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Geographical accessibility analysis of public health care centers in Faisalabad city (Pakistan) for a sustainable future

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Abstract

Primary health care is the most important element in health services while geographical accessibility explains the efficient provision of health care facilities to the public of any particular area. Current study is an attempt to explore the accessibility of health care centers in Faisalabad city (Pakistan) in order to investigate different problems faced by the people to reach these centers. Proximity buffer analysis was used to measure the distance of public health care centers. It was found that all the 16 public health care centers are situated within the two kilometers radius from city center. While the other three zones which are 2-8 kilometers away from city center do not have any public health care facility and residents of these zones have to depend upon city center for health care facilities. This study also proposes the equal distribution of public health care centers within the city.

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Introduction

Geographic accessibility has a great impact on provision of health care services. It has always been a great challenge to maintain good health and provision of efficient health services to mankind. Various studies in past proved with evidences that the distance effects the usage of facility as the distances increases the usage of this health care facility is reduced. Although limited transportation facilities are hindrance to fully functional and effective health care system but the distance from residential area of people to health care providing facility center is a major factor that keep health services from people who need it most and creates hurdles in proper and fruitful utilization of health services (Phillips 1979; Egunjobi 1983; Habib and Vaughan 1986; Perry & Gesler, 2000; Noor *et al.* 2003; Buor 2004). Accessibility to primary health care is directly linked to desire and need of a population that lived in a specific area as a medium between their residential locations to primary health care facility of that concerning area covering the basic need of that population. Accessibility is defined in several parts, barriers that include distance, transportation cost, and mean traveling time to that facility (Cromley & Mc Lafferty, 2002).

A number of researches considered distance as the major and primary element that defines the utilization rates and consumption of health care services in developed world (Noor *et al.*, 2003). It is also known as *distance decay effect,* the contact and reach of a person in a village is inversely proportion to the distance of health care center's location. This method is used in many of the studies about health care accessibility behavior and measurement. This extreme challenge made Government(s) and Non-Governmental Organizations NGO, s working in this scenario to setup good health care facilitation in different parts of the world. Regarding HealthCare, public health care facility is taken as primary form of healthcare as it facilitates less expensive source of medical treatment to a bigger part of the population living in any specific area (Effiong, 2010).

It is globally recognized that primary health care (PHC) is the most important element in health services considerations for the distribution of public health facilities to the people of the World (WHO & UNICEF, 1978). As (PHC) is most cost reducing and easy to access as compared to the specialized services delivery. Therefore if PHC is provided without any biasness considering everyone equally, deserving for this facility, it can provide the maximum results for the good and efficient service deliveries while reducing disease based problems and reduction in inequality behavior in a bigger picture of society (Guagliardo 2004).

Effective accessibility of public to PHC is one of the key factors to reach high aim of "health for all". Accessibility analysis is directly related to spatial environment thus GIS is the best tool for the measurement of Accessibility since last ten years uprising trend of GIS usage for measurements of access physically. There is a notable well defined criterion for usage, linkage and optimization of transport and socio economic data sets and is perfectly fit specially in GIS involving environment (Liu & Zhu, 2004).

Studies show that in public sector spending share of total expenses are increasing or in decreasing trend depending directly to various income generating collaborators and is directly concerned and related to quality of delivery of services and benefits of public health expenses throughout region, gender, religious views and cast system provide base (Lamiraud *et al.* (2005); Younger (1999); Roberts (2003); Gupta, *et al.* (2000); and Castro, *et al.* (2000).

Material and methods

Study Area

Faisalabad is the 3rd largest city of Pakistan (fig. 1) and the 2nd largest of Punjab Province. Faisalabad city is possessed by a number of health care facilities both by public and private sector hospitals. Hospitals that are administrated and managed by Government are Allied hospital, DHQ Hospital, PINUM Cancer Hospital, Faisalabad Institute of Cardiology, General

Hospital Samanabad and General Hospital Ghullam Muhammad Abad Faisalabad (Survey of Faisalabad Pakistan, 2013). Hospitals that are under private supervision and management are Faisal Hospital, National Hospital, Mujahid Hospital, Sahil Hospital and Al-Rahmat Laboratories. There are four Tehsil Head Quarter (THQ) Hospitals, eleven Rural health centers, 168 basic health units, five Government Rural Dispensaries and 70 district council dispensaries in Faisalabad district.

