ENSIGN COLLEGE OF PUBLIC HEALTH, KPONG, EASTERN REGION, GHANA

**MAPPING OF HEALTH RESOURCES IN LOWER MANYA KROBO MUNICIPALITY
IN THE EASTERN REGION OF GHANA**

BY

BERETE Ansoumane

**A thesis submitted to the department of community health in the faculty of public health in
partial fulfillment of the requirements for the degree**

MASTER OF PUBLIC HEALTH

APRIL, 2017

DECLARATION

I hereby declare that except for reference to the work of others', which I have duly

cited, this project submitted to the Ensign College of Public Health, Kpong is the

results of my own investigation, and has not been presented for any other degree

elsewhere.

BERETE Ansoumane   ……………..   ……………….

(1571000059)   **Signature**   **Date**

DR. Juliana Enoss   …………………   ……………

Supervisor   **Signature**   **Date**

DR. Prof Stephen C Alder   ………………..   …………

Dean   **Signature**   **Date**

I

ACKNOWLEDGEMENT

ABBREVIATION/ACRONYMS

CHPS-   Community Based Health Planning Services

GHS -   Ghana Health Service

GSS -   Ghana Statistical Service

GIS -   Geographic Information Systems

GPS-   Global Positioning System

H/C   Health center

KRHTS-   Kintampo Rural Health Training School

MOH-   Ministry of Health

MDG-   Millennium Development Goals

MH: Maternity Home

NGOs -   Non-Governmental Organizations

NHRC-   Navrongo Health Research Center

NHIS-   National Health Insurance Scheme

OIM-   International Organization for Migration

OS-   Open Source

USDHHS-   United State Department of Health and Human Service

WHO -   World Health Organization

ABSTRACT

Variations in the distribution of health facilities have resulted in differences in health outcomes within the administrative districts of the country of which the Lower Manya Krobo Municipality is no exception. The primary objective of this study was to examine the distribution of health care resources in the Lower Manya Krobo Municipality in the Eastern Region of Ghana. A single case study approach was adopted, with the LMKM as the study area. The sampling frame for this study included all the health resources, facilities and their supporting service centers in the municipality. All functional health facilities in the municipality during the time of study were included in the study. The study partly utilized records of generated coordinates using the Geo positioning system (GPS) and other resources and services. The study unit was all health facilities within the municipality and the supporting centers, 285 clinical health workers were found in the municipality and it was observed that Odumase and Akuse, which happened to be the urban areas within the municipality, had high percentages of clinical health personnel. The population per single health worker ratio for the whole municipality was found to be 13201:1. The district had a total of 16 health facilities and 29 supporting centers. Agomanya had the highest number of facilities and supporting centers. There was a 15,086 population per health facility ratio. The study demonstrated the disparity in the distribution of health facilities across the municipality. There is the need to ensure distribution of all health resources is done in correspondence with the population size and the health needs of the Lower Manya Krobo Municipality.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Access to health care is an important component of an overall health system and has a direct impact on the burden of disease that affects many countries in the developing world. Measuring accessibility to health care contributes to a wider understanding of the performance of health systems within and between countries which facilitates the development of evidence based health policies(Black *et al*. 2004). Managing scarce resources and health care effectively and efficiently is an important part of this story. Experience has shown that, without strategic policies and focused spending mechanisms, the poor and other ordinary people are likely to get left out. The use of GPS as a tool to enhance public sector performance is well documented in other sectors of the economy. Extension of this experience to the health sector is more recent and lessons learned are now being successfully applied to developing countries. (Diderichsen, 2004).

A profile of health care resources within communities describes the health status and availability of resources that promote health within communities areas (Yonek and Hasnain-wynia n.d.). Poor people shoulder the greatest burden of disease but receive a smaller share of health care resources than do the healthy and wealthy. In other words, health care resources are distributed inversely in relation to need. This phenomenon is known as "the inverse care law." It holds true from country to country and within countries across socioeconomic groups (Diderichsen, 2004). Improved understanding of geographic variation and inequity in health status, wealth, and access to resources within countries is increasingly being recognized as central to meeting development goals. Mapping provides an alternative need approach to the more common need or deficit model

for service. Mapping focuses on what communities have to offer by identifying resources that can be used for building system (Tatem *et al*. 2014). The benefits of resource mapping are many. By taking part in this process, communities can develop a more results-driven system that supports and improves their available resources(Crane and Skinner n.d.)

Geographic information systems (GIS) and global positioning system (GPS) technologies have greatly rejuvenated studies of distribution, accessibility and utilization of health facilities, especially in the developing world. Studies have developed methods for comparing the distribution of health service provision with respect to the Latin American populations being served. These studies used GIS to analyze physical distribution and accessibility to health care. There are three main dimensions of accessibility to primary healthcare, namely the supply of healthcare providers, demand for health care service and the distance-time impedance between the locations of the population and the health care providers(Manortey and Kwarteng, 2016).

1.2: Statement of Problem

We do not only want to allocate resources proportionate to the greater morbidity among the poor but also want to reduce the social inequalities in health care. hence, we have to look more closely at the vertical aspects of equity (Diderichsen, 2004). In other words, deprived groups should receive preferential allocation of health care resources to achieve more rapid improvements in their health, thereby reducing inequalities in their health vis-à-vis richer groups. This distinction between horizontal and vertical aspects of health equity is thus closely linked to two different issues in health policy: how to reduce inequities in access to health care and inequities in health status.(Anon, 2015)

The inequitable distribution of health facilities and personnel in Ghana has resulted in a situation where more than three-quarters of urban households have good access to health facilities compared to a low 42% of rural households(Manortey and Kwarteng, 2016).

A further 78% of the urban poor live within 30 minutes of a health facility compared to 27% of rural households (MOH, 2011). This is worrying because the time required to reach a health facility could be critical in the survival of a sick person, especially in emergency situations. Variations in the distribution of health facilities have also resulted in differences in health outcomes between the administrative regions of the country (Manortey and Kwarteng, 2016).

1.3: Rational of the study

Equity in access to and use of health services is a common goal for policy-makers in most countries. Poverty alleviation through the re-distributive effect of public health spending is another important welfare goal in many countries. However, assessment of the extent to which these goals are achieved in reality is rare, outside the developed world.

In Ghana, two governmental bodies oversee health care infrastructure and delivery – the Ministry of Health (MOH) and Ghana Health Services (GHS). Until 1996, the MOH oversaw the direct provision of health service delivery in Ghana. Today, health service delivery is provided by GHS. The goal of MOH is, "to improve the health status of all people living in Ghana through effective and efficient policy formulation, resource mobilization, monitoring and regulation of delivery of health care by different health agencies" (www.moh-ghana.org).

MOH works on policy formation, the monitoring and evaluation of health service delivery throughout the country, resource allocation for health services and the regulation of health services delivery. MOH also develops the framework for the regulations of food, drugs and health service delivery.

1.4 General objective

The primary objective of this study is to examine the distribution of health care resources in the

Lower Manya Krobo Municipality in the Eastern Region of Ghana.

