

## Chapter 58

# GIS, Spatial Analysis, and Modeling: The Case of Breast Cancer Incidence in the US

**Khadijeh Rouzbehani**

*University of Tehran, Iran*

**Ghazaleh Sajjadi**

*Azad University, Iran*

**Mohamad Rahim Hatami**

*Iran Medical School of Science, Iran*

### ABSTRACT

*Breast cancer is a major health issue in all countries affecting thousands of women. Its causes are unknown and the national and international strategies to reduce its morbidity and mortality levels are based on early detection of cancer through screening and treatment according to clinical guidelines. Thus, knowledge of which women are at risk and why they are at risk is therefore essential component of disease prevention and screening. In 2015, an estimated 231,840 new cases of invasive breast cancer are expected to be diagnosed in women in the United States, along with 60,290 new cases of non-invasive (in situ) breast cancer. The purpose of this study is to provide a more detailed analysis of the breast cancer distribution in the United States by comparing the spatial distribution of breast cancer cases against physical environmental factors using Geographic Information System (GIS). Further, it gives background information to the GIS and its applications in health-related research.*

### INTRODUCTION

Breast cancer is a major health issue in all countries affecting thousands of women (Tazzite et al., 2013; Dube & Gupta, 2015). So far its causes are unknown and the national and international strategies to reduce its morbidity and mortality levels are based on early detection of cancer through screening and treatment according to clinical guidelines. Thus, knowledge of which women are at risk and why they

DOI: 10.4018/978-1-5225-7033-2.ch058

are at risk is therefore essential component of disease prevention and screening. In 2015, an estimated 231,840 new cases of invasive breast cancer are expected to be diagnosed in women in the United States, along with 60,290 new cases of non-invasive (in situ) breast cancer (Siegel et al., 2015). However, all locations are not equal for breast cancer risk and thus support a major role of the geography in breast carcinogenesis (Akram & Nanna, 2003).

The purpose of this work is to provide a more detailed analysis of the breast cancer distribution in the United States by comparing the spatial distribution of breast cancer cases against physical environmental factors using Geographic Information System (GIS) (Figure 1). Further, it gives background information to the GIS and its applications in health-related research.

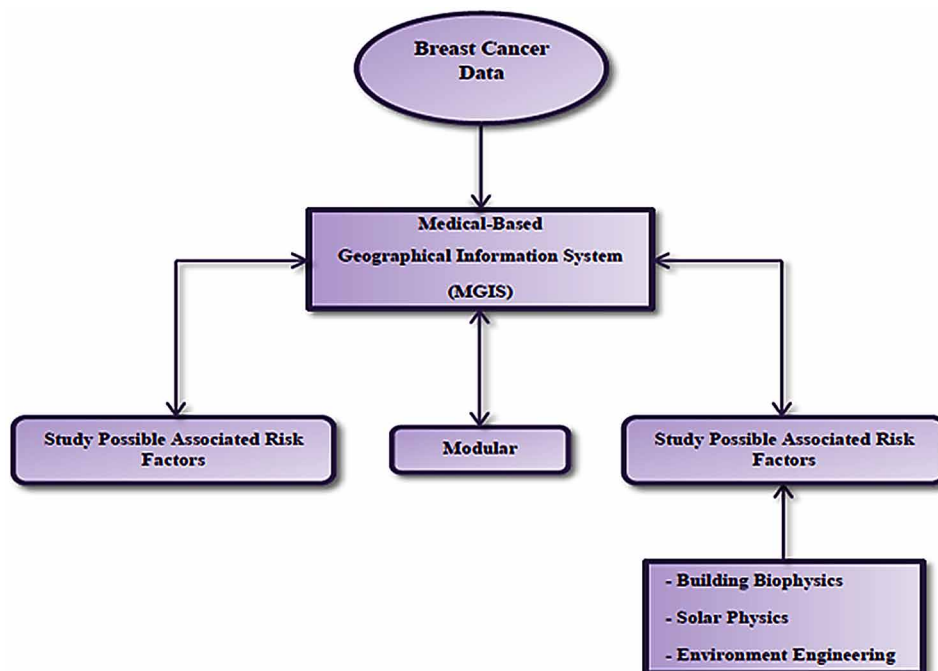
## **BACKGROUND**

### **Breast Cancer Facts/Spatial-Based Patterns**

Previous reports have shown that the Northeast United States has a 16% higher breast cancer mortality rate than the rest of the country (Kulldorff et al., 1997). The probability of breast cancer risk is not equal for all locations which indicate that geography plays a very important role in the etiology of breast cancer.

There are geographic patterns of high cases of breast cancer, and the analysis of these patterns is very important in the formulation of hypotheses about risks and focus investment more effectively in research and intervention on the most significant areas (Laden et al., 1997).

*Figure 1. Medical-based GIS*



12 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:

[www.igi-global.com/chapter/gis-spatial-analysis-and-modeling/212994](http://www.igi-global.com/chapter/gis-spatial-analysis-and-modeling/212994)

## Related Content

---

### Load Flow Analysis in Smart Grids

Osman Hasan, Awais Mahmood and Syed Rafay Hasan (2019). *Advanced Methodologies and Technologies in Engineering and Environmental Science* (pp. 187-199).

[www.irma-international.org/chapter/load-flow-analysis-in-smart-grids/211872](http://www.irma-international.org/chapter/load-flow-analysis-in-smart-grids/211872)

### Impact of Green Growth and Development Path for Skilled and Unskilled Job Creation and Economic, Social Sustainability: Case Study of India – A Recursive Dynamic CGE Model Approach

Anandajit Goswami, Saswata Chaudhury and Tarun Garg (2017). *Renewable and Alternative Energy: Concepts, Methodologies, Tools, and Applications* (pp. 1350-1361).

[www.irma-international.org/chapter/impact-of-green-growth-and-development-path-for-skilled-and-unskilled-job-creation-and-economic-social-sustainability/169638](http://www.irma-international.org/chapter/impact-of-green-growth-and-development-path-for-skilled-and-unskilled-job-creation-and-economic-social-sustainability/169638)

### Role of Water-Energy-Waste Inter-Relatedness to Drive Sustainability amid Climate Concerns

Salil K. Sen and Junya Pookayaporn (2018). *Climate Change and Environmental Concerns: Breakthroughs in Research and Practice* (pp. 614-629).

[www.irma-international.org/chapter/role-of-water-energy-waste-inter-relatedness-to-drive-sustainability-amid-climate-concerns/201727](http://www.irma-international.org/chapter/role-of-water-energy-waste-inter-relatedness-to-drive-sustainability-amid-climate-concerns/201727)

### Estimating the Impact of the Sustainable Development Goals on the Lebanese Society: Effects on Bio-Economic Indicators

Georges Bellos and Mazen Muhieddine Kotob (2023). *Handbook of Research on Bioeconomy and Economic Ecosystems* (pp. 88-108).

[www.irma-international.org/chapter/estimating-the-impact-of-the-sustainable-development-goals-on-the-lebanese-society/326885](http://www.irma-international.org/chapter/estimating-the-impact-of-the-sustainable-development-goals-on-the-lebanese-society/326885)

### The Dynamics of Copper and Zinc Pollution in Soils: The Case of Sub-Saharan Africa

(2023). *Global Industrial Impacts of Heavy Metal Pollution in Sub-Saharan Africa* (pp. 268-284).

[www.irma-international.org/chapter/the-dynamics-of-copper-and-zinc-pollution-in-soils/328153](http://www.irma-international.org/chapter/the-dynamics-of-copper-and-zinc-pollution-in-soils/328153)