Data Insights: A Tool for Analyzing Patient-Specific Comorbidity Risks Associated with Obesity

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Background

Trust for America's Health recently reported that the obesity rate in America has consistently increased in the past decade, with no signs of plummeting. Nationwide, this rate is 41.9% with higher rates in rural areas than urban and suburban areas[1]. Obesity is a multifaceted health condition that leads to different comorbidities. Novo Nordisk, a leading global pharmaceutical company, has built a machine learning model that analyzes the comorbidity risks and costs associated with obesity based on input information from a patient's clinical data, social determinants of health (SDoH), and other diagnosed health conditions. This model is provides a quantitative view into the comorbidity risks of patients and their cost associated with treatment based on state and national level costs. In order to ensure that patients diagnosed with obesity from all demographics are given an opportunity to treatment without cost barrier., the market access representatives at Novo Nordisk need to proffer information from the model to healthcare payer programs. However, the model output, in its raw form, is difficult to interpret and visualize succinctly to present to the stakeholders. Hence, the need is of an effective end-user platform to better convey the predictions of the model.

Objectives

❑ Develop a front-end data insights application that can visualize and interpret predicted comorbidity risks and the associated costs

❑ Use data visualization and processing to succinctly contextualize and represent social determinants of health factors per state in comparison to national data

❑ Provide Novo Nordisk's market access representatives accurate and concise prediction interpretations for outreach to healthcare payer programs

Challenges

❑ Retrieving authorized access to the dataset due to a delay in receiving the Non Disclosure Agreement.

❑ Learning a new programming language (Swift), environment (XCode), and best practices of mobile application development.

❑ Understanding what the large dataset with numerous features represents and how to interpret the data, as well how to generate appropriate visualizations to best capture the data.

UX Research & Tech Implementation

Figure 1: (L) User Profile (R) Applications used: Swift (top) and Xcode (bottom)