1.5 Specific objectives

1. To examine the geographical distribution of health facilities

2. To map out the health facilities in the municipality

3. To assess the available services.

4. To identify the total workforce in the municipality.

5. To investigate the distribution of health personnel in the municipality

DISTRICT MAP OF LOWER MANYA
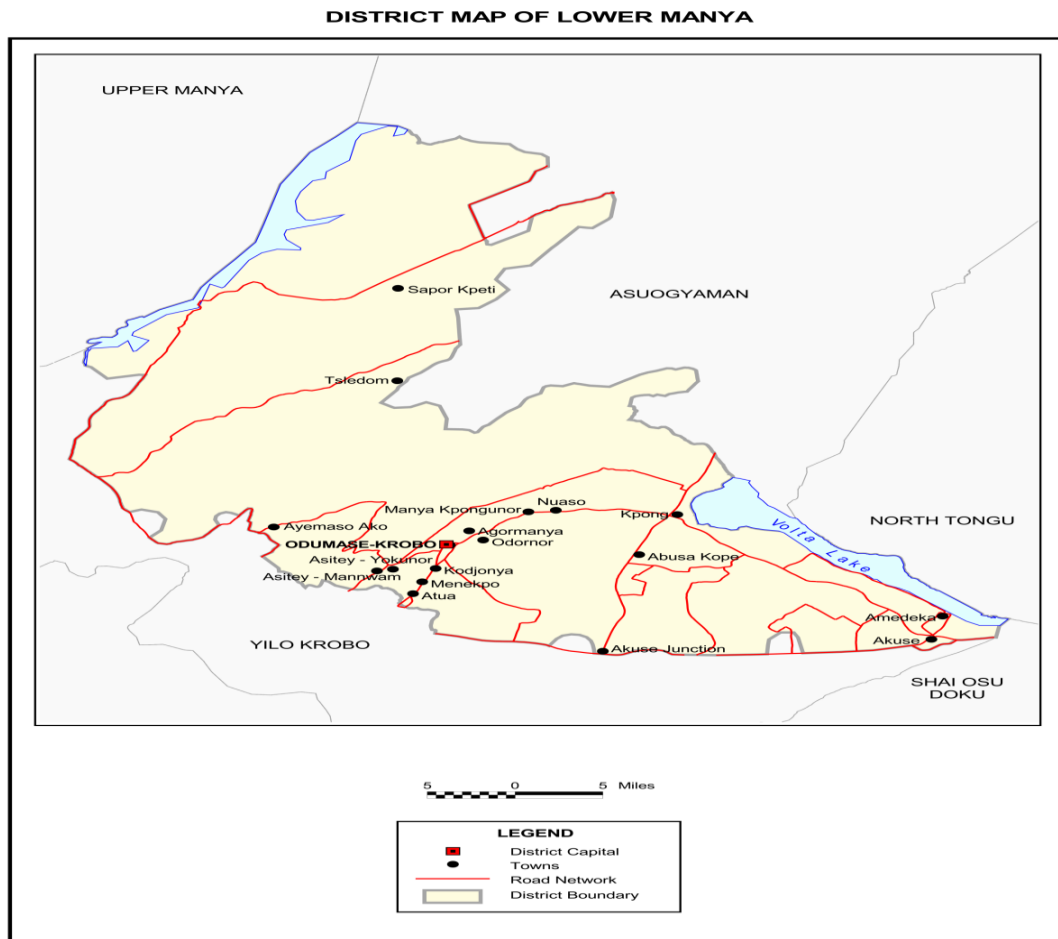
1.6 Profile of the Study area -The Eastern Region of Ghana

Introduction

Lower Manya Krobo forms part of the twenty six (26) Municipalities and Districts in the Eastern Region of Ghana. It lies between latitude 6.05S and 6.30N and longitude 0o08E and 0.20W. The Administrative Capital of the District is **Odumase**. The District covers an area of 1,476 km, constituting about 8.1% of the total land area within the Region (18,310 km). The major towns in the district include Odumase township (which incorporates Atua, Agormanya and Nuaso), Akuse and Kpong in the Lower Manya area. The District shares Boundaries with Upper Manya Krobo District to the north, to the south with DangmeWest and Yilo Krobo respectively, to the west with Yilo Krobo Municipal and to the east with Asuogyaman District.

5

2.1 Demography

2.1.1 Population

The Lower Manya Krobo Municipality has an estimated population of 101,098 as at 2016. There are six sub-municipalities in the Municipality and the population is distributed as follows:

Table. 1 Population at 5th January 2015

LOWER MANYA KROBO MUNICIPAL HEALTH ADMINISTRATION						
MUNICIPAL POPULATION						
DISTRICT POPULATION		POPULATION AS AT 5TH JANUARY, 2016		101,098		
4% (0-11 MONTH)				4,044		
24% ELIGIBLE (W IFA)				24,264		
TT/EXPECTED PREGNANCY 4%				4,044		
SUBDISTRICT POPULATION						
ODUMASE (27.4%)				27,701		
AGORMANYA (29.1%)				29,420		
KPONG (23.2%)				23,455		
ASITEY (5.4%)				5,459		
AKUSE (9%)				9,099		
OBORPA (5.9%)				5,965		
TOTAL				101,098		

FACILITY	%OF TOTAL POPULATION	POP 2016	42%OF POP. <15	<5 YRS 20%	POP 12-23 MNTH (4%)	POP 24-59MNTH (12%)	POP 6-59MNTH (90% of <5)	4%TARGET 0-11MONTHS 2016	MONTHLY TARGET	Q-LY TARGET	24% TARGET WIFA	TT/EXPECTED PREG 4%	ADOLESCENTS 22.9%
ODUMASE S.M.													
ATUA HOSPITAL	4.0	4,044	1,698	809	162	485	728	162	13	40	971	162	926
ODUMASE H/C (SOUTH)	4.6	4,651	1,953	930	186	558	837	186	16	47	1,116	186	1,065
KODJONYA CHPS	4.2	4,246	1,783	849	170	510	764	170	14	42	1,019	170	972
ODUMASE NORTH CHPS	3.1	3,134	1,316	627	125	376	564	125	10	31	752	125	718
MAMPONG CHPS	3.6	3,640	1,529	728	146	437	655	146	12	36	873	146	833
KORLETSOM CHPS	4.1	4,145	1,741	829	166	497	746	166	14	41	995	166	949
ATUA CHPS	3.8	3,842	1,614	768	154	461	692	154	13	38	922	154	880
TOTAL	27.4	27,701	11,634	5,540	1,108	3,324	4,986	1,108	92	277	6,648	1,108	6,343
AGORMANYA S.M.		-											-
ST MARTIN'S HOSP.	2.0	2,022	849	404	81	243	364	81	7	20	485	81	463
AGORMANYA H/P	3.0	3,033	1,274	607	121	364	546	121	10	30	728	121	695

FACILITY	% OF TOTAL POPULATION	POP 2016	42% OF POP. <15	<5 YRS 20%	POP 12-23 MNTH (4%)	POP 24-59MNTH (12%)	POP 6-59MNTH (90% of <5)	4% TARGET 0-11MONTH POP 2016	MONTHLY TARGET	Q-LY TARGET	24% TARGET W IFA	TT/EXPECTED PREG 4%	ADOLESCENTS 22.9%
ASITEY S.M.		-			-	-							-
ASITEY H/C	3.5	3,538	1,486	708	142	425	637	142	12	35	849	142	810
PAT ERHUNYA CHPS/	0.6	607	255	121	24	73	109	24	2	6	146	24	139
AYERMESU CHPS/R	1.3	1,314	552	263	53	158	237	53	4	13	315	53	301
TOTAL	5.4	5,459	2,293	1,092	218	655	983	218	18	55	1,310	218	1,250
AKUSE S.M.		-			-	-							-
AKUSE HOSPITAL	3.0	3,033	1,274	607	121	364	546	121	10	30	728	121	695
AKUSE-ZONGO CHPS	1.0	1,011	425	202	40	121	182	40	3	10	243	40	232
AMEDEKA CHPS	0.5	505	212	101	20	61	91	20	2	5	121	20	116
OKW ENYA CHPS/R	1.0	1,011	425	202	40	121	182	40	3	10	243	40	232
AKUTUE CHPS	1.0	1,011	425	202	40	121	182	40	3	10	243	40	232
SALOM CHPS	0.5	505	212	101	20	61	91	20	2	5	121	20	116
OSORKUTU CHPS	1.0	1,011	425	202	40	121	182	40	3	10	243	40	232
BANGALOW CHPS	1.0	1,011	425	202	40	121	182	40	3	10	243	40	232
TOTAL	9.0	9,099	3,822	1,820	364	1,092	1,638	364	30	91	2,184	364	2,084
OBORPA S.M.		-			-	-							-
OBORPA	3.0	3,033	1,274	607	121	364	546	121	10	30	728	121	695
DJEKETI CHPS/R	1.5	1,516	637	303	61	182	273	61	5	15	364	61	347
YONGUASE CHPS/R	1.4	1,415	594	283	57	170	255	57	5	14	340	57	324
TOTAL	5.9	5,965	2,505	1,193	239	716	1,074	239	20	60	1,432	239	1,366
TOTAL	100.0	101,098	42,461	20,220	4,044	12,132	18,198	4,044	337	1,011	24,264	4,044	23,151

Literacy and Education

About eight out of 10 (81.7%) of the population 11 years and older are literate whiles 18.3 percent are not literate in any language. The proportion of literate males (78.5%) is higher than females. The proportion of males who can read and write in English or a Ghanaian language is 90.7 percent as compared with 74.3 percent of their female counterparts. Majority of the population 3 years and older currently attending school are at the primary level (46.4%) whiles 2.2 percent are in post-secondary or tertiary level. More males than females are currently attending tertiary education. (Osires, 2010)

Political Administration

The LMK Municipal has only one constituency which is made up of twenty-nine (29) electoral areas. The LMKM Assembly is a decision making body and is sub-divided into four sub-districts (Urban and Area councils) namely Odumase urban council, Akuse-Amedeka, Oborpah-

Ayermesu and Kpong Area Council. The Municipal Chief Executive is the political head of the administration while the Municipal Co-coordinating Director is the head of the bureaucracy. Figure 1 is a map showing the municipality. (Osires , 2010)

CHAPTER 2

LITERATURE REVIEW

Introduction

This chapter looks at the various reports and studies conducted in different countries and subsequently in Ghana. It reviews the access to health care services in various localities including Ghana. It further look at the history of geo spatial distribution moreover it also looks at the issue of GIS and public health. In addition to that, the application of GIS in the public health sector is discussed. The mapping process is subsequently highlighted. Ghana's situation is also discussed in areas of the causes of spatial inequalities, regional distribution of health facilities as well as accessibility to health facilities.

