

Significance of GIS in Understanding The Various Demographic Aspects (With Special Reference to the Healthcare Services)

Mamta Verma

Lecturer

Dept. of Geography,
Government P.G. College,
Dholpur, Rajasthan, India

Abstract

Geographic information system (GIS) refers to a system that is designed to capture, store, manipulate and analyse geographical data. This type of information system is used for planning and designing layout for land use and management. The data collected and stored by the GIS can be used for varied purposes ranging from transport, disease-outbreak analysis, draught analysis, land occupancy, etc.

A geographical information system (GIS) is defined as 'a computer-based system for collecting, editing, integrating, visualizing and analysing spatially-referenced data'. They contain the spatial dimensions of specific geographic areas. This allows for mapping and analysis of spatial information to occur and be applied in business, market research, government, etc. Health GISs are integrated systems containing tools for managing, inquiring, analysing and presenting spatially-referenced health data.

GIS databases are comprised of both spatial and non-spatial data to allow for a greater understanding of their relationships through a series of thematic features in geography. Non-spatial data (also called attribute or characteristic data) are that information that is independent of geometric considerations.

For example, a person's height, mass and age are non-spatial data because they are independent of a person's location. However, weight is spatial data in the sense that weight of something depends on its location. Spatial data define precise geographical locations. Using GIS converts street addresses and coordinates to a specific point on a map. Spatial data include spatial relationships. For example, the arrangement of houses on a street is also spatial data.

The paper is a theoretical study on the use of GIS in the field of healthcare services. The findings reveal that GIS is helpful in realizing the healthcare services on a given geographical area occupied by the people with various demographic features.

Keywords: GIS, Understanding, Healthcare, Health Outcomes, Fields, Geographical Research.

Introduction

Geographic information system (GIS) refers to a system that is designed to capture, store, manipulate and analyse geographical data. This type of information system is used for planning and designing layout for land use and management. The data collected and stored by the GIS can be used for varied purposes ranging from transport, disease-outbreak analysis, draught analysis, land occupancy, etc.

Review articles are the summary of current state of understanding on a particular research topic. They analyze or discuss research previously published by scientist and academicians rather than reporting novel research results.

Review article comes in the form of systematic reviews and literature reviews and are a form of secondary literature. Systematic reviews determine an objective list of criteria, and find all previously published original research papers that meet the criteria. They then compare the results presented in these papers.

Literature reviews, by contrast, provide a summary of what the authors believe are the best and most relevant prior publications. The concept of "review article" is separate from the concept of peer-reviewed literature. It is possible for a review to be peer-reviewed, and it is possible for a review to be non-peer-reviewed.

GIS is a very popular technique of monitoring and realizing the availability of various services being provided to the population that live on a particular place. Though it is helpful in studying and supplying reliable information about all the demographic aspects, it is especially useful in the understanding and evaluating the healthcare services and health outcomes in a community that belongs to a particular geographical area. Its importance is increasing day-by-day with the increase in the complexity of human life.

Review of Literature

Gary Higgs (2004), in A Literature Review of the Use of GIS-Based Measures of Access to Health Care Services, surveys that GIS and Global Positioning Systems (GPS) have significant potential to address policy concerns regarding health inequalities that may partly arise through a lack of access to primary and secondary healthcare facilities. Recent developments in geographically disaggregate data will enable the implementation of analytical techniques in a range of health contexts and at a variety of spatial scales. GIS has the potential to provide an improved evidence base with which to identify and target groups and areas with lower levels of accessibility and to monitor the impacts of any service re-locations or changes in delivery on accessibility.

Gail Langran (2007), in the research paper entitled A review of temporal database research and its use in GIS applications, finds that a great deal of recent work in computer science applies itself to temporal database design. Designers of geographical information systems (GIS) can build on this work to create a temporal GIS capability to trace geographical change and understand geographical processes.

Barbara Ann Graves (2010), in her research paper entitled Integrated Literature Review: A Review of Literature Related to Geographical Information Systems, Healthcare Access & Health Outcomes, finds that GISs are an emerging technology in the analysis of health from a geographical or location context. As a type of information technology, GISs are potentially powerful assessment tools for the investigation of healthcare access, health outcomes, and the possible resulting health disparities. Their ability to integrate health data with mapping functions allows for visualization, exploration, modeling of health patterns. Application of GIS technology using health data can help in describing and explaining disparities in healthcare access and health outcomes.

Eyup Artvinli (2010), in The Contribution of Geographic Information Systems (GIS) to Geography Education and Secondary School Students' Attitudes Related to GIS, holds the idea that the students' attitudes towards GIS are positive, but new and widespread applications are needed for students to learn their lessons with GIS in a more motivated way. The place of Geographic Information Systems (GIS) in teaching geography, the general level of secondary school students' attitudes towards Geography Information Systems and whether this changes according to different variables need to be considered

and reconsidered for the sake of proper understanding.

