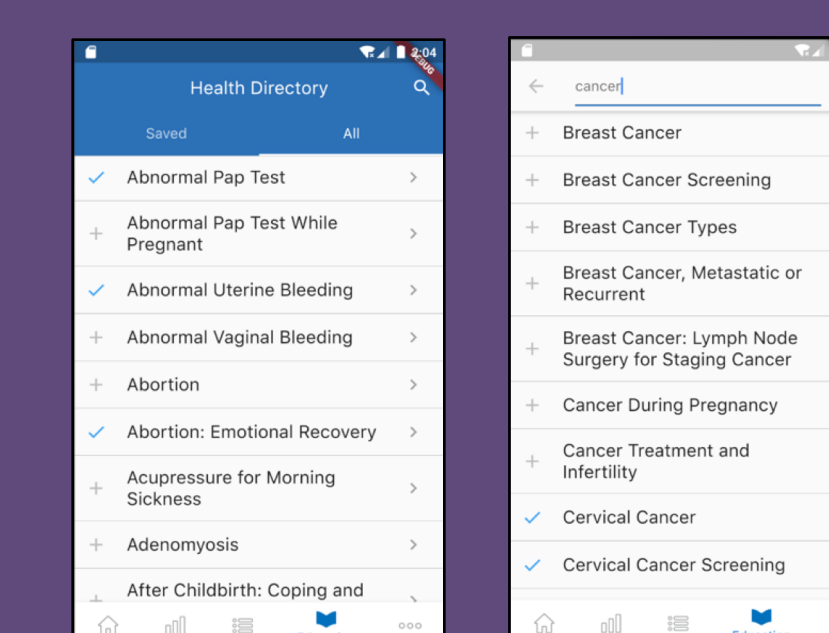


Figure 5. Health Education screens.

7. Evaluation and Results

Eight women (4 iPhone and 4 Android users) user tested the application.

Users were first asked the following questions about Flutter:

- Did the application feel like a website (1) or a native application (10)? **Average Response: 9.0**
- Did the application feel as though it belonged on an Android (1) or an iPhone (10), with (5) meaning that it applies to either? **Average Response: 5.0**, unanimous among those who responded*
- Did the application feel slow (1) or smooth (10) to use? **Average Response: 9.8**

Users were then asked to rate the effectiveness of each page in keeping up with one's health, on a scale from 1 to 10. The average responses:

- Health Log: 7.0
- Body Tracker: 7.3
- Education: 8.8
- Home Page (Tip of the Day): 7.9

Six of the eight user testers stated that they would use the application personally, though two of those six commented that push notifications would be helpful in maintaining regular use.

*Two users abstained due to lack of experience with the other operating system.

8. Conclusion

The application received mainly positive ratings for its current capabilities, though additional features may need to be added to better appeal to more users and help maintain regular use. In its current state, the application offers unique features such as the Body Tracker and Education pages that users had not seen in other apps on the market.

Flutter did successfully meet the needs of both Android and iPhone testers, since users rated the application as directly in the middle when asked if it was more of an Android or an iPhone application. Users of both platforms viewed the application as native and smooth to use. As a result, Flutter may create new opportunities in the future to quickly and effectively develop technical solutions focused on making healthcare easier to navigate regardless of the end user's device.

9. References

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