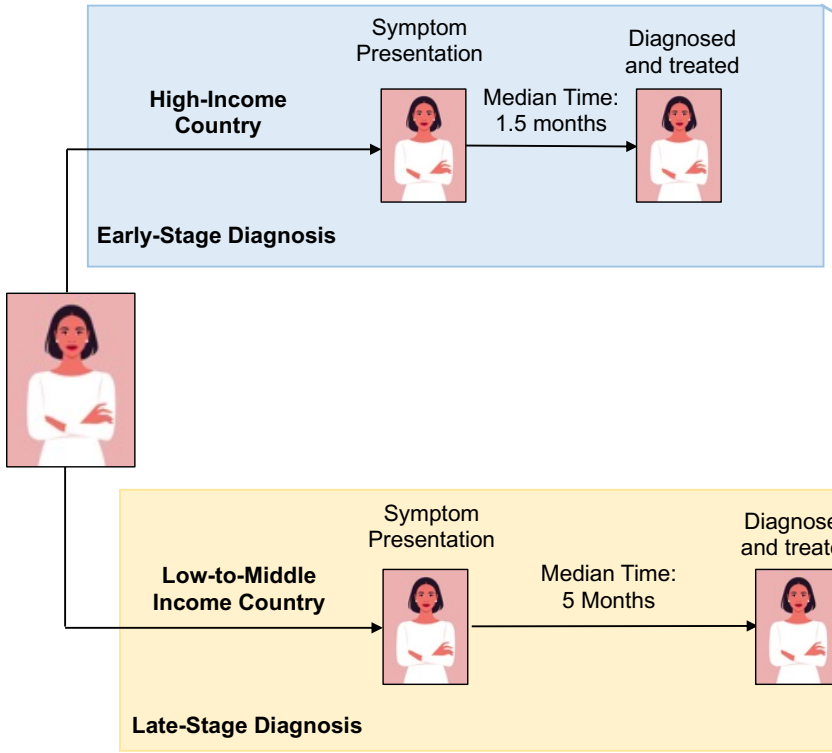
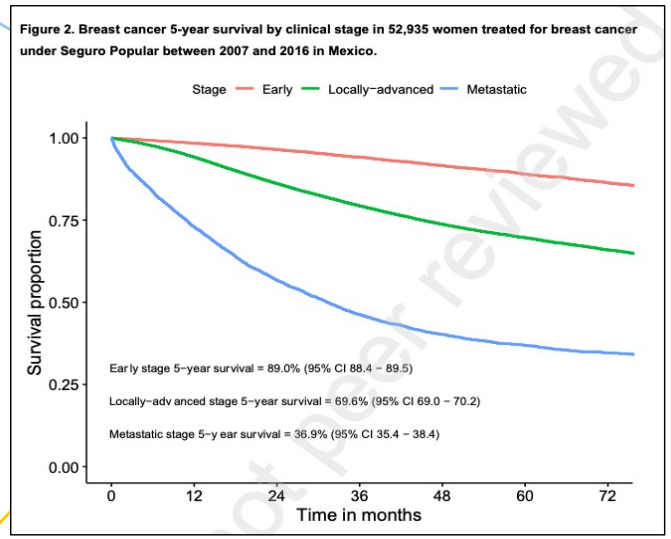