Diane Whitaker (2011), in Using Geographic Information Systems in science classrooms, illustrates several GIS lessons that span the gamut of worksheet type lessons to independent student research. Using Geographic Information Systems, GIS, in the science classroom has a variety of benefits which the associated literature describes. Visual learners find GIS a way to establish and communicate relationships that may be difficult for them to communicate with words and this makes their learning more enjoyable and rewarding. GIS use allows teachers to simplify many science concepts and again appeal to visual learners. Earthquake and volcano location relative to plate boundaries is a good example that is illustrated in a model lesson here. Additionally, GIS technologies allow students to practice and enhance their inquiry and problem solving skills. Students must select appropriate data layers, produce a map that communicates clearly to an audience, and calculate values like perimeter and area. GIS maps can be used to help students generate research questions and then answer those questions.

Ashley Mariko Aimone & Others (2013), in their paper on A systematic review of the application and utility of geographical information systems for exploring disease-disease relationships in paediatric global health research: the case of anaemia and malaria, discuss that use of geographical information systems (GIS) to investigate this disease-disease interaction could contribute important new information for developing safe and effective anaemia and malaria interventions.

K. Lyseen & others (2014), in A Review and Framework for Categorizing Current Research and Development in Health Related Geographical Information Systems (GIS) Studies, conclude that spatial analysis of diseases and health service planning are well-established research areas. The development of future technologies and new application areas for GIS and data-gathering technologies such as GPS, smartphones, remote sensing etc. will be nudging the research in GIS and health.

P. Jia , X. Cheng & H. Xue (February, 2017), in Applications of geographic information systems (GIS) data and methods in obesity-related research, hold that geographic information systems (GIS) methods offer good promise for public health programs including obesity-related research. Applications of GIS data/methods in obesity research are still limited, and related research faces many challenges. More and better GIS data and more friendly analysis methods are needed to expand future GIS applications in obesity-related research.

Objectives of the Study

1. To study the ongoing trends in the field of Geography and geographical research involving both the research in natural geography and human geography
2. To concentrate on human geography and its various aspects that are attracting researchers to study

3. To be familiar with the variety of geographical areas, environment and demographic features
4. To have an idea about research and its components
5. To discuss the process of geographical research
6. To focus on the literature review and its importance in giving a sufficient feedback about the problem to be studied to the researchers
7. To interpret the various techniques adopted in geographical research and studies
8. To study in particular GIS as a tool of supplying required information about the demographic issues and services
9. To study the use of GIS in healthcare services and health outcomes
10. To reflect the various fields in which GIS is used effectively

Hypothesis

1. Geographical studies are made using various tools and techniques of data collection
2. Observation, questionnaire, remote sensing, GIS etc. are some of the popular techniques
3. Field survey is the integral part of the geographical studies whether they belong to physical geography or human geography
4. Questionnaire is used to collect information on the various aspects of the selected problem
5. GIS is quite helpful in understanding the demographic features and demographic problems, and in the evaluation of the various services being provided to the population living at a particular place.
6. GIS is preferred by most of the geographers, but its importance in the study of the problems relating to the human geography is so immense
7. GIS is incredibly helpful in making the evaluation of the healthcare services and health outcomes relating to the population belonging to a specific area

Methodology

The study is designed on the inductive method of study. Purely theoretical in nature, the paper is designed on the secondary data that were found available in the various research papers published in national and international journals. The research papers that were found suitable to the paper include both the studies carried out in India and abroad. Attempts were made to keep up and maintain the scientific spirit of the work. For it, all the steps required for a theoretical work in geography, were adopted.

The idea of writing about GIS came with the author's studying about the application of GIS technique in various fields, and finally mentally prepared the author to explore its relevance in the study of the healthcare services and health outputs of the population of a place. For the purpose, the steps that were undertaken include-selection of the problem, going through the literature on the theme, selection of the specified studies through the research journals on the internet sites, classification of the contents as per their nature, content analysis, interpretation and finally summing up.

Findings

1. GIS has evolved out of the tradition of map making.
2. GIS dramatically supplies information that can be presented through a map.
3. Cartographic conventions and limitations apply to digital maps.
4. Before computers became widely available, thematic maps on plastic Mylar sheets were used for the representation of the reality
5. McHarg's method resembles the output of contemporary GIS
6. The development of the GBF-DIME files by the U.S. Census Bureau in the 1960s marked the beginning of digital mapping
7. The early GIS packages were often written for specific applications
8. In the 1970s, private vendors began offering off-the-shelf GIS packages.
9. M & S computing and ESRI emerged as leading vendors of GIS software.
10. In 1980s, GIS was approved as a viable technology for state and municipal planning.
11. In the late 1990s, GIS was adopted for sub-municipal level
12. By now the access to both GIS software and spatial data sets has improved
13. GIS as a planning or research tool needs to be adopted and used by community organization
14. GIS is developed, enhanced and used in different fields of Geography
15. GIS is successfully used in the various fields, such as, Agriculture, irrigation, soil management, Geology, Geomorphology, land information system, natural hazard management, urban planning, environment, health, natural resource management, human resource development etc.
16. In order to reflect and mirror the real picture of healthcare services and health outcomes, GIS needs to be adopted
17. The future of GIS technique is bright, as with the passage of time, it is attracting more and more geographers and forcing them to deviate from the conventional tools of the study.

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