

Assessing Spatial Accessibility to Public Health Care Services in Kurunegala District Using GIS

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1. Introduction

Efficiency of health care services of a country depends on level of accessibility to available health care services. World Health Organisation predicates that accessibility remains a problem for isolated rural families in Sri Lanka and identifies the necessity of development of services in order to improve equity of access in areas which are lagging behind as a main priority (World Health Organization, 2012). Hence local level studies are timely important to identify the level of accessibility in different parts of the country to prioritise in developing required facilities. Kurunegala District was selected for this study since nearly 97% of total population is recorded as rural.

2. Objectives

Main objective is to assess spatial accessibility to public health care services in Kurunegala District. Specific objectives are,

1. Determining spatial distribution of public health care services with respect to population density
2. Identifying different levels of proximity to public health care services in study area

3. Methodology

Kurunegala district was selected as the study area and about 1,609,916 people lived in Kurunegala district by census year 2012. It is located in the North-Western Province and total land area is 4,812.7 Sq. Km. Kurunegala District accommodates 30,671 urban population, 1,597,680 rural population and 7,649 estate population by 2014 (Kurunegala District Secretariat, 2017). Basically, layer of hospitals in Kurunegala district was prepared using Google map and Arc GIS, referring list of public hospitals in Kurunegala collected from PDHS of North Western Province based on standard categories. Accordingly, 34 hospitals were plotted including 01 Provincial General Hospital, 14 District hospitals, 3 Base hospitals, 9 rural hospitals and 7 peripheral units. Public health care services such as MOH offices (Medical officers of Health) and special public health care institutes such as Chest hospital, Mental Health Care unit were not considered here. Population data was collected

from Department of Census and Statistics and land use and road network was obtained from Survey Department.

Proximity analysis was prominently utilised in this study. Thiessen polygons were created to identify catchment of each hospital based on nearest facility. Buffer analysis was used to identify different levels of proximity to health care facilities and accessibility levels to road network. Spatial Statistics was used to extract mean population density in each catchment. Centroids were generated to each Grama Niladhari (GN) division and 1,610 centroids were used to draw desire lines to identify spatial proximity to each health care service from each GN Division (centroids) in each catchment area. Road network is important in determining the accessibility that road density (length of roads in Km in GN/Area of GN in Sq. Km) was calculated (considered only main roads, secondary roads and jeep/cart tracks). And multiple buffer rings of between 1 and 5 km was created.

4. Results

The catchment of each hospital based on nearest facility is indicated in Figure 1. People living in Sothern and South-Eastern part of the region have good access for health care services that many services are available within a shorter proximity. The Provincial General Hospital/ Teaching hospital of Kurunegala is also located in this area.

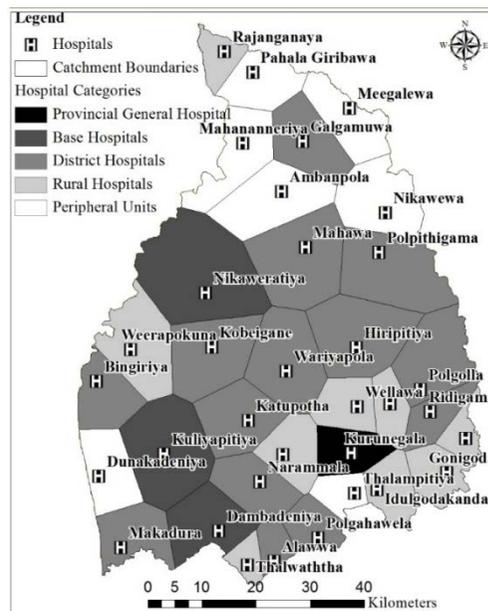


Figure 1: Catchments of each public health care service

Population density is also very high (population density is 500-2000 and over in most GN divisions) in this region compared to the northern half of the district.

Accordingly, Figure 2 depicts that that distance to Nikaweratiya Base Hospital from most of GN divisions in Nikawaratiya catchment is considerably high. Same issue is there in health care catchments in Pollgolla, Polpithigama and Hiripitiya. And population density is also considerably higher in these areas (figure 3).

Based on the buffer analysis of 5Km and 10 Km from health care services about 44% of the total area is within the proximity of 5 Km from health care services. Approximately 8% of the total area is not at least within proximity of 10 Km from health care facilities. A considerable area in Nikawaratiya and Polpithigama DS divisions are having lack accessibility to health care services.

