

Abstract

Effects of demographics, immigration related factors and cancer screening on female breast cancer mortality rates in United States

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Background: Studies of spatial patterns of cancer mortality rate and its variation by socio-demographic and health care access factors of the geography are essential to inform understanding and improve health outcomes to reduce geographic disparities. Objective: To assess the effects of various county level characteristics on female breast cancer mortality (FBCM) rate and on its geographical variation. Methods: Structured additive regression models using Bayesian inference based on Markov chain Monte Carlo (MCMC) simulation techniques were fitted using age standardized FBCM rates and county level attributes data obtained from Surveillance Epidemiology & End Results (SEER) program for the years 1990 to 2014. Models took into account the non-linear effects of various county level attributes on FBCM rate and were adjusted for spatial heterogeneity and spatial autocorrelation. Results: Spatial dependence of FBCM rates were mostly explained by the county level socio-demographic characteristics. The effects of the mammography use, lack of higher education, minority and foreign born populations on FBCM varied geographically. FBCM rate increased with increases in the proportion of non-Hispanic black population, decreased with an increase in the proportion of Hispanic-white population and were unaffected by the non-Hispanic white population proportion. Immigration related factors such as foreign-born and language isolation rates were positively correlated with FBCM rate. While the effects of unemployment and urban population rates were irrelevant, lack of a high-school or college education showed a strong negative correlation with the FBCM rate. Cancer preventive services such as mammography and Pap smear screening, demonstrated a beneficial effect in reducing the FBCM rate. Conclusions: FBCM rates vary by county as a function of the county's socio-economic, cultural, and healthcare access factors. Negative association of FBCM rate with lower educational rates is in support of breast cancer's exception to the positive education gradient to health. But further research is needed to establish if this negative association with education holds up across all race/ethnic groups and when education is exogenously determined. Barriers for access to and quality of health care may explain the higher rates of FBCM among counties with higher proportions of foreign born and less acculturated populations. These findings support the view of breast cancer as disproportionately impacting specific race/ethnicity groups and a need for a stronger evidence-based health care policy intervention to tackle modifiable risks associated with health care access and cultural beliefs & values.

Epidemiology Public health or related research

