

Longer travel distances and late stage presentation of breast cancer in Rwanda

Kayleigh Bhangdia

Harvard T.H. Chan School of Public Health

Motivation

There are roughly 10 million deaths per year from cancer, equating to 1 in 6 total deaths. Breast cancer is the most common cancer globally with the majority of deaths occurring in low- and middle-income countries where there is limited diagnostic and treatment availability. Rwanda, a small and mountainous country in East Africa, has been strengthening its approach to tackling noncommunicable diseases and in 2012, the Ministry of Health in collaboration with Partners In Health and Dana Farber Cancer Institute launch the Butaro Cancer Center of Excellence (BCCOE) which became the first center to provide comprehensive and highly subsidized cancer care throughout the country. Strategically located outside the capital city of Kigali, this center aimed to target the rural-poor which is a relatively unique cancer care delivery model. With the majority of breast cancer patients in Rwanda presenting with late stage disease, understanding barriers to accessing diagnoses early is critical to guide early detection strategies. This study explored the relationship between distance and stage at presentation hypothesizing that longer distances were associated with later stage presentation adjusting for contextual and socioeconomic determinants.

Data

Data was collected from electronic and paper medical records from BCCOE which included detailed clinical histories and patient demographics. The study population included a total of 446 patients diagnosed at BCCOE from 2012-2016 that had complete data, were female, resided within Rwanda, and had not received any prior treatment for breast cancer before being diagnosed at BCCOE. Sector level poverty from a national poverty mapping report and records from a breast cancer early detection intervention were merged with the dataset.

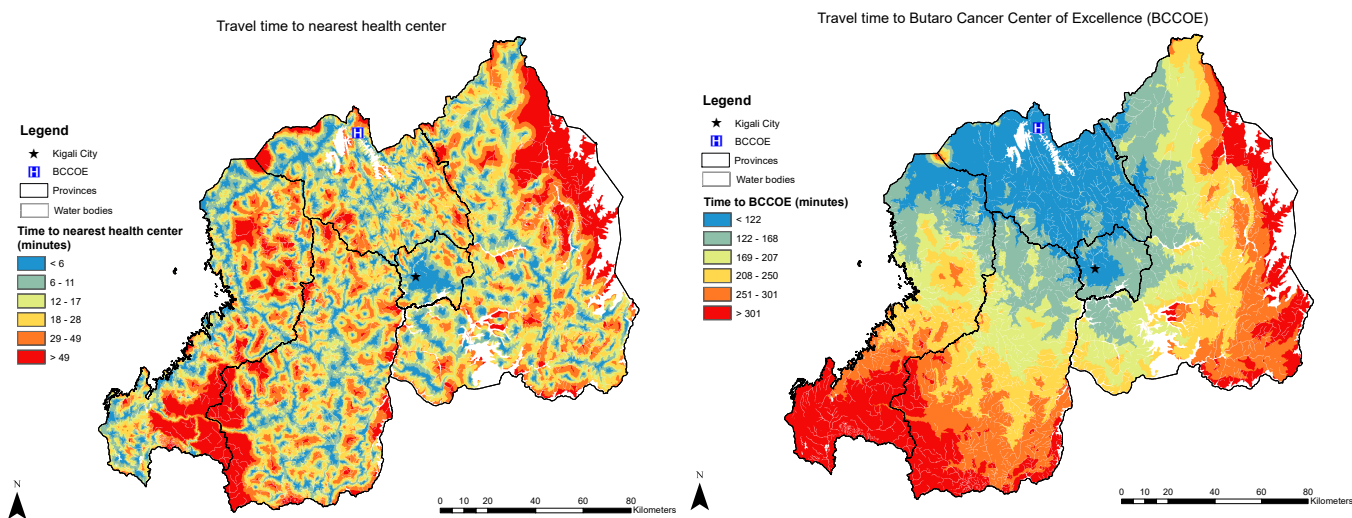
Methodology

The geographical analysis was conducted using AccessMod5, estimating the distance and travel time from each patient to their nearest health center and then to BCCOE. After conducting descriptive statistics and a univariate analyses, a multivariable logistic model was run with the dependent variable, stage, categorized as either early or late stage and the independent variable of distance to BCCOE as a categorical variable of distance quartiles. This model adjusted for age, year of diagnosis, sector level poverty, pre-existing comorbidities, distance to nearest health facility, receiving early detection intervention, and hormone receptor status – variables that were

either statistically significant in univariate analysis or previously determined to be *a priori* confounders.

Main Results

The median age of the study population was roughly 50 years. The majority of patients lived in regions with between 40-60% poverty and 32% resided in the Northern Province. Overall, more than 75% of patients were diagnosed with late stage disease. The median travel time to nearest health center was about 10 minutes and median distance was 3 km. The median travel time to BCCOE was roughly two hours and about 90 km. In the univariate analysis, year of presentation, sector level poverty, residing in Burera district, health center participation in early detection program, hormone receptor status and both distance and time to BCCOE were significantly associated with stage at diagnosis. Interestingly, there was no association found between distance or time to nearest health center and stage. The results from the multivariable model confirm the hypothesis that longer distance to tertiary level facility is associated with later stage at presentation. It was found that the odds of late stage diagnosis were 2.4 times higher among those in distance quartile 4 (living more than 139 km from Butaro) compared to those in distance quartile 1 (living within 55 km from Butaro).



Recommendations

Ultimately, this study highlights how travel distance impacts stage at breast cancer presentation, suggesting that travel distance should be optimized through early detection interventions that prioritize factors such as decentralizing cancer diagnostic testing, providing transport subsidies, social support, or patient navigation all to lessen the burden of distance and long travel times. With the burden of breast cancer increasing throughout the region and the evident presence of late stage diagnosis, these findings emphasize the need for urgent and widely accessible early detection of breast cancer.