2.1 Access to health care

The idea that all people are entitled to have their physical needs satisfied is at the heart of the human rights movement. This includes the right to survive and to live without preventable suffering. The Declaration of Human Rights details the right to adequate health in Article 25 as follows: "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care…"(Ismaila and Usul 2013).According to Quah 1977, accessibility of health care is a complex indicator for the health of the health care system in a country or region and implies adequacy in numbers, fair geographical distribution and absence of any type of barrier (economic, social, or cultural) to medical care. Penchansky and Thomas in 1981 also argue that there are several dimensions (availability, accessibility, accommodation, affordability and acceptability) that we need to consider when discussing access of population to health care facilities(Kara and Egresi 2013).

Spatial inequalities in income, health, education, and poverty present significant economic and political challenges for the governments of many developing countries.

While systematic evidence on the extent of spatial inequality in developing countries is still relatively scarce, a growing body of work has documented the existence of spatial in equalities in many forms in various countries in Asia, Europe, Africa and Latin America. Because rapid economic growth is often associated with uneven regional and urban development, policy makers are also concerned that development is likely to exacerbate rather than reduce spatial inequalities.(Kim, 2006).

The adequate supply and optimal allocation of health care services is important for improving health; however an adequate supply is not enough as access to them must also be guaranteed. Spatial accessibility therefore remains one of the most important factors considered in health care studies. The focus of such studies include for instance, the examination of physical and/or structural accessibility to health care, assessment of the variations in the provision and utilization of health care services, analysis of the extent of service areas and identification of gaps in provision, modelling of optimal facility locations, examination of issues of equity and efficiency in health care provision, assessment of health care policies among others(Alake, 1991).

Accessibility can be explained in terms of mobility, which incorporates a number of spatial and associated non-spatial attributes and their temporal constraints on individuals or groups. Spatial accessibility refers to the relationship between the locations of supply and the locations of demand for specific services, taking into perspective existing transportation infrastructure and travel barriers. Measures of accessibility can be opportunity based. Opportunities to access a

health care service can be specified in terms of a fixed threshold of travel distance or time. Travel time in this respect includes notions of barriers, connectivity and critical distance (Manortey and Kwarteng 2016). Differences in access to healthcare services and the resulting adverse health outcomes are major public health priorities. The Institute of Medicine (IOM, 2002) and the Department of Health and Human Services (USDHHS, 2000), identified the need for strategies to improve access to healthcare services and to support improvement of health outcomes (AHRQ, 2002; IOM, 2002).

2.2 History of spatial distribution

Historically, public health information (surveillance) systems, based in local, state and Commonwealth governments, have collected and tabulated data on illness, disabilities, Causes of death, injuries, behavioural and environmental risk factors, health costs and other health issues.

Globally, improvements to both the spatial analysis tools (sophisticated software and fast personal computers) and the quality and accessibility of the information itself (unique identifiers, digital census data, rapid internet), have led to the increasing use of GIS when considering associations between causative influences in their geographic context and public health outcomes. (Anon, 2005).

How location can influence health is an old concept in medicine. As far back at the time of Hippocrates, physicians discovered that certain diseases tend to occur in some places and not in others. In fact, different locations on Earth are usually associated with different profiles: physical, biological, environmental, economic, social, cultural and sometimes even spiritual profiles that affect and affected by health, disease and healthcare.(Abdelhafiz and Abdel-samea 2013).

The connection between public health and geography can be traced back to Hippocrates who deduced that spatially varying factors such as climate, elevation, environmental toxins, ethnicity and race contributed to the spatial patterns of illness .The observations of Hippocrates still hold true today and these relationships between geography and disease have allowed geospatial methods to become valuable within the field of public health. Maps have long been a useful tool for visualizing patterns in health care. One of the earliest and most commonly cited examples is from the mid-1800s when John Snow deduced the source of a cholera outbreak in London based on a simple visualization of the incidents of cholera in relation to water pumps(Patel and Waters 2012). Although visualizing data geographically is still very valuable for uncovering patterns and associations over space, geospatial analysis has become more sophisticated over time.(Patel and Waters 2012).

2.3 Geographic Information Systems and health

Health is an indispensable commodity for all and is an essential component of an individual's social needs. Equal access to primary health care services for low socioeconomic cohorts is an aim for various governments to meet as a social justice policy agenda. In response to this policy agenda, various governments' investments prioritize monitoring and evaluation of health care services. It is also essential to plan for more health facilities and transport for areas which need more attention when it comes to healthcare. To improve the access to public services either on the basis of the distribution of these services or on the availability of a number of transport services, studies pertaining to examining existing accessibility problems to healthcare facilities and transport provision must be conducted (Manortey and Kwarteng 2016). One tool that can be used to apply advanced geospatial methods to health care problems is a GIS. The power of GIS lies in its ability to analyse, store and display large amounts of spatially referenced data. In a field where

manual data analysis can become overwhelming, GIS is a valuable tool. The medical research applications of GIS are numerous and include finding disease clusters and their possible causes, improving deployment for emergency services and determining if an area is being served adequately by health services(Patel and Waters 2012)

Geographic Information System (GIS) Geographic Information System is a computerized system that records, stores, as well as analyzing information about the various features that make up the surface of the earth. GIS software can generate two to three-dimensional images of an area, showing topographical features such as rivers, mountains, hills and with artificial features such as roads, buildings and electric power lines. Scientists use GIS imaging as models and for gathering data Manortey and (Manortey and Kwarteng 2016).

Geographic Information System Software Most GIS products use only a small fraction of the functionality of expensive and complex commercial GIS packages. A broad range of visualisation techniques and queries can be performed using free simple open source (OS) software. It was assumed that staff who are able to update and graph data in spread sheets (such as Excel) would have the competencies to view the same data spatially using OS GIS software.(Fisher and Myers 2011).

2.4 Application of GIS

GIS has been successfully applied in many areas of population health. Applications have included informing the placement of water pumps in villages most infected by Guinea Worm to ensure a safe water supply, enhancing community-based child welfare services and identifying culturally appropriate health promotion material distribution points for diabetes literature in a multicultural community. GIS has also been used in the surveillance and monitoring of vector-

borne diseases, quantifying lead hazards in a neighbourhood, predicting child pedestrian injuries and analysing disease policy and planning.

These applications have been integral in the development of targeted interventions leading to the following better health outcomes and/or reductions in the cost of service provision respectively; by reducing the prevalence of guinea worm in villages where pumps were introduced, by ensuring that children in high child poverty areas receive subsidised meals whilst at family day care, by helping target a culturally-sensitive diabetes program, by directing a finite vector control resource to the highest priority response areas during dengue fever outbreaks, by directing lead screening programs to ensure comprehensive screening in high-risk neighbourhoods whilst reducing overall costs, by locating clusters in space and time of child pedestrian injuries and suggesting intervention sites. (Anon ,2005).

The use of Geographic Information Systems (GIS) for the measurement of physical accessibility is well established and has been applied in many areas including retail site analysis, transport, emergency service and health care planning. GIS are well suited to measuring spatial accessibility to health care as they contain the core components needed for such analysis namely:

• Data capture storage, management and manipulation tools for both spatial and attribute (textual) data

• Core analysis algorithms such as buffering, overlay, proximity analysis, shortest path and raster cost-distance analysis

• Programming environments to customize and extend existing algorithms and create new analysis tools

• Mapping and visualization tools to communicate the results of analysis (Patel and Waters 2012).

Specifically, the resource mapping process can help community gain in-depth information about an agency's policies, procedures, funding streams, and collaborative practices identify opportunities and challenges for meeting the transition needs, and provide comprehensive set of policy recommendations across agencies, along with opportunities for interagency collaboration. Other benefits include: • Identification of new resources to develop, enhance and sustain goals; • Determination of whether existing resources are being used effectively to achieve expected outcomes; • Improved alignment and coordination of resources; • Enhanced coordination and collaboration among stakeholders with relevant resources; and • Development of new policies and legislation to better meet goals and objectives.