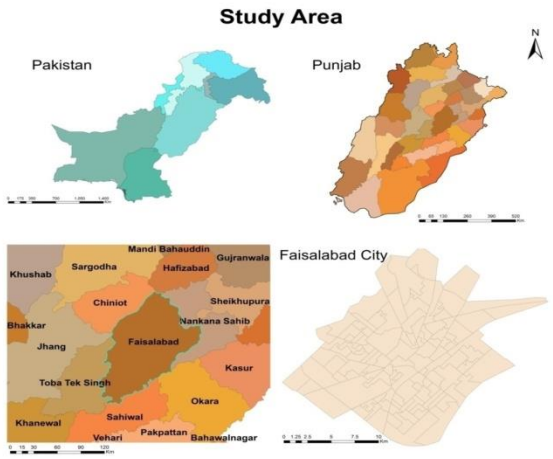

Fig. 1. Study Area.

Methodology

The methodology has 3 main phases:

- ✓ Data Acquisition and Integration
- ✓ Accessibility Analysis
- ✓ Buffer Analysis

Data Acquisition and Integration

This research work was conducted to mark out the spatial patterns of health care centers in Faisalabad and to analyze the accessibility and service utilization of health care centers in Faisalabad city along with the problems faced by the patients visited health care centers. For this purpose several social, medical GIS and remote sensing datasets are used to maintain exact figures regarding objectives of this research work. The first phase is dedicated to the data acquisition and integration in what concerns the preparation of the geographical information. The most important information is the one that describes the road network.

Accessibility Analysis

Data Related to health care services have been collected from the Faisalabad city in May 2014. The city area of Faisalabad has been divided into four quadrants (South East, North East, South West and North West) and data has been collected related to each part are patients mobility towards public hospital facilities.

Buffer Analysis

The possible relationship in terms of interactions of population with health care centers can be figured out with the use of Proximity Analysis. This type of method is very handy and useful in urban and other environments where the feeding areas for the health care centers are badly explained and the boundaries of the catchment areas are not properly defined and there is notable interaction within the facility services of health care. In disparity with the gravity model, that considers a diversity of health care facilities and the chances for the concerned population to select from a large number of health care facilities. The way I used to represent is very compatible to the areas where there is limited accessibility to health care facilities.

As the map uses spreading of the colonies along with accessibility to health care facilities to reach the goal o maximum impact, is the most suitable for the rural areas where there is a less rate of reach to the health facilities in limited premises in confined resources. This method reveals the accessibility phenomenon in terms of relationship of nearest clinic and it do not depends upon theoretical contacts with all surrounding clinics located near to the area of residence in catchment.

Outcome of analysis is a roadmap that leads to a larger impact about accessibility to health care centers by choosing the most reachable , effective (for the public reach) area for establishment of a clinic or a Public Health Care center. In more industrialized countries, there is a multiple availability of options of health care facilities along with well facilitated mobility.

In such way the patient use to visit clinic located at a long distance with personal satisfaction from the facility. The decay in time increased due to long traveling time in faster way. This pointed out towards the negative exponential function to explain the distance decay in various environments.

The Arc Map 10.1 has been used to make the spatial data model for the spatial analysis of health care centers and to calculate accessibility to health care facilities. Map of mobility and distance traveled by the patient is prepared in this software. Microsoft Excel 2013 has been used to draw graphs and tables for graphical representation. The satellite image of Faisalabad city was obtained from Google Maps to use as base map of Faisalabad city.