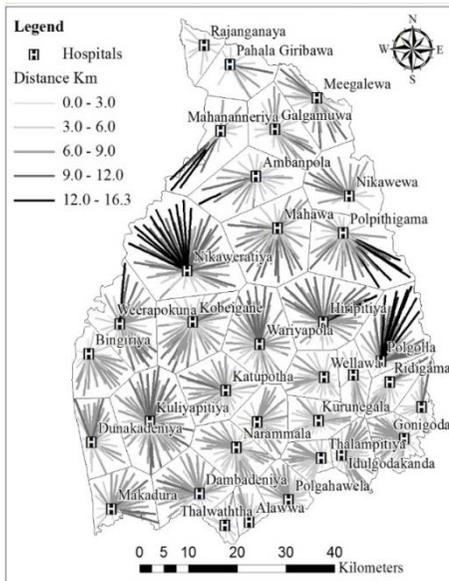


Figure 2: Proximity to Nearest Health Care Service

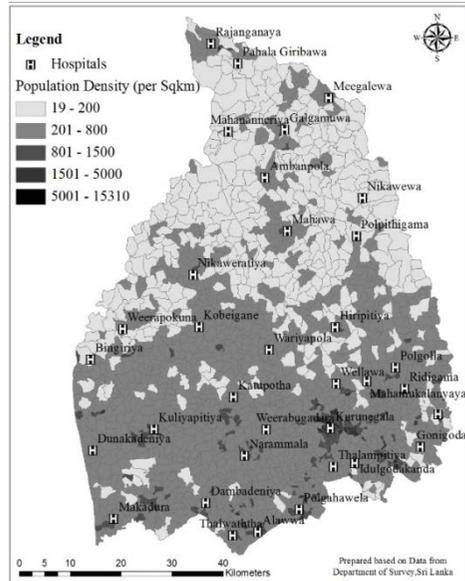


Figure 3: Population Density

Among these health care services Provincial General Hospital of Kurunegala plays a critical role in providing most of health care facilities. It is important to determine different proximity levels to Kurunegala Hospital. Accordingly, nearly 50% of existing health care services are located within proximity of 30 Km of Provincial General hospital, Kurunegala.

Road network is important in determining accessibility that higher road density is evident in Sothern half of the district while lower density in northern half. Accessibility to roads is also vital in determining the efficiency of accessibility to health care facilities that Figure 4 illustrates different proximity levels to main roads and secondary roads. Distance to nearest main road or secondary road is also low in southern half of the area that most of roads are located within proximity of 2km.

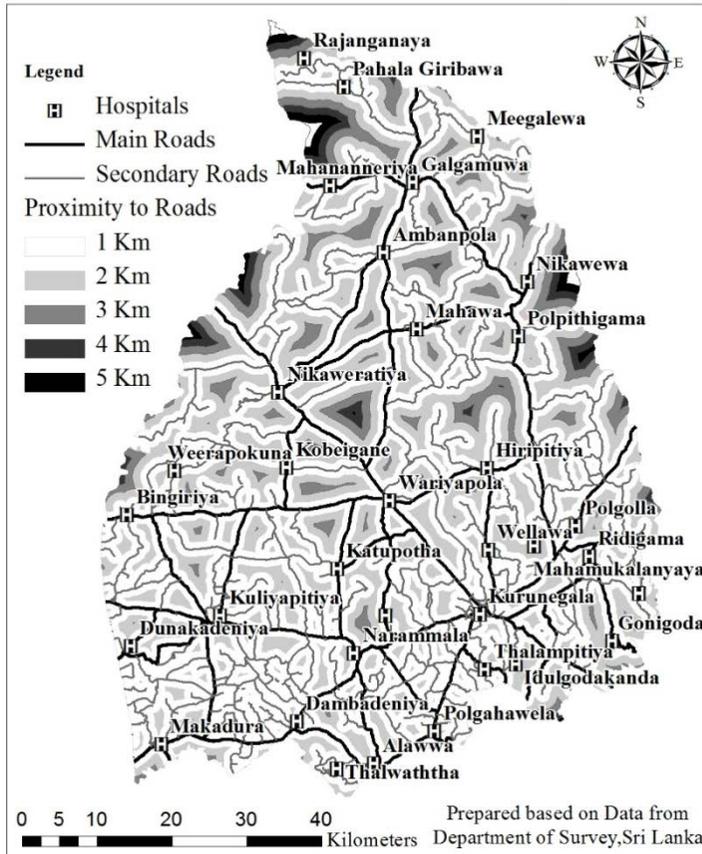


Figure 4: Proximity to Main & Secondary Roads

5. Conclusion/Recommendation

In conclusion, this study identified using different spatial analysis methods that accessibility to public health care services is higher in the southern half of the district whereas the northern half has lower accessibility. Population density and traffic density are also higher in the southern half of the district with higher levels of accessibility. DS divisions like Nikaweratiya, Popithigama and Polgolla should be prioritised when developing the health care service in Kurunegala District where population density is also somewhat high. This study is being continued to determine spatial accessibility to public health care services using travel time, identifying catchments based on health care facilities and network analysis. Furthermore, it is recommended to consider private health care services, economical capability and mode of transport to assess different accessibility levels to health care services.

6. References

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