2.5: The mapping process

Communities have myriad resources and activities directly and indirectly related to meeting the needs. Yet, these resources are commonly duplicative when used in isolation of one another. Fortunately, mapping resources is a straightforward process. It starts with establishing a shared vision, definitions, priorities, and desired results.

For example, a community vision might be to improve the transition. Some goals within this vision might include the reduction of the burden of illness, or an increase in the number of community accessing high quality of care. Mapping can address curriculum, financial resources, human resources, policies and legislation, state academic standards.

Regardless of where mapping takes place or the content being mapped, the process is the same. Once a vision and aligned goals are recognized, community partners must work together to

identify the type of mapping to be completed, data collection strategies, and related timelines. Once data are collected, key stakeholders analyze the data to identify assets and overlaps, as well as any priorities that lack resources. Community partners then design strategies to build on strengths and eliminate gaps. The last step in the process is the implementation of the action plan or strategies designed by the stakeholders employing the resource map in a strategic way to accomplish the established vision and goals of the community. It is critical throughout the mapping process that partners meet on a regular basis and that a leader convenes the group.(Crane and Skinner, 2003).

In summary, mapping is a process that requires strong partnerships; clear goals that everyone in the partnership supports; good communication; commitment to collecting relevant data and analyzing the data for gaps and overlaps; on-going evaluation to ensure continuous improvement; and specific, strategic actions based on the information learned (Crane and Skinner, 2003).Globally, the rural population is almost 50 percent of the total human population as available data provides that by the middle of 2009, the number of people living in rural areas was 3.41 billion and urban areas 3.42 billion (United Nations, 2009). The Ghanaian context presents a similar case as 49.1 percent of the population lives in the rural areas (Ghana Statistical Service, 2012). A recent United Nations report indicated that if the MDG4: Target (Reduce by two thirds, between 1990 and 2015, the under-five mortality rate) is to be met, efforts must concentrate on those countries and regions where child death rates are highest(Sulemana and Dinye 2014).

2.6: Inequality in Ghana

Inequalities in spatial development give rise to poverty, which then tends to be spatial in nature. In most, cases spatial inequalities are related to resource endowment. In this regard, climate, weather, and physical resource endowment are important. Most important resources such as gold, diamonds and most recently crude oil are all found in the Southern part of the country. The climate in the South is also favourable for cultivating export crops.

Primary health care in Ghana is structured to serve the rural and urban population according to priority. The rural areas which are mostly deprived of permanent health infrastructures have been prioritised with programmes such as the Community Health Planning Service (CHPS), which aims to transform clinic- based primary health care and reproductive health services to community-based health services‖. Most CHPS workers are mobile and move from community to community to educate community members on preventive practices as well as administer curative services. Ghana has embarked on training health workers especially for the need of rural areas. The Kintampo Rural Health Training School (KRHTS), situated in the middle of the rainforest region of BrongAhafo, Navrongo Health Research Centre (NHRC) situated farther in the north-east of the country, and others of their kind in other regions of the country train community health workers, nurses and health administrators for deployment into rural. Secondary and tertiary care is classified as purely curative and offers a range of hospital services, depending on the defined status of the institutions. The secondary and tertiary health care level is sub-divided into several different categories depending on their range of service. A teaching hospital, for example, takes both referral cases and serves as a first point of contact. The military and police hospitals of Ghana serve as tertiary healthcare infrastructures, serving both as first point of contact and referral institutions but do not serve as teaching hospitals. Secondary and

tertiary health care delivery in Ghana is mostly an income generating area of health. Most of the services in these institutions are available at the cost of patients only. These tertiary institutions also operate on private bases as profit making institutions by offering curative services to non-insured people on a cash-and-carry basis. (Saeed, 2013)

A clear pattern of inequality in Ghana manifests itself in the North-South dichotomy in development. A number of studies have emphasized the broad disparity between the three Northern Regions and the Southern part of the country in terms of levels of economic development and the general quality of life, with Northern Ghana falling relatively behind.(Saeed, 2013).

Health facilities, with regard to physicians and beds, are poor in Ghana. The number of physicians per 1000 population is as low as 0.1, as against an average of 0.5 for low-income countries, and 2.9 for high income countries. The figure is at par with those of all her immediate neighbours, but Burkina Fasso. The number of 1.5 hospital beds per 1000 population is however relatively better, compared with 1.3 for low income countries; and above the average for her immediate neighbours(Buor, 2004) .

Regardless of the various strategies for achieving 'Health for All' in the 1980s, in 1990 more than 70% of all Ghanaians still lived over 8 km from the nearest health care provider(Ministry of Health, 1998) and rural infant mortality rates were double the corresponding urban rates. Improving access to health care delivery therefore remained a central goal of the health sector and till date, rural dwellers are constrained. Other policies and strategies such as the Community-based Health Planning and Services (CHPS) was introduced in 1999 and the National Health

Insurance Scheme (NHIS) in 2004 to help achieve health for all irrespective of the economic and geographical conditions of individuals. (Sulemana and Dinye, 2014) .

In recent times, there has been little research to ascertain barriers to geographical access to healthcare, particularly, in rural areas.

The spatial variation in availability and access to rural infrastructure results in spatial disparities in living standards both within and between regions and localities. Thus, inequalities exist between spatial units as they do between individuals. The existence of disparities in living standards therefore makes the analysis of the patterns of rural development imperative in order to identify areas of deprivation. Only through such an analysis can the imbalance in the achievement of rural development be understood (Madu, 2007).

CHAPTER 3

METHODOLOGY

3.1 Research design

A single case study approach was adopted, with the LMKM as the study area. A case study is a systematic inquiry into an event with an objective of describing and explaining a certain phenomenon of interest to the researcher.

3.2 Research methods

The sample of this study included all the health resources, facilities and their supporting service centers in the municipality. These include(hospitals, clinics, Community Based Health Planning services (CHPS) compounds, health centers and Maternity homes, Pharmacies, Licensed chemical drugs shop, Clinics, Private laboratories)

. All functional health facilities in the municipality during the time of study were included in the study. However traditional healers as well as herbal treatment centers were not included in this study.

1. Data on the health resources across the Lower Manya municipality was used for this study and was obtained from the municipality health facilities.

2. The study partly utilized existing records of the way points of health facilities and also generated the coordinates using the Geo positioning system (GPS).

3. A discussion was held with facilities administrators of the municipality to deliberate on issues of available resources.

3.3 Study population and units

3.3.1 **Study Unit**

The study unit was all health facilities within the municipality. These facilities included hospitals, clinics, Community Based Health Planning services (CHPS) compounds, health centers and Maternity home, pharmacies, Chemical drug shop.

3.3.2 **Study population**

The total number of health personnel (both administrative and clinical and 'others') in the municipality was obtained and grouped by sub district. The clinical health personnel included; medical officers, physician/medical assistants, pharmacists, pharmacy technicians, dispensary technicians, professional nurses, community health nurses, enrolled nurses, midwives, biomedical scientists and laboratory technicians. Administrative personnel include; health system administrators, administrative managers, executive officers, accountants, auditors, finance officers, audit officers and account officers.

3.4 Data handling and management

QGIS 2.10.1 (Geo information system) software was used to display the distribution of health facilities and health personnel. Data entry was done using excel 2010, STATA statistical software (Stata Corp. 2007. *Stata Statistical* Software *Release* 14 *Stata Corp LP, College Station, TX, USA)* was used for all univariate and multivariate analysis.

Analysis was done based on set objectives. Geographical coordinate of health facilities was converted to a shape file format and launched into the QGIS software to display the position of health facilities (hospitals, clinics, Community Based Health Planning services (CHPS)

compounds, health centers, Maternity, Pharmacy, Licensed chemical drug shop) within the map of the Lower Manya Krobo municipality.

3.**5 Data analysis**

To explore the influence of the geo-political zones on the number and type of health facilities that were provided, data on health facilities and sub district population were both categorized and subjected to a chi square analysis. The dependent variables was the number of health facilities and independent variables was the resident population in every sub-district,

Pearson Correlation analysis was applied to investigate the relationship between the population and number of health facilities as well as that between the population and the health personnel. Tables and graphs are used to display the data.

3.6 Ethical consideration

Ethical approval was obtained from the Ethics Committee of the Ensign College of Public Health. Letters of notification was written to the Municipal Health Directorate of the Lower Manya Krobo health management teams, and facilities managers of the identified facilities in the Municipality.

3.7 Plans for data usage

Data on the GPS way points of health facilities, the population per sub-district along with information on number of health facilities and number of health workers per district was double entered into both QGIS and STATA 14 software. Analysis was done based on set aims and specific objectives. QGIS was used to carry out all geospatial analysis while STATA 14 was used to carry out all quantitative analysis.