Women face higher mortality when diagnosed at more advanced cancer stages

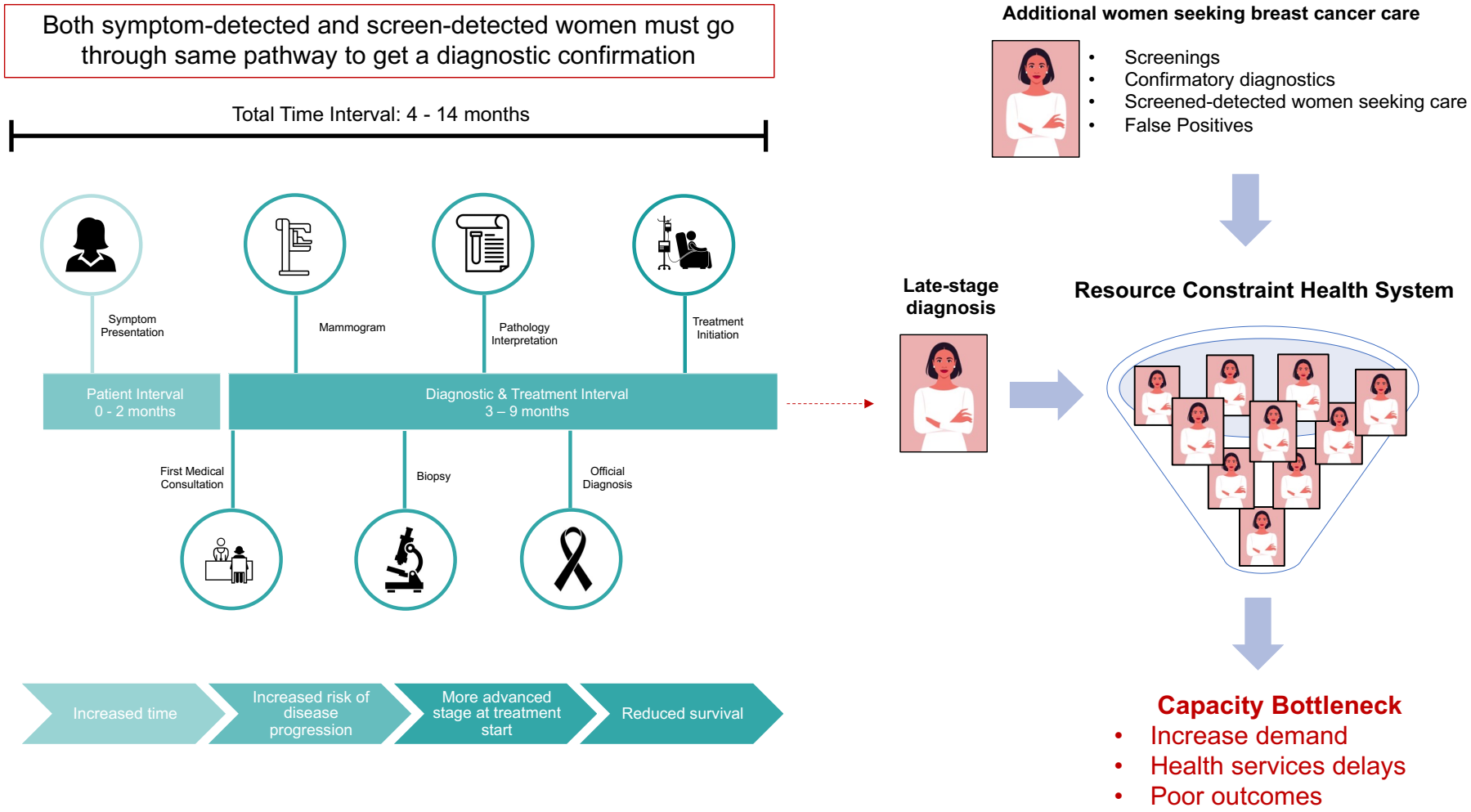


Citation: Unger-Saldaña, Karla and Bandala-Jacques, Antonio and Huerta-Gutierrez, Rodrigo and Zamora-Muñoz, Salvador and Hernandez-Avila, Juan Eugenio and Cabrera-Galeana, Paula Anel and Mohar, Alejandro and Lajous, Martin, Breast Cancer Survival in Mexico between 2007 and 2016. Available at SSRN: https://ssrn.com/abstract=4252677 or http://dx.doi.org/10.2139/ssrn.4252677