Results and discussion

Faisalabad city has an extension of around 8 kilometers from its center. It is most densely populated in the center while becomes less populated in the suburban areas (Fig. 2). To locate the distribution of public hospitals Faisalabad is sub divided into four buffer zones with the help of proximity analysis from the center of the city (fig. 3).

A) Buffer Zone One (0-2 Kilometres)
B) Buffer Zone Two (2-4 Kilometres)
C) Buffer Zone Three (4-6 Kilometres)
D) Buffer Zone Four (6-8 Kilometres)

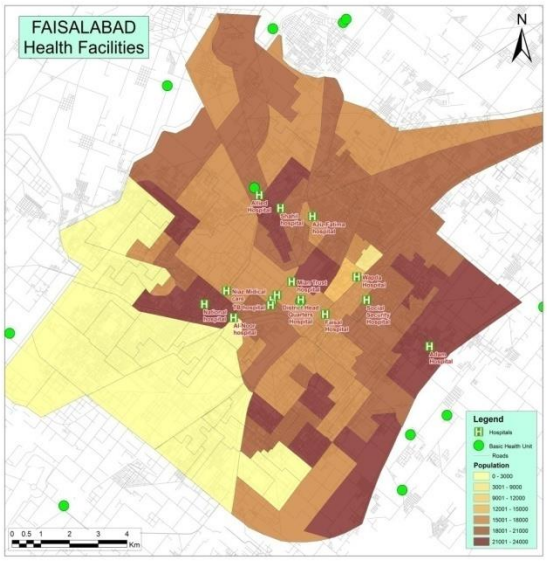

Fig. 2. Health Care Facilities in Faisalabad City.

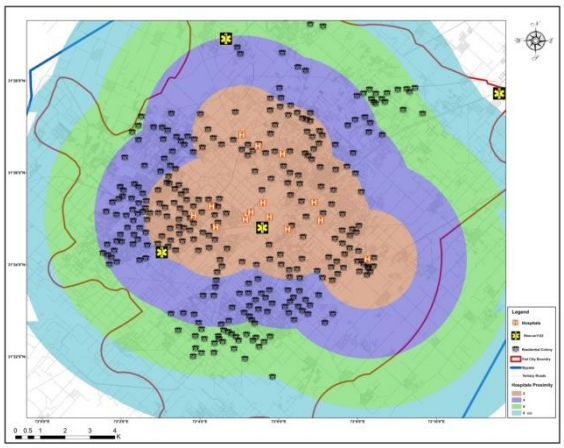

Fig. 3. Proximity Buffer Analysis.

Buffer Zone One (0-2 Kilometres)

There are 151 residential colonies in buffer zone one i.e. of 2 kilometers from the center of city and there are 16 Public hospitals in this zone. It is most densely populated area because it is the oldest part of the city. There are two Rescue 1122 stations in this zone. It is a busy area in terms of traffic because this zone bears the presence of Faisalabad Shaikhupura road with heavy traffic rush. Although this zone possesses highest number of hospitals yet narrow streets and roads make it harder for people to reach nearby hospitals. The center of the city not only provides health facilities to the residents of this particular zone but also people of other areas of the city.

Buffer Zone Two (2-4 Kilometres)

This zone is not as populated as zone one. The distance of buffer is 2- 4 kilometers from city center. There are 114 residential colonies in this zone of buffer but it has no public hospital. However, presence of two rescue 1122 stations has made people a little comfortable to reach the public hospitals in zone one. This zone is also dense in traffic as sheikhupura - Lahore road passes through it. This zone is moderately dense in terms of its population which has allowed broader roads and streets due to which people can access easily towards public health centers.

Buffer Zone Three (4-6 Kilometres)

There are 41 residential colonies in this zone. There is no Public Health Care center in this zone hence people have to go to zone one that is located away from their residential areas.