User Flow & Wireframe Prototype

Main objectives for the user flow and wireframe design:
❑ Easily understandable and simply accessible to people of all technological proficiency levels
❑ Information presented at a glance in smaller pieces, with the option of expanding on certain aspects if needed
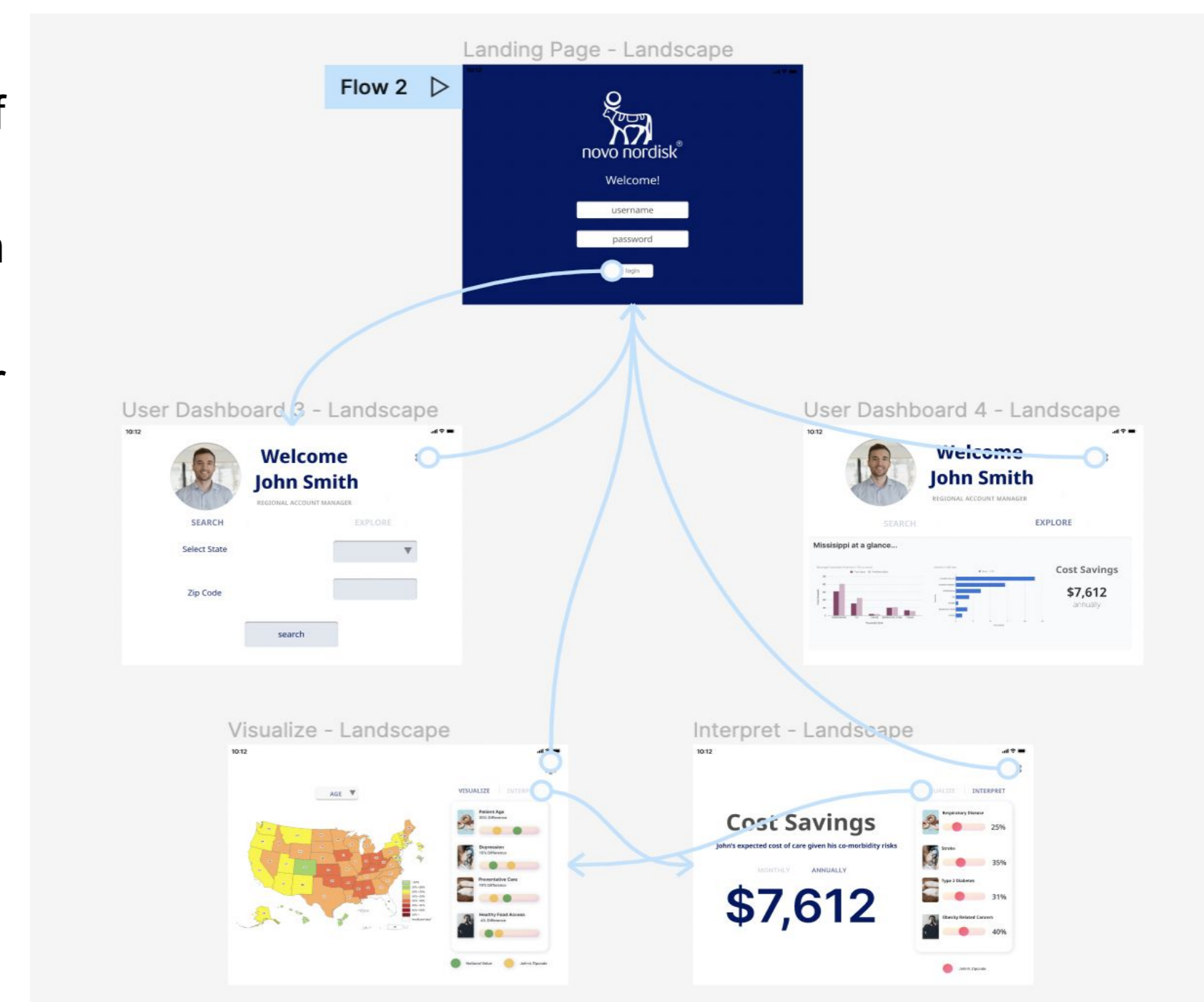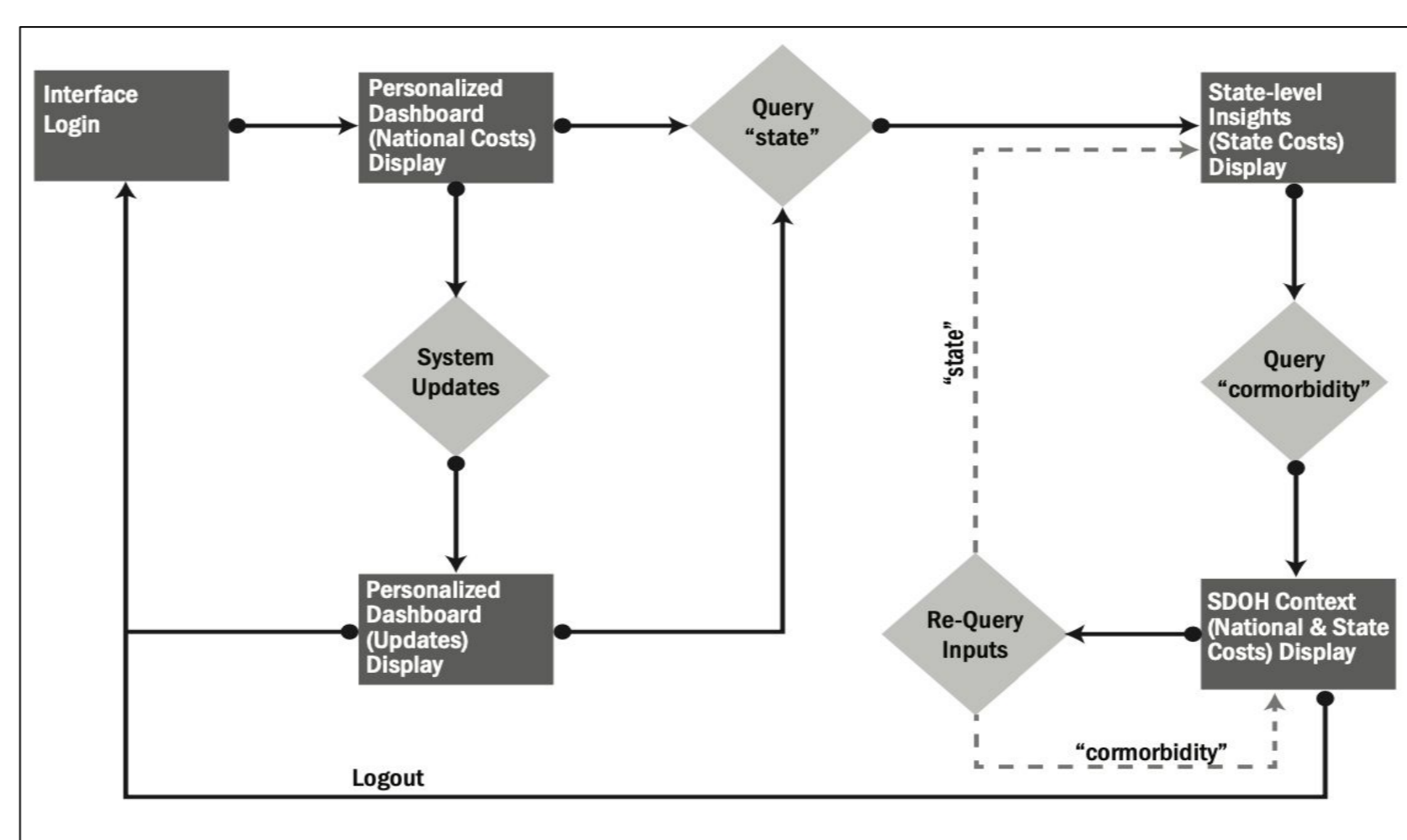❑ Customized information on the user dashboard per user interests