3.8 Dissemination of findings

During the weekly meetings of the municipal health directorate team, findings will be presented by the research team to the staff of the directorate. The outcome of the study will also be published in a peer-reviewed scientific journal as a way to contribute to knowledge about the distribution of the health resources in developing countries.

3.9 Potential policy impact

This study is expected to provide a platform for policy direction towards meeting the national policy of social justice and equity

CHAPTER 4

RESULTS

A summary of the study variables investigated from a district perspective is provided in Table 3 The population of the Lower Manya Krobo district as at 2016 according to the Ghana Statistical Service was 105,604 and a population density of 71.54 individuals per square kilometer. As at March, 2017, a total of 45 health facilities including other supporting health centers were counted in the municipality. The health facilities include; hospitals, clinics, health centers, CHPS compounds, maternity homes. These mentioned supporting health centers include; pharmacies and chemical drug stores. The population breakdown of the Lower Manya Krobo municipality by sub district is displayed in Table 2 below. Figure 2 as well displays the geographical distribution of the sub districts of the Lower Manya Krobo municipality. From Table 2, it is observed that the Agromanya sub district/municipal is the most populated sub district out of the entire 6 sub districts whilst Asitey is the least populated.

Table. 4.1 Lower Manya Krobo municipality population distribution by sub district

SUB DISTRICT	POPULATION	PERCENTAGE DISTRIBUTION (%)
Odumase	28,935	27.4
Agormanya	30,731	29.1
Kpong	24,500	23.2
Asitey	5,703	5.4
Akuse	9,504	9
Oborpa	6,231	5.9
Total	105,604	100

Table.4.2 Summary of study variables

VARIABLE	FIGURE RECORDED
Population	105,604
Area	1,476 km
Population density	71.54
GPS way point	Latitude 6.05S and 6.30N and Longitude 0.08E and 0.20W
Total number of health facilities and supporting centers	45
Total number of health personnel	416
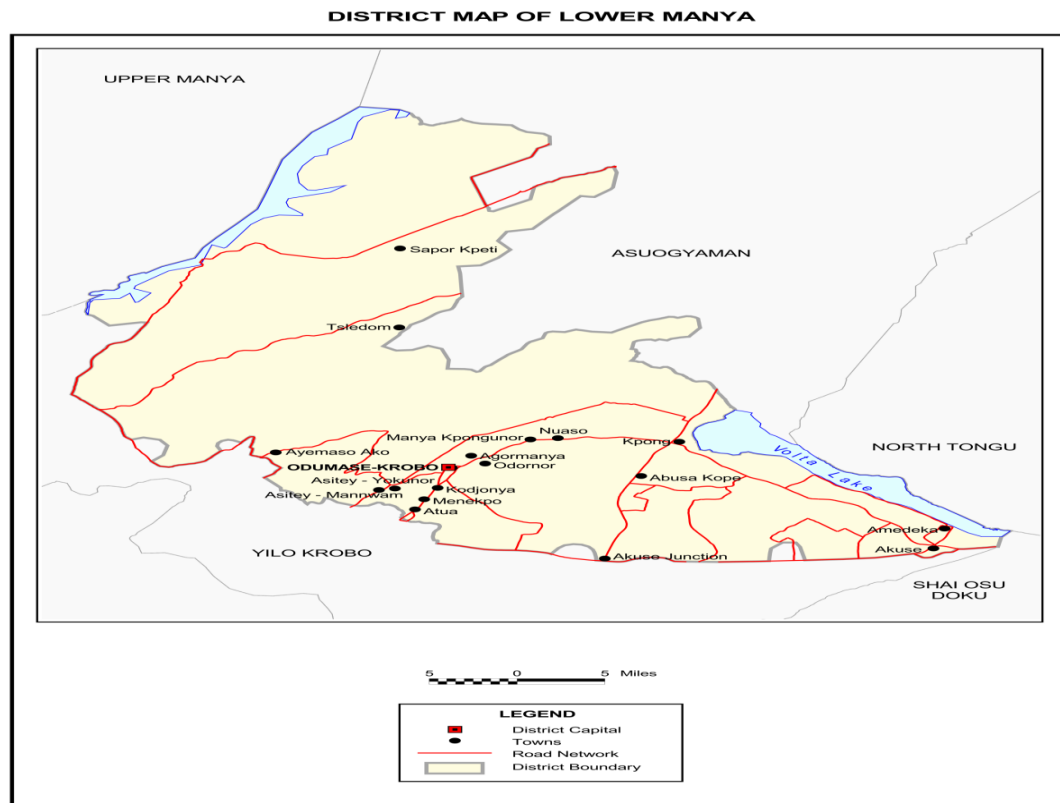
Figure4.1 District map of the Lower Many

4.1 Distribution of health facilities

The health facilities in this study were classified into two broad areas; Main health facilities and supporting health centers. The main health facilities included hospitals, health centers, CHPS and the supporting centers include pharmacies and the licensed chemical shop.

26

Table. 2.3 Percentage distribution of categories of health facilities

	(%)
Main facilities	16(35.55)
Supporting centers	29(64.44)
Total	**45(100)**

4.2 Geographical distribution of health facilities across LMKM

The geographical distribution of main health facilities and some supporting health centers (CHPS, hospitals, health centers, pharmacies and chemical shops) were examined and displayed on a choropleth map. The following sub headings details the findings from geographical studies.

4.3 Distribution of CHPS compounds

The distribution of CHPS compounds in the municipality shows major disparity in terms of distribution of health resources. Sub districts such as Agomanya and Kpong recorded more than half of the CHPS compound in LMKM. Asitey sub district had only one CHPS (Ayermesu CHPS) for 5703 habitants. Oborpa sub district has also one CHPS for 5965 population. Akuse sub district despite its huge population of about 26,788 is covered by only one structured CHPS.
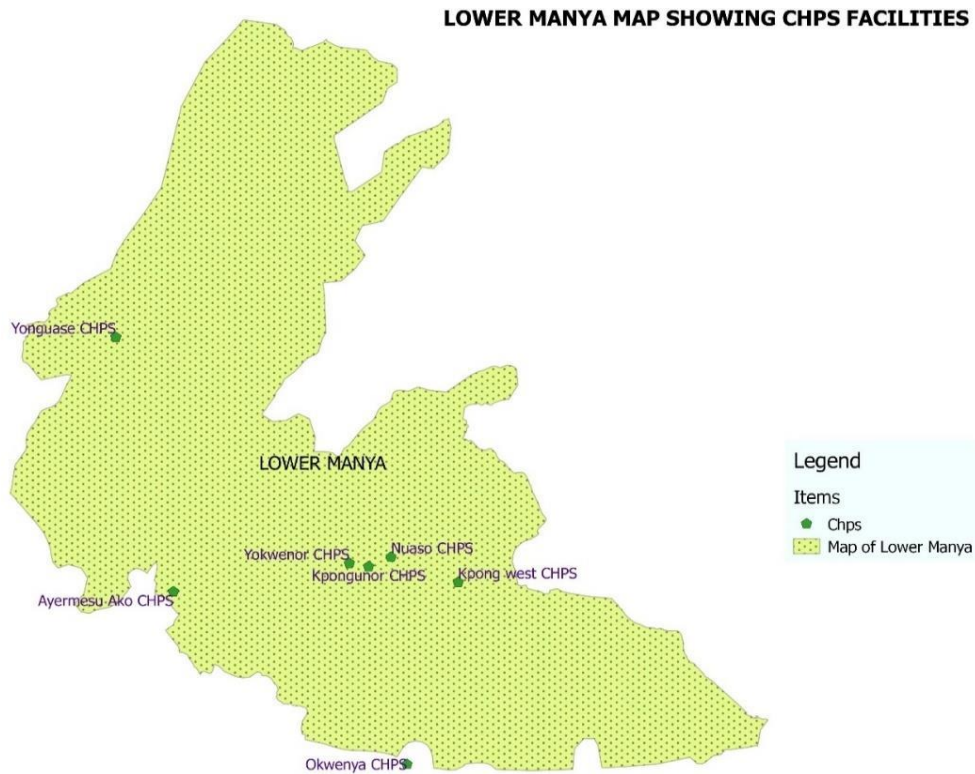
Figure 4.2: showing distribution of CHPS compounds in LMKM

4.4 Distribution of hospitals and health centers across LMKM

There are 2 government hospitals and 1 mission hospital in the municipality. The map in Figure 4 displays an uneven distribution of hospitals across the LMKM. The northern and southern part of the municipality also has relatively poor hospital distribution, with virtually no hospital located in the northern sector of LMKM. Looking at health center distribution as showed in the map, Kpong sub district, Oborpa sub district and Asitey sub district have 1 health center each, again the other three sub district unfortunately do not have health centers which happens to be one of the most affordable and accessible health services to the community's members.

