# Developing a budget impact shiny application to assess the financial implications of implementing organized cancer screening programs in countries with limited resources: breast cancer as an example

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**PT 01**

## Background & Objective

- Early detection of cancer through organized cancer screening can improve overall survival rates[1].
- Screening and early detection are therefore critical[2]. However, organized cancer screening program must be applicable, affordable, and sustainable[3].
- Countries and institutions need to assess the finical implication of adapting an organized cancer-screening strategies to determine their affordability.
- We aimed to develop an open-source budget impact analysis (BIA) model to assess the financial implications of organized cancer-screening strategies. The model is intended for use in other countries that may lack the capacity or resources to develop such tools
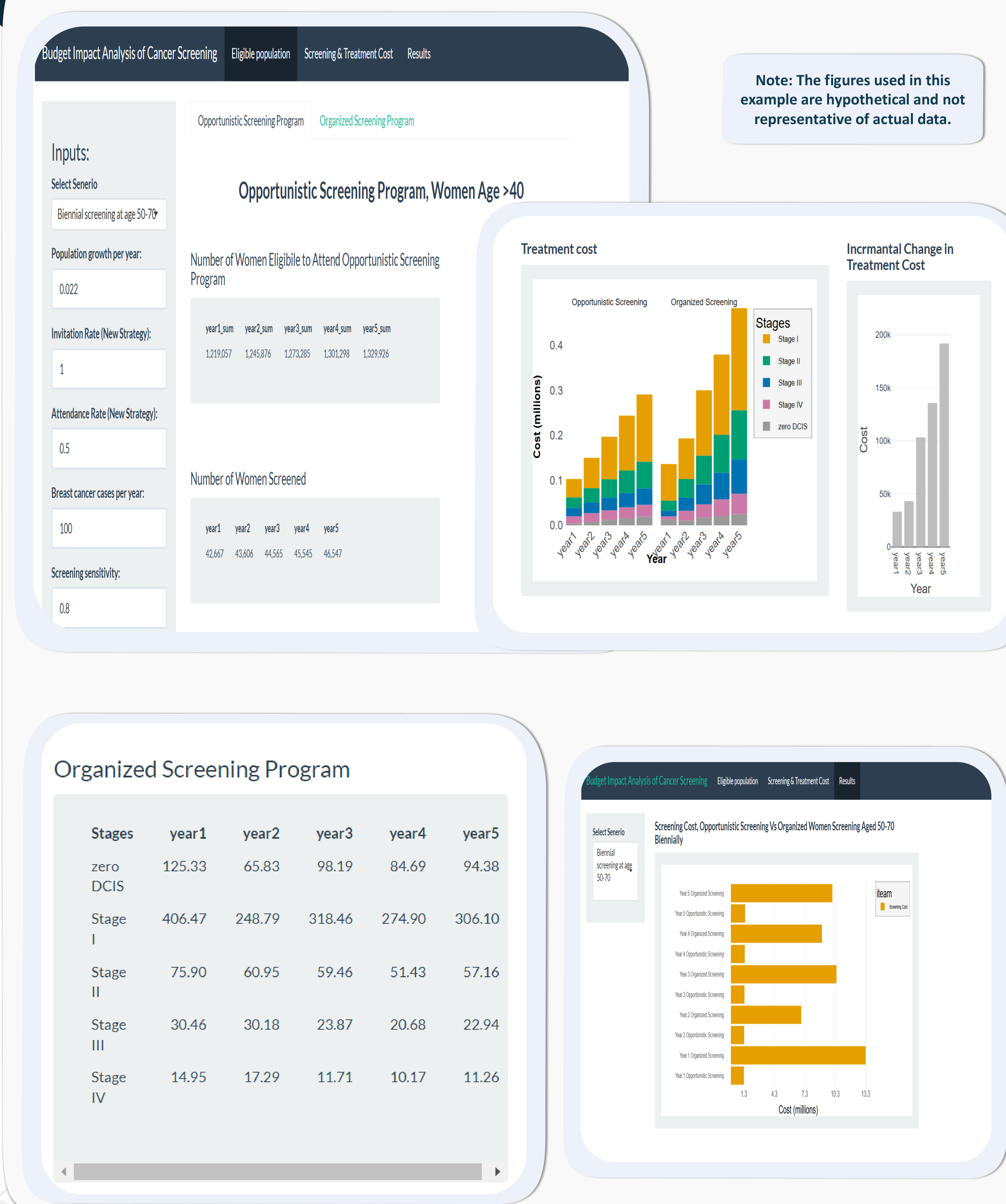
## Methods

- **Design:** We based our methodology on four phases: building the initial model in excel, writing the script code for BIA using R programming language, transforming the R code to shiny application, and validating the results.
- **Eligible Population:** based on screening strategy, invitation rate and attendance rate
- **Cost calculation:** Costs were calculated based on selected screening strategies for comparison. The incremental cost per each strategy was determined.
- **Data Presentation:** We included scripts to present the results in tables and charts for clear visualization and interpretation. The costs were presented in disaggregate form to show the cost of screening and the cost of treatment over the model's time horizon. Costs can be reported in different currencies including Jordanian Dinar and US dollar.
- The model was built following ISPOR principles of good practice for budget impact analysis[4].

## Figure 1 Budget impact shiny application



Note: The figures used in this example are hypothetical and not representative of actual data.

### Organized Screening Program

| Stages | year1 | year2 | year3 | year4 | year5 |
|---|---|---|---|---|---|
| zero DCIS | 125.33 | 65.83 | 98.19 | 84.69 | 94.38 |
| Stage I | 406.47 | 248.79 | 318.46 | 274.90 | 306.10 |
| Stage II | 75.90 | 60.95 | 59.46 | 51.43 | 57.16 |
| Stage III | 30.46 | 30.18 | 23.87 | 20.68 | 22.94 |
| Stage IV | 14.95 | 17.29 | 11.71 | 10.17 | 11.26 |

## Results

- The model is able to predict the number of eligible subjects for screening based on the selected strategy.
- The model predicts the number of positive cancer cases detected by each screening strategy.
- The model is able to stratify positive cases into age groups, and stage at diagnosis.
- The model successfully predicts the 5-year budgetary impact of several screening strategies.
- The cost of treating cancer per stage is calculated using the shiny application.
- The application demonstrates the incremental cost of several organized breast cancer-screening strategies compared with the current opportunistic screening strategy in Jordan (40-70 years annually, 3.5% attendance rate) in the example.

## Conclusions

- The shiny application was user friendly and generated valid results upon comparing its result to BIA excel model. This open-source model is intended to support decision makers in countries with limited resources and reduce the time required to develop such models from scratch.

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**Scan the QR code to access the application**

## References

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