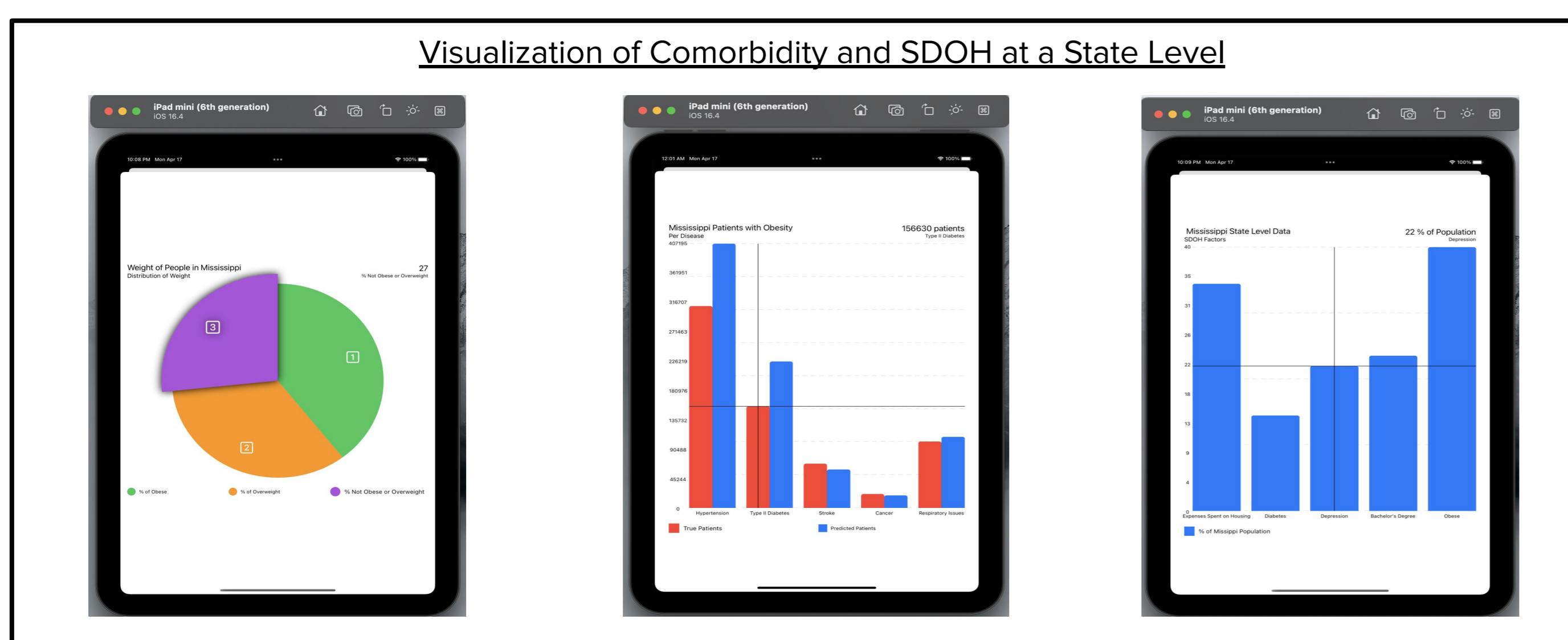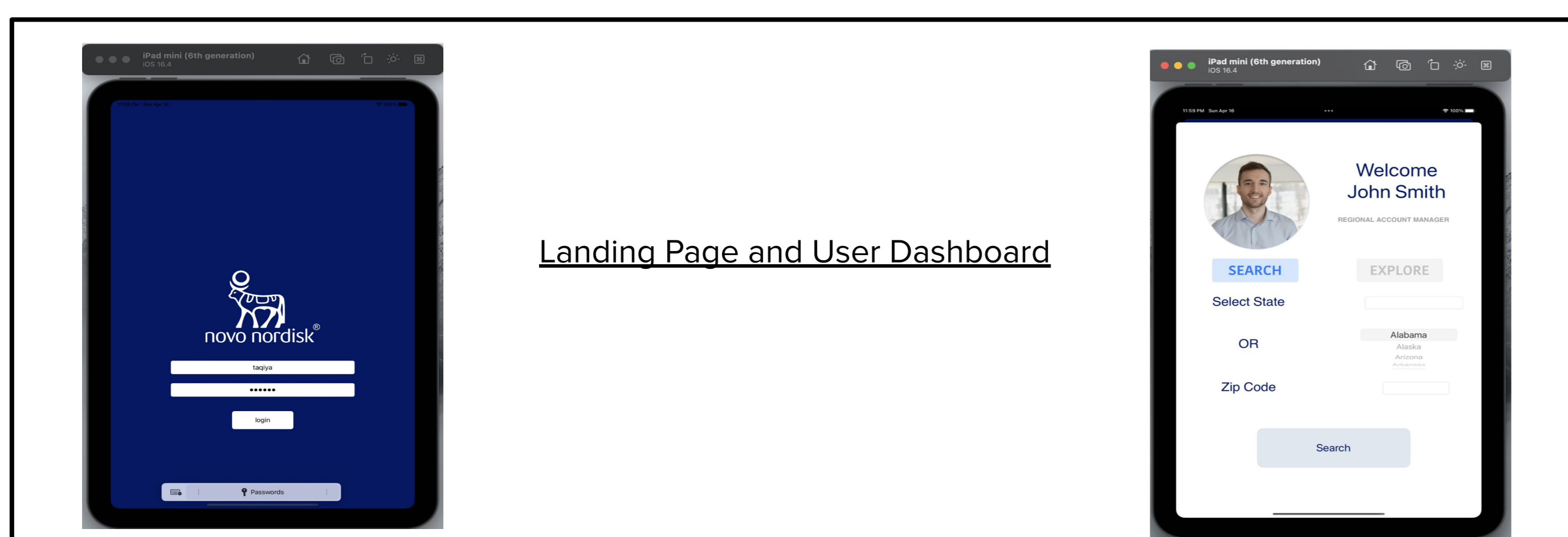