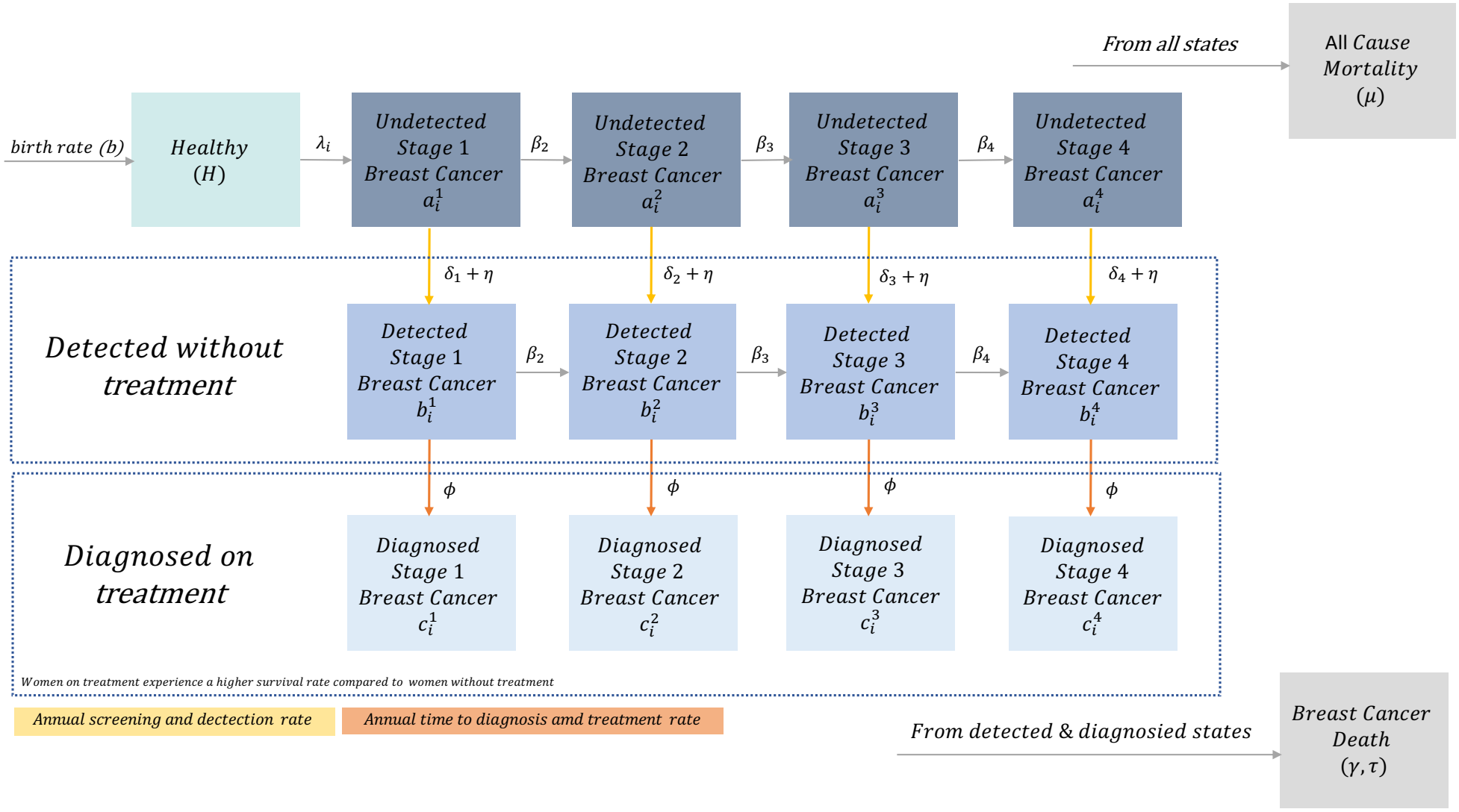
Increased time → Increased risk of disease progression → More advanced stage at treatment start → Reduced survival

Symptom Presentation: A woman's first consultation with a healthcare professional

The median time interval from symptom presentation to a healthcare professional to diagnosis is about **1.5 months** in high-income countries. However, a study among Mexican women with breast cancer found that the median presentation to diagnosis time is about **5 months.**



