

User Manual

Overview

The Breast Cancer Surveillance Consortium (BCSC) previously developed an invasive breast cancer risk calculator that estimates five- and ten-year risk based on the following factors: age, race and ethnicity, first-degree family history of breast cancer, history of breast biopsy, and breast density. In 2023, the BCSC invasive breast cancer risk calculator was updated to include second-degree family history of breast cancer, body mass index (BMI), and age at first live birth. The BCSC calculators and risk models were developed in individuals assigned female sex at birth, hereafter 'individuals.' The goal of the BCSC Invasive Cancer Risk Calculator app is to aid health professionals in computing invasive breast cancer risk, which may be used to guide decisions about primary prevention.

This application is supported on three platforms, iOS, Google Play, and a web-based app on the BCSC website <https://www.bcsc-research.org/>, each implemented with distinct and intuitive UI & UX. For more advanced usage, the mobile app provides visualizations for users to compare an individual's personal risks to the risk of an individual of the same age and race/ethnicity and to the overall risk distribution of the population. The application contains a user manual and definition page to guide terminology used in the model.

Installation or Distribution

iOS

1. Go to <pending link> or search "<pending>" in App Store.
2. Login with an Apple Account.
3. Click on the "Get" button and follow the on-screen instructions to complete the installation.

Android

1. Go to <Pending link> or search "<Pending>" in Google Play Store.
2. Login with a Google Account.
3. Click on "Install" and follow the on-screen instructions to complete the installation.

Functionalities

Home Page

The Home page contains various information, in order from top to bottom:

- Background on the risk model development and purpose.
- Description of the inclusion and exclusion criteria of the model.
- Description of the risk factors used in the model.
- References for the peer-reviewed publications underlying the model.
- Model and app version information.

Calculator Page

The Calculator page provides a form composed of selectable fields for each risk factor. After all fields are filled, clicking on the “Calculate Risk” button at the bottom of the page will redirect the user to the Results page.

- For each field, a small “i” information icon button reveals additional information about the corresponding factor.
- The BMI calculator allows users to calculate an individual's BMI by inputting the individual's height and weight using either imperial or metric units, and also allows BMI category to be selected from a drop-down menu if known in advance.

Results Page

Navigation:

- Back button: clicking the back button returns the user to the Calculator form where previously selected inputs remain and can be changed to see the impact of changes in risk factors on risk.
- Reload button: clicking the reload button returns the users to a blank Calculator form and resets all inputs to begin a completely new calculation.

Features:

- The first box shows the individual's estimated five-year risk and the average five-year risk for an individual of the same age and race/ethnicity, based on information from the submitted Calculator's form.
- The second box shows the individual's estimated ten-year risk and the average ten-year risk for an individual of the same age and race/ethnicity, based on information from the submitted Calculator's form.

- The Density Plot shows the distribution of all risk values for the overall population. The color on the chart is shaded from low risk (green), to average risk (yellow), to intermediate risk (orange), and to high risk (red). The red vertical line indicates the individual's risk based on their risk factors relative to the whole population.
- The selected input values from the submitted Calculator's form, which corresponds to the values displayed in the first two boxes, are displayed near the bottom of the page.

Graphs page

The Graphs page provides different graphs that users can consult to gain insights about the breast cancer risk model and how the individual's personal risk compares to the overall population. The Graphs page will not display until the user completed the form on the Calculator page.

Note: Any user-related information displayed on the graphs in the Statistics page will use the latest user's information submitted in the Calculator page and will reflect changes only after clicking the "Calculate Risk" button on the Calculator page.

Navigation

Navigation is located on the top app bar of the Graphs page.

- The first button allows users to switch between different types of graphs.
- A second button allows users to switch between different risk factors but is only supported for the Bar Charts.

Graph Types

- Bar Charts displays the overall population average risk for each risk factor category holding input values for other risk factors constant. The red bar corresponds to risk factor value of the current individual.

Graph Layouts

For each graph page, the graph displays five- or ten-year risk, and the box displays the risk factor values selected by the user.

Information page

Under the information page, you will find the following subsections:

User Manual

This tab guides the users on how to use the BCSC calculator step by step with detailed explanations so that users with no previous experience using the app can easily navigate, calculate, and view results using the BCSC calculator.

Risk Factors

This tab explains each risk factor and possible values that the users can select as an input while using the BCSC calculator.

Definitions

We provide detailed definitions for some of the highly technical terminology used in the risk factor input values.

Resources

The Resources page which will direct the users to home page of the BCSC for additional information.

Troubleshooting

- Most pages will show error messages and hints to resolve issues for invalid interactions.
- Relaunch the app when all else fails.

Frequently Asked Questions

- What is the BCSC?
 - The Breast Cancer Surveillance Consortium (BCSC) is a collaborative network of breast imaging registries focused on research to assess and improve the delivery and quality of breast cancer screening, surveillance, and risk assessment in the United States.
- What is the purpose of the BCSC Invasive Breast Cancer Risk Calculator?
 - The BCSC Invasive Breast Cancer Risk Calculator is an interactive tool designed by the scientists at the BCSC to estimate invasive breast cancer risk.
- On which platforms are the application available?
 - The BCSC Invasive Breast Cancer Risk Calculator is available on the BCSC main website, iOS App Store, and Google Play App Store.
- Where can I find more information?
 - The BCSC Invasive Breast Cancer Risk Calculator can be found here:
 - <https://www.bcsc-research.org/tools>

Contact Information

This application was designed and built by a University of California, Davis Computer Science Senior Project student team working in conjunction with members of the BCSC:

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To contact someone with questions or suggestions regarding the Breast Cancer Surveillance Consortium, please email us at: KPWA.scc@kp.org.

For more information, please visit:

<https://www.bcsc-research.org/>