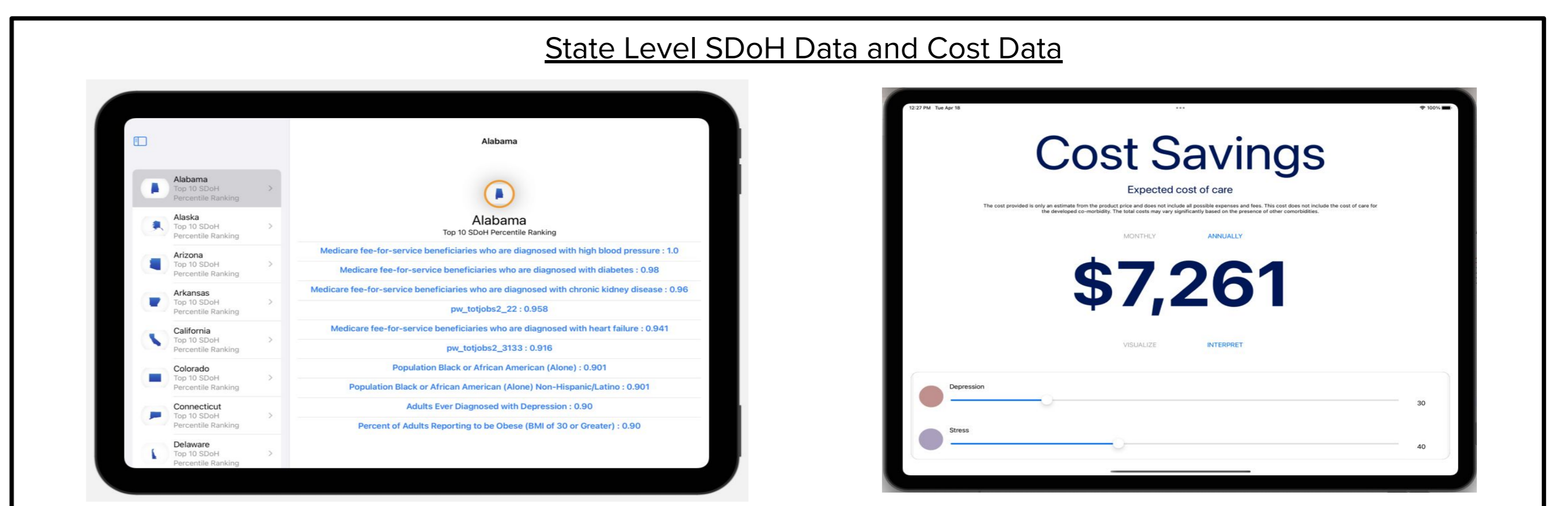**Figure 2**: (L) User Flow (R) Wireframe prototype on Figma

