**Title : Assessment of Adaptive Breast Cancer Screening Policies for Improved Mortality Reduction in Low to Middle Income Countries**

**Author Name :** Baban Wagh

**CO Author Name :** Ramesh Chaluvarayaswamy

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**Department :** Department of Epidemiology and Biostatistics

## Asbstract :

Objective: To investigate adaptive breast cancer screening policies using clinical breast examination for early detection and mortality reduction in low to middle income countries like India. Methods: Using published data from the Mumbai randomized cluster control trial (1998-2006), we first estimated the mean sojourn time at 5.9 years (95% Confidence Interval: 5.3-6.5) assuming 52% sensitivity of the test. The estimated mean sojourn time was used as a "silent interval" in time varying cellular kinetics with the two stage deterministic clonal expansion model, and we found age specific sojourn times in years as follows: 35-39. 0.8; 40-44, 1.0; 45-49, 1.8; 50-54, 3.2; and 55+, 5.9. Equipped with age specific sojourn times and sensitivity, we investigate adaptive screening policies for various year age groups using different screening intervals, maintaining a constant screen count of 10 and a 6 state Markov transition model. The rationale for using a fixed number of screens was to benchmark the effect of the screening interval. Result: We found that annual screening at ages 35-39 and biennial from 41-49 would achieve a mortality reduction of 27.9%, while annual screening from 38-42 and triennial from 43-58 would achieve a mortality reduction of 25.5%. Biennial screening from 40-60 years of age showed a mortality reduction of 23.6%, indicating inclusion of annual screening might be effective. We demonstrated a modelling framework that could be applied to the final data of randomized controlled trials, such as the ongoing Mumbai and Trivandrum trials in India, for assessing efficacy of annual screening in younger women. Conclusion: The framework could be useful to decide age groups that would yield maximal effectiveness in screening trials with selected screening intervals. Further, the framework could be adapted in other low to middle income countries for designing either screening trials or adaptive screening policies.