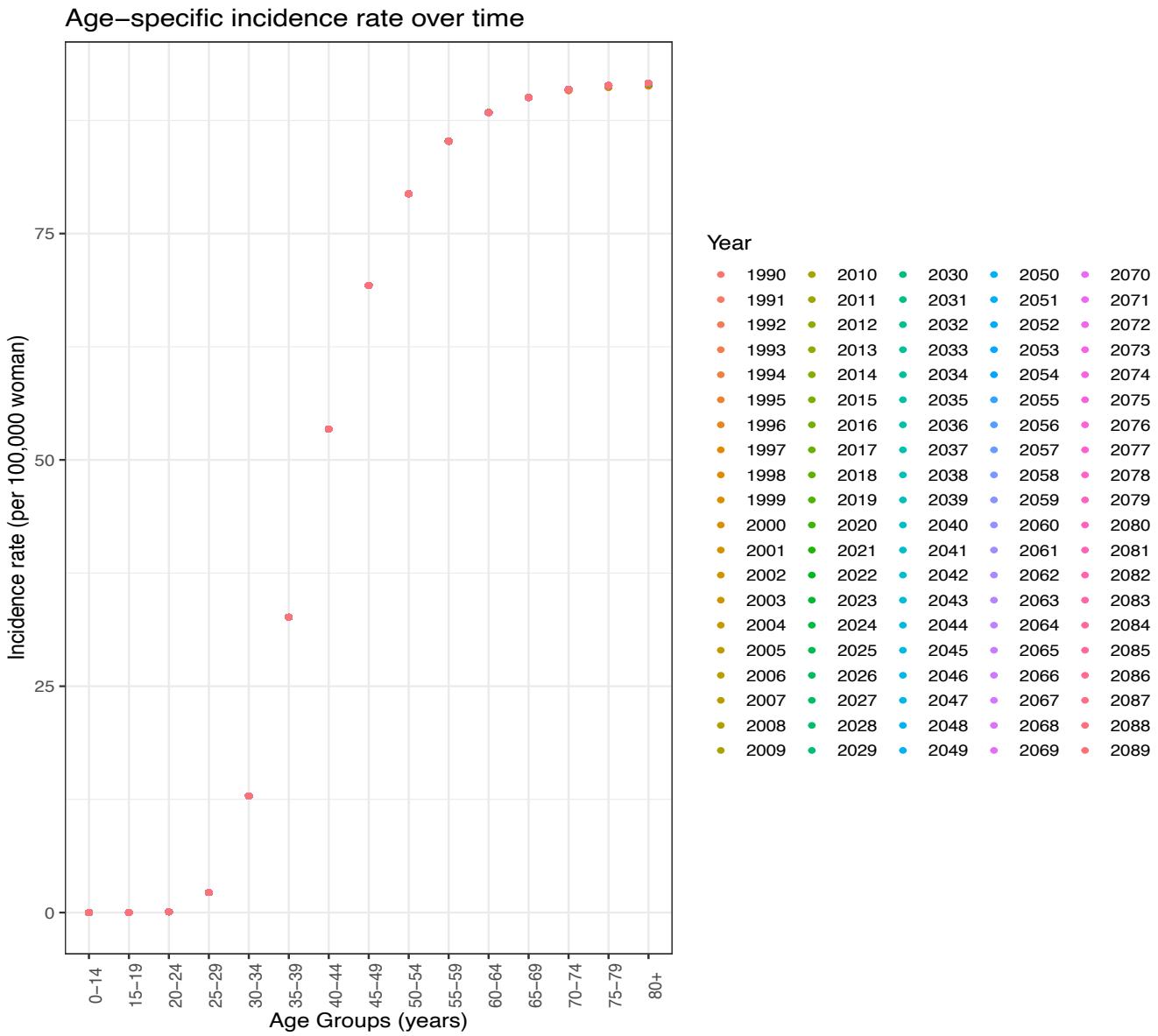
Health policymakers in low-to-middle-income countries (LMICs) face unique challenges in implementing breast cancer control policies. **Traditional screening-focused policies aimed at identifying disease in asymptomatic patients are challenging to implement in resource-constrained LMICs as they tend to increase the demand on the healthcare system, reducing its ability to provide on-time and appropriate diagnosis and care for both symptom- and screened-detected women.** Therefore, efforts must focus on allocating timely diagnostic and treatment resources for newly symptomatic women in LMICs.



A mathematical population-level policy model of the natural history of breast cancer, allowing for screening, and detection of breast cancer in Mexican women.

Model Description: To illustrate, in the model of a generic disease, a population of Mexican women is divided into fifteen compartments. These compartments represent the number of women at time t. Female infants enter the population into the healthy compartment at the birth rate (b). Healthy (H) women develop breast cancer symptoms at a rate of lambda (λ), known as the age-specific breast cancer onset. Women progress through subsequent undetected breast cancer stages $(a_1 - a_4)$ at constant rates $(\beta_2 - \beta_4)$. Women who are detected for breast cancer transition to being detected and not receiving any treatment by the detection rate $(\delta_1 - \delta_4)$. The screening rate for mammography is η. This parameter was obtained from the National Health and Nutrition Survey (Ensanut). Women who do not receive treatment $(b_1 - b_4)$ progress through subsequently diagnosed breast cancer $(\beta_2 - \beta_4)$. Disease progression in detected and not treated stages captures progression to more advanced stages as women wait for treatment. Women progress to treatment stages $(c_1 - c_4)$ at a rate of $1/\phi$. The parameter ϕ represents the median annual wait time to receive treatment in Mexico.[3] Women can exit each compartment at a background mortality rate (μ) or a breast cancer-related mortality (γ, τ). Stage-specific mortality rates are used from a pervious cost-effectiveness analysis in Mexico. Women who are detected and not receiving treatment experience lower survivability compared to women who are receiving treatment.

The age-specific incidence that is produced by the model.



The stage distribution that is produced by the model at steady state.