Project Design

Landing Page and User Dashboard

Visualization of Comorbidity and SDOH at a State Level

Figure 3: The final iOS application

State Level SDoH Data and Cost Data

❑ The final iOS application features a unique **user dashboard** accessible upon successful authentication with username and password through the **landing page**.

❑ Within the dashboard, there are two pages:
  ❑ **Search:** This page allows the user to specify a state or zip code to look into numerous social determinants of health (SDoH) factors for the specified area.
    ❑ There is also an **Interpret** page connected here, which explains the data by visualizing the associated costs and comorbidity risks.
  ❑ **Explore:** This page of the dashboard allows the user to view brief SDoH information from across all states. Each tab on the page opens to the top 10 SDoH factors of each state.

Impact & Future Plan

❑ Equitable choice of medical solutions for people diagnosed with obesity
❑ Raising awareness and consciousness surrounding comorbidity risks related to obesity
❑ Contextualizing socioeconomic factors that directly impact obesity and comorbidities

Moving forward, we would like to extend the usage of our application in not only predicting and contextualizing obesity-related comorbidities, but also affordably navigating through recuperation plans across all demographics in the country.

References

[1] Farberman, R., & Bright, W. (2022). *State of obesity 2022: Better policies for a healthier america.* https://www.tfah.org/report-details/state-of-obesity-2022