THE DISTRIBUTION OF HOSPITALS AND HEALTH CENTRES ACROSS LOWER MANYA

LOWER MANYA

Legend

Items
- ● Hosp
- ▨ Map of Lower Manya

Oborpa health center
Kpong health center
Saint martin Hospital
Lydia Nyako memorial memorial maternity home
Asitey health center
Atua government hospital
Akuse government hospital
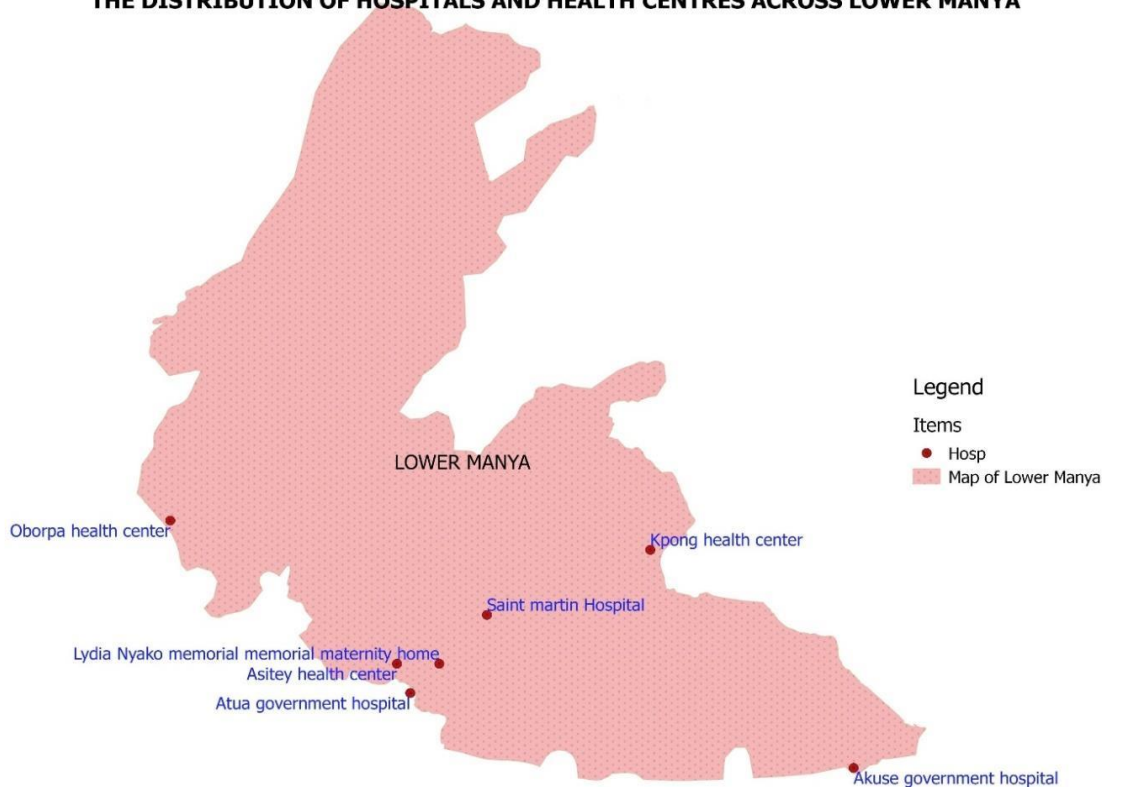
Figure 4.3 Distribution of hospitals and Health centers across the LMKM

4.5 Distribution of pharmacies and chemical shops

Pharmacies seemed to be the most important health supporting services, despite its importance, LMKM does not have sufficient numbers subsequently making them unequally distributed across the municipality. As observed in Map 5 the northern and southern part of the municipality completely lacks pharmacies making access to medication a bit of a difficulty. Two of the pharmacies in the municipality are located at Odumase sub district; one is located at Kpong and another in Agomanya. Almost all the chemical shops are clustered in Agomanya and Odumase sub district.

29

THE DISTRIBUTION OF PRIVATE PHARMACY AND LICENSED CHEMICAL SHOPS-LOWER MANYA
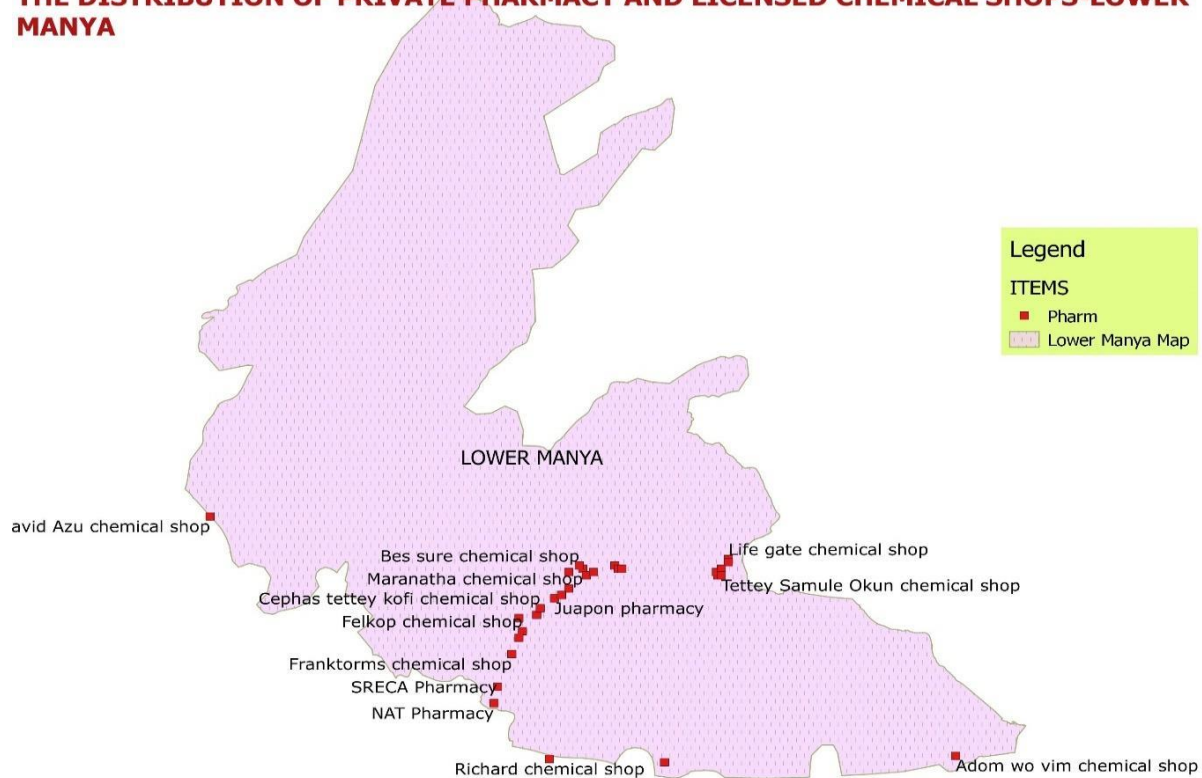
Figure 4.4 Distribution of Pharmacies and Chemical shops

Reproductive and Child Health centers (RCH), Community based and Health Planning Services (CHPS) and maternity homes. The supporting health centers were made up of pharmacies and chemical shops. The percentage distribution of these two categories of health facilities is displayed in Table 2. The following Table 4.6 shows the distribution of the main health facilities by sub district. CHPS compounds formed the majority of these facilities followed by health centers. RCH centers and maternity homes were the least with only 1 each found in the Agomanya and Odumase sub districts respectively. It is again observed from Table 4.6 that the Kpong, Oborpa and Asitey sub districts are without hospitals and RCH centers. The numbers of chemical shops in the LMKM were on the high side compared to other facilities.