Two rescue 1122 stations are available here. The main road connecting to PHC is four kilometer from this zone. It is also moderately populated area and well connected with the other parts of the city. People of this area are dependent upon zone one for health services. Although road infrastructure is good but people have to face traffic congestions to access public health centers which not only wastes time bit also proves a hurdle for emergency patients.

Buffer Zone Four (6-8 Kilometres)

This zone is the suburban area of Faisalabad city and there is only one approved colony from FDA however, there are many unplanned and unapproved societies located in the zone. There is no Public hospital in this zone and people have to travel 6-10 kms to reach any of the public sector hospitals. It is thinly populated area and road infrastructure yet to be developed properly. The unplanned and haphazard development of residential colonies serve as a barrier for health care facilities providence. Like zone three, residents of this zone also depend upon the city center for health care and face the same problem of time wastage during travel towards health centers. At the outer edge of buffer zone of six kilometres at Khuraryanwalla there is a Rescue 1122 station that serves about 10 kilometres radius areas around this station.

Conclusion

GIS provides a platform and new methods to inquire hand examine health needs for large and small areas collectively. There are many methods for measurement of access to health care centers and it introduced new ways to analyze different approaches, techniques while planning the locations and facility's capacity building. The analysis of this study enables to demarcate that there are many problems to access the health system benefits properly. It clearly points that the distribution of health care centers is not equal everywhere in the city. It is also noted that health care facilities are not growing with the growing pace of population. It is concluded from above studies, there is a need of integration in decision making, implementation and follow up system for the improvement and well supported, reliable and sustainable health care delivery system in Faisalabad city. Faisalabad city needs such system of location selection that can make this whole system reliable and easily accessible and with the factor of satisfaction for general public. Location selection is an important part of all the planning about health system activism because it directly affects the whole community related to that facility who needs it more.

References

Buor D. 2003. Analysing the primacy of distance in the utilization of health services in the Ahafo-Ano South district, Ghana. The International journal of health planning and management **18(4),** 293-311.

Castro-Leal F, Dayton J, Demery L, Mehra K. 2000. Section on developing health systems-Public Spending on Health Care in Africa: Do the Poor Benefit? World Hospitals and Health Services **36(2),** 23-30.

Cromley EK, Mc Lafferty SL. 2002. GIS and public health. New York: Guilford Press Google Scholar.

Effiong E. 2010. GIS Based Public Healthcare Delivery in Oyo East Local Government Area. Proceedings of the Technical Session of 45th AGM of NIS 26-37.

Egunjobi L. 1983. Factors influencing choice of hospitals: a case study of the northern part of Oyo State, Nigeria. Social Science & Medicine **17(9),** 585-589.

Guagliardo MF. 2004. Spatial accessibility of primary care: concepts, methods and challenges. International journal of health geographics **3(1),** 3.

Gupta S, Davoodi HR, Tiongson E. 2000. Corruption and the provision of health care and education services (No. 2000-2116). International Monetary Fund.

Habib OS, Vaughan JP. 1986. The determinants of health services utilization in Southern Iraq: a household interview survey. International Journal of Epidemiology **15(3)**, 395-403.

Lamiraud K, Booysen F, Scheil-Adlung X. 2005. The impact of social health protection on access to health care, health expenditure and impoverishment: A case study of South Africa.

Liu S, Zhu X. 2004. An integrated GIS approach to accessibility analysis. Transactions in GIS **8(1),** 45-62.

Noor AM, Zurovac D, Hay SI, Ochola SA, Snow RW. 2003. Defining equity in physical access to clinical services using geographical information systems as part of malaria planning and monitoring in Kenya. Tropical Medicine & International Health **8(10),** 917-926.

Perry B, Gesler W. 2000. Physical access to primary health care in Andean Bolivia. Social Science & Medicine **50(9),** 1177-1188.

Phillips DR. 1979. Spatial variations in attendance at general practitioner services. Social Science & Medicine. Part D: Medical Geography **13(3),** 169-181.

Younger SD. 1999. The relative progressivity of social services in Ecuador. Public Finance Review **27(3),** 310-352.