SPATIAL MAPPING OF ASTHMA HOSPITALIZATIONS IN RELATION TO PARTICULATE POLLUTION- A GIS BASED DECISION SUPPORT FOR HEALTH ADMINISTRATION

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Abstract: Current observations indicate that asthma population is growing every year in the United States but specific reasons for this are not well understood. This study stems from an ongoing research effort to investigate the spatio-temporal behavior of asthma and its relationship to air pollution. The association between environmental variables such as air quality and asthma related health issues over Mississippi State are investigated using Geographic Information Systems (GIS) tools and applications. Health data concerning asthma were obtained from Mississippi State Department of Health (MSDH) for 9-year period from 2003-2011, and data of air pollutant concentrations (PM₂.₅) collected from USEPA web resources. Both data were analyzed geospatially to establish the impacts of air quality on human health specifically related to asthma. Disease mapping using geospatial techniques provides valuable insights into the spatial nature, variability, and association of asthma to air pollution. Asthma patient hospitalization data of Mississippi has been analyzed and mapped using quantitative Choropleth techniques in ArcGIS. Patients have been geocoded to their respective zip codes. Potential air pollutant sources of interstate highways, industries, and other land use data have been integrated in common geospatial platform to understand their adverse contribution on human health. Existing hospitals and emergency clinics were geocoded to further understand their proximity and accessibility to patients. Spatial richness of Asthma is increased over the studied years (past to recent) and disease clusters have been observed in specific Zip code regions. At the current level of analysis and understanding, spatial presence of Asthma is observed in the populations of Zip code regions in gulf coast, along the interstates of south, and in counties of northeast Mississippi. It is also found that asthma is prevalent in most of the urban population. This GIS based project would be useful for health risk assessment and providing support to administrators and decision makers for establishing satellite clinics in the future.

Key words: Asthma, GIS, Geocode, Choropleth map, Health, Satellite clinic, Air pollution