Table. 4.4 Distribution of main health facilities per sub district

SUB DISTRICT	No. OF HOSPITAL	No. OF HC	No RCH	No. OF CHPS	MATERNITY HOME	TOTAL
Odumase	1	1	0	0	1	**3**
Agomanya	1	0	1	2	0	**4**
Kpong	0	1	0	2	0	**3**
Oborpa	0	1	0	1	0	**2**
Akuse	1	0	0	1	0	**2**
Asitey	0	1	0	1	0	**2**
Total	**3**	**4**	**1**	**7**	**1**	**16**

Key HC-Health Centre, RCH-Reproductive and Child Health, CHPS; Community Based Health Planning Services

Table. 4.5 Distribution of supporting health centers per sub district

SUB DISTRICT	No. of PHARMACIES	No. of CHEMICAL SHOPS	TOTAL
Odumase	1	4	**5**
Agomanya	1	9	**10**
Kpong	1	9	**10**
Oborpa	0	1	**1**
Akuse	0	3	**3**
Asitey	0	0	**0**

Table 4.6 shows the health facility per population ratio in LMKM per sub district. In computing the ratios, priority was given to the main health facilities specifically to those with high numbers in the municipality as observed from Table 7, the ratios for hospitals, health centers and CHPS compounds were hence computed and displayed by virtue of the high numbers of CHPS compounds in LMKM relative to hospitals and health centers, the ratio of the population per number of CHPS (15,086:1) was by far better than that of hospitals and by extension health centers.

Table. 4.6 Health facility per population ratio per sub district

SUB DISTRICT	POPULATION	HOSPITALS	HC	CHPS
Odumase	28,935	28,935:1	26,935:1	0
Agomanya	30,731	30,731:1	0	15,366:1
Kpong	24500	0	24,500:1	2042:1
Oborpa	5965	0	5965:1	5965:1
Akuse	26788	26,788:1	0	26788:1
Asitey	5703	0	5703:1	5703:1
Total	105,604	35,201:1	26,401:1	15,086:1

Key HC-Health Centre, RCH-Reproductive and Child Health, CHPS; Community Based Health Planning Services

4.6 Distribution of clinical health personnel

The distribution of clinical health personnel in the Lower Manya Krobo Municipality is displayed in the following Table 4.7 It can be observed that, Odumase and Akuse which happen to be the urban areas within the municipality had high percentages of clinical health personnel. Rural areas like the Oborpa and Asitey sub districts recorded very few clinical personnel. As observed from Table 4.7 again, nurses and midwives formed the greater majority of all clinical health personnel with doctors and physician assistants forming the minority. It is most likely that the ratio of nurses/midwives to the population of the municipality will be much better than that of

doctors/physician assistants due to obvious reasons. The distribution of doctors as observed from this table is fairly uneven. For example; a sub district such as Kpong with a population almost that of Akuse's do not have any doctors at all contrary to the situation in Akuse with 4 doctors. The situation in Oborpa and Asitey is much dire than the other sub districts. The virtually non-existent doctor population in these two sub districts is compounded by a further absence of physician assistants who usually deputize in the absence of doctors.

Table. 4.7 Frequency distribution of clinical health personnel in the LMKM

SUBDISTRICT	POPULATION	DOCTORS	NURSES	MIDWIVES	PHYSICIAN ASSISTANTS	TOTAL
ODUMASE	28,935	3	81	20	3	107
AGORMANYA	30,731	2	27	18	0	47
KPONG	24500	0	16	5	1	22
OBORPA	5965	0	9	1	0	10
AKUSE	26788	4	63	20	4	91
ASITEY	5703	0	7	1	0	8
TOTAL	**105,604**	**9**	**203**	**65**	**8**	**285**

From Table 4.8, it is observed that the doctor to population ratio of the LMKM stood at 11,734:1, a figure which is significantly less than the regional average of 17,438:1. Sub districts such as Kpong, Oborpa and Asitey as mentioned in the previous paragraph have extremely poor doctor population ratios. The nurse to population ratio in the municipality stood at 520:1, this is a significantly better than the regional average which stands at 701:1. Nevertheless sub districts such as Kpong, Asitey and Agomanya fell well above the national average as can be seen from Table 4.8.

Table. 4.8 Clinical health personnel per population ratio in the LMKM

SUBDISTRICT	POPULATION	DOCTORS	NURSES	MIDWIVES	PHYSICIAN ASSISTANTS
Odumase	28,935	9645:1	357:1	1447:1	9645:1
Agomanya	30,731	15366:1	1138:1	1707:1	0
Kpong	24500	0	1531:1	4900:1	24500:1
Oborpa	5965	0	663:1	5965:1	0
Akuse	26788	6697:1	425:1	1339:1	7683:1
Asitey	5703	0	815:1	5703:1	0
Total	**105,604**	**11734:1**	**520:1**	**1625:1**	**13201:1**

4.7 Availability of utilities and other resources

With regards to availability of utilities, water supply appeared to be a major challenge in LMKM. Close to 70% of health facilities did not have access to portable water, these facilities had to buy water from various sources or harvest rain water to use for their daily activities. Only 24% of health facilities had access to pipe borne water. On the other hand, there appeared to be no problem at all with supply of electricity,92% of all facilities had electricity supply from the national grid with only a worrying 2.22% having back up power.

Table 4.9 Resource and utility availability for health facilities in LMKM

Resource/utility	Resource availability/type	Frequency (% distribution)
Water	Not available	31(68.89)
	Pipe	11(24.44)
	Borehole	1(2.22)
	Pipe and Borehole	1(2.22)
	Tank	1(2.22)
Electricity	Not Available	4(8.89)
	National Grid (1)	36(80)
	Back up electricity supply (2)	1(2.22)
	Both (1 & 2)	4(8.89)
Toilet facility	Available	15(33.33)
	Not Available	30(66.67)
Communication	Both(telephone and internet)	2(4.44)
	Telephone	42(93.33)
	Other	1(2.22)
Drug supply	Regional	9(20)
	Open Market	29(64.44)
	Both	6(13.33)
	Other	1(2.22)
Roads	Highway	23(51.11)
	Feeder roads	21(46.67)
	Non-motorable	1(2.22)

Again, close to 70% of facilities did not have installed toilet facilities as observed in Table 4.9 above, a development which does not help the process of health delivery. Majority of these facilities either rely on public places of convenience or the toilet facilities of surrounding neighbors.

4.8 Distribution of health services in LMKM

The ability of the health facilities to satisfy the community's health needs is related to the availability of various services. Facilities with more available services are likely to have healthy communities around. From the current observation in the LMKM case it appears that despite the effort internationally put in place to end malaria, some 18.75% of the facilities do not have the ability to diagnose and treat malaria as observed from Table 4.9. It is alarming that only a few (43.75%) were able to conduct antenatal care service. Again just 50% are able to conduct skilled delivery in the municipality. A low 37.50% and 43.75% are only able to provide essential new born care and postpartum care services respectively. Though Ghana has highlighted the reduction of mother and child mortality in her reproductive health policy, only 18.75% of facilities are able to provide comprehensive abortion care and emergency obstetric care.

Table. 4.10 Distribution of health services across various facilities in LMKM

SERVICE	SERVICE AVAILABILITY	PERCENTAGE DISTRIBUTION (%)	CHPS	MH	RCH	HSP	HC
Death and birth registry	2	12.50	0	0	1	1	0
Diagnosis and treatment of malaria	13	81.25	6	0	1	3	3
Diagnosis and treatment of TB	14	87.50	6	1	1	2	4
Availability of free condom	13	81.25	4	1	1	3	4
Mother to child prevention	13	81.25	4	1	1	3	4
Antenatal care	7	43.75	2	0	0	3	2
Skilled delivery	8	50	2	0	0	2	4
Essential new-born care	6	37.50	0	0	0	3	3
Postpartum care	7	43.75	1	0	1	3	2
Comprehensive abortion	3	18.75	0	0	0	2	1
Emergency contraception	8	50	2	1	1	3	1
Hypertension treatment	8	50	2	0	0	3	3
Diabetics treatment	4	25	0	0	0	3	1
Mental health care	5	31.25	2	0	0	3	0
Laboratory services	3	18.75	0	0	0	3	0
Blood bank services	3	18.75	0	0	0	3	0
Comprehensive emergency obstetric care	3	18.75	0	0	0	3	0

Service	Personnel Availability	Percentage distribution (%)	Chps	Mh	Rch	Hsp	Hc
Basic emergency obstetric care	7	43.75	4	0	0	2	1

Key; CHPS-Community Health and Planning Services, MH-Maternity Home, RCH-Reproductive and Child Health Centre, HSP-Hospital-Health Centre

4.9 Distribution of administrative health personnel across facilities

Table. 4.11 Distribution of administrative health personnel across facilities in LMKM

Service	Personnel Availability	Percentage distribution (%)	Chps	Mh	Rch	Hsp	Hc
Health system admin	3	20	0	0	0	3	0
Administrator/manager	1	6.67	0	0	0	1	0
Executive officer	2	13.33	0	0	0	2	0
Accountant	3	20	0	0	0	3	0
Auditor	3	20	0	0	0	3	0
Finance officer	1	6.67	0	0	0	1	0
Audit officer	2	13.33	0	0	0	2	0
Estate officer	3	20	0	0	0	3	0
Procurement	3	20	0	0	0	3	0
Stores and supply	3	20	0	0	0	3	0

4.10 Correlation between population and health personnel

A correlation analysis was subsequently conducted to examine the relationship between clinical health personnel and the LMKM population. The number of health personnel was

considered as dependent variable and the municipal population was the independent variable, the results are displayed in the following Table 4.11. For all categories excluding nurses there was no significant relationship between the population and the number of doctors, midwives and physician assistants as p-values 0.1170, 01422, 0.2627 were recorded respectively. There was a strong positive relationship between the number of nurses and the population ($r = 0.87$, $p < 0.05$), implying an increase in population was followed by a corresponding increase in the number of nurses in LMKM.

