Editorial

GEOGRAPHICAL INFORMATION SYSTEMS AND THE ANALYSIS OF HEALTH FOR RURAL POPULATIONS

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A myriad of economic, political and demographic factors continue to propel the "social transformation" of health in America. The healthcare industry has undergone drastic restructuring in the United States (Folland et al, 2001; McLafferty, 2003). During the 1980's and 1990's hospital closures, mergers, and reorganizations greatly impacted spatial organization and availability of healthcare services. Geographical restructuring to date has followed a pattern of hospital closures in rural and lower socio-economic (SES) areas and expansions of larger hospitals located in higher SES areas (Folland et al, 2001; Ginter et al, 1998; McLafferty, 2003). Subsequently, rural-to-urban restructuring has resulted in overall greater concentration of healthcare services in large tertiary hospitals thereby decreasing access by increasing the distance and travel time to healthcare services. This geographical restructuring of health services has most notably impacted rural populations. Significant decreases in healthcare services to the already vulnerable, at-risk rural populations have compounded the existing problem of healthcare disparities.

Geographic Information Systems (GIS) is an emerging new technology in healthcare. Historically, it has been used in the past for the management of land and natural resources. This growing technology and new research methodology is simply an information system that can be used to efficiently capture, organize, store, manipulate and analyze spatial data. GIS can link and join geographical and attribute databases as well as query these databases to identify patterns of health outcomes. Its ability to link geographical features on a map with attribute data is proving more and more useful in the analysis of health data and planning of healthcare services.

GIS has demonstrated its value in the integration of statistical and geographic data and the visualization of spatial relationships. GIS is efficient for analyzing health data, revealing trends and determining relationships that might be missed in a strictly tabular format. Mapping and visualization of health disparities and their relationship to the geographical location of healthcare services allow for better planning and resource allocations to vulnerable populations.

The literature is replete with reports of regional, locational, and small-area analysis of health disparities. Studies of medical geography and epidemiology well document significant variations in health over even small geographical areas. Disparities in access to healthcare services have been associated with barriers to access such as age, sex, race, ethnicity, income, insurance status, and geography. Geographical proximity to healthcare services has been shown to be a strong predictor many health outcomes and various health disparities. According to the Agency for Healthcare Research and Quality, geographical disparities continue to exist. More research is needed to evaluate the impact of geographical access and important healthcare outcome measures.

This innovative technology is becoming instrumental in the synthesis of information to foster awareness of specific health concerns, facilitate development of intervention strategies, and enhance utilization of resources. GIS technology can be of value for future health planning,

the development of health policies and the allocation of healthcare resources. GIS is effective in the management and analysis of health data. Geographical analysis is important for the identification of patterns of healthcare outcomes and the association or linkage to political processes and policy makers (Cromely, 2002; Gatrell, 2002; Elliott, Wakefield, Best, & Briggs, 2000; Meade & Earickson, 2000).

The World Health Organization (WHO) has recognized the value of public health mapping and GIS. According to the WHO:

> Geographical information systems (GIS) provide ideal platforms for the convergence of disease-specific information and their analyses in relation to population settlements, surrounding social and health services and the natural environment. They are highly suitable for analyzing epidemiological data, revealing trends and interrelationships that would be difficult to discover in tabular format. Moreover GIS allows policy makers to easily visualize problems in relation to existing health and social services and the natural environment and so more effectively target resources (WHO, 2003, p.1).

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