Table. 4.12 Pearson's correlation analysis of clinical health personnel against population

Health Personnel	Pearson's correlation (r)	P-value
Doctors	0.70594	0.1170
Midwives	0.67391	0.1422
Nurses	0.87067	0.0240
Physician Assistants	0.54569	0.2627

CHAPTER 5

DISCUSSION

5.1 Geographical distribution of health facilities across LMKM

5.1.1 Distribution of CHPS compounds

The distribution of CHPS compound in the municipality indicates major disparity in terms of health resources among sub districts in LMKM, sub districts such as Agomanya and Kpong sub district recorded more than half of the CHPS compound. Asitey sub district has only one CHPS (Ayermesu CHPS) for 5703 habitants. Oborpa sub district has also one CHPS for 5965 population. Akuse sub district despite its huge population of about 26788 is covered by one structured CHPS compound.

5.1.2 Distribution of hospitals and health centers across LMKM

Generally, the Eastern region falls short with regards to distribution of health facilities especially when it comes to hospitals (Manortey and Acheampong, 2016; Ofosu, 2012). Hospitals seemed to be weighed more towards the Southern and middle sections of the Eastern region compared to its Northern section (Manortey and Acheampong, 2016; Ofosu, 2012) .A similar trend is observed in the LMKM where facilities in general tend to be more clustered at the South. There were 2 government hospitals and 1 mission hospital in the municipality. The hospitals in LMKM were not evenly distributed across the municipality which inhibits good access to healthcare especially in the southern part of the municipality. Sub districts such Odumase, Agomanya and Akuse have respectively Atuah Government hospital, Saint Martin mission hospital and Akuse government hospital while the other three sub districts have no hospital. Looking at the health center distribution, Kpong sub district, Oborpa sub district and Asitey sub district had 1 health

center each. Again, the other three sub districts have not given any chance to seek health care from health center which is often providing affordable and accessible health services to the communities. In addition to the hospital and health center, Odumase is blessed with one maternity home.

5.1.3 Distribution of pharmacies and chemical shops

Pharmacies seem to be the most important health supporting services, despite its importance; LMKM does not have sufficient numbers. The Northern and Southern part of the municipality completely lack pharmacies hence the poor access to drugs in the municipality. Two of the pharmacies in the municipality are located at Odumase sub district; one is located at Kpong and the last one at Agomanya. Almost all the chemical shops are clustered between Agomanya and Odumase sub district. The LMKM has majority of its population in rural areas (Osires, 2010). Rural areas tend to be characterized by lack of infrastructural development such as poor road networks so forth (Vissandjée *et al.,* 1997; Umar and Bolanle, 2015; Sulemana and Dinye, 2014). The poor distribution of pharmacies and chemical shops in this respect is therefore an expected phenomenon (Sulemana and Dinye, 2014; Adedayo and Yusuf, 2012) and hence the need to address the situation.

5.2 Utilities

5.2.1 Water

Despite the need of water in infection prevention and nosocomial infections prevention (Hill, 2015), it was found that more than half (68.89%) of the health facilities in the municipality had no access to potable water supply. Among facilities having water supply, only 24.44% had access to pipe-borne water. Boreholes and tanks were available for only 4% of facilities.

This disturbing development has a telling effect especially on the prevention of diarrheal diseases and other outcomes that require good water supply and basic good hygiene practices (Gamper-rabindran, 2008; Bampoky, 2013; Isafe *et al.*, 2012)

5.2.2 Electricity

The importance of electricity in health service delivery cannot be overemphasized (Ojakaa *et al.,* 2014). It is imperative for health facilities to have adequate and backup power supply to ensure that medical equipment keeps running. About 80% of facilities had power supply from the national source, backup electricity was available in only one facility (2%) which means for majority of facilities, in an unfortunate case of power outage from the national source related medical functions cannot be performed, a situation which does not promote good health service delivery (Rannan-Eliya, 1999).

5.2.4 Drug supply

In Ghana, 80% of drugs are supposed to be bought from the regional store. This study established that only 20% of drugs were bought from the regional store and 64.44% comes from the open market. 13.33% of the facilities and supporting centers obtain their drugs from both regional store and open market. This development could be due to the fact that the procedure of accessing drugs from regional store may be tedious and time consuming. A study done in 2012 on assessing facility capacity and costs of care revealed that preferred sources for purchasing essential medicines varied by platform type. For hospitals, the majority of facilities acquired drugs from a combination of sources, with 73% of regional referral hospitals and 72% of public hospitals procuring pharmaceuticals products through both public and private sources. Among primary care facilities in the public sector, the central medical stores provided all drugs at just over half of public health centers and 34% of CHPS. Over 90% of maternity clinics and pharmacies reported procuring all of their essential medicine stocks from private sources, while 70% of private clinics

indicated the same. Notably, some percentage of facilities across platforms reported acquiring at least some pharmaceuticals through the private sector.(Sulemana and Dinye, 2014).

5.2.4 Type of roads

In the LMKM half of the facilities (51.11%) are located along side of a highway and 47% located by feeder roads, a result which implies a significant proportion of health facilities are difficult to access in the LMKM. The location of the facility could positively or negatively influence its access by healthcare seekers, therefore facilities with good roads could be easily accessed than those with unmotorable roads (Frankenberg,1995; Kara and Egresi 2013; Buor, 2004).

5.3 Distribution of health services in LMKM

Being able to diagnose ailments and effectively treat them is a basic, yet crucial, indicator of a health facility's capacity to optimally serve its patients and their health needs (Vissandjée *et al.,* 1997; Rannan-Eliya, 1999; Hadley and Cunningham, 2003). In LMKM most of the services were carried out by the hospital and the health centers and a few by the CHPS compounds. Diagnosis and treatment of malaria, the availability of free condom and the prevention of mother to child transmission of HIV were all available at almost 80% in the assessed facilities while Skilled delivery, Emergency contraception and hypertension treatment were 50% at the assessed facilities. The following were below 50%: Death and Birth registry, Antenatal care, Essential new born care, postpartum care, comprehensive abortion, Diabetes treatment, mental health services, laboratory services and Basic emergency obstetric care. Blood bank service was available only in the 3 district hospitals. Buor, D at 2004 in Ghana found that, malaria diagnostic and treatment availability was found across platforms in both hospital types, 100% of facilities reporting malaria diagnostic equipment. CHPS and pharmacies reported malaria diagnostic and treatment capacities with 23% and 3%, respectively. CHPS and pharmacies recorded a similar proportion of

facilities lacking concurrent malaria diagnostic capacity and treatment (8% and 9%, respectively). Nearly 90% of pharmacies only carried ACTs without accompanying diagnostic tools. Comparing the LMKM and the national level in this respect, the LMKM does not have much of a problem with malaria diagnostic in all the various categories of health facilities, other availability of antenatal care, essential new born care, postpartum care, comprehensive abortion, diabetes treatment, mental health services, laboratory services and basic emergency obstetric care needs to be addressed.

5.4 Distribution of clinical health personnel

The results from this study showed that there was a challenge of clinical health personnel distribution in LMKM. For a population of 105,604, there are a total of 285 clinical workers, these include 9 doctors, and the nurses were the most represented (203 nurses), followed by 65 midwives and 8 physician assistants. Odumase and Akuse have a greatest number of health personnel 107 and 91 respectively. Agomanya which is the most populated sub district has fewer personnel only 47 as compared to 107 for Odumase. The doctor to population ratio of the LMKM stood at 11,734:1, a figure which is significantly less than the regional average of 17,438:1 (Ofosu, 2012). Sub districts such as Kpong, Oborpa and Asitey as mentioned in the previous paragraph have extremely poor doctor population ratios. The nurse to population ratio in the municipality stood at 520:1, this is a significantly better than the regional average which stands at 701:1. This finding is similar to the findings of study on the distribution of health personnel in the Eastern region of Ghana with nurses forming the category with the highest number of these workers representing 77% of workers, followed by midwives at 541. Doctors counted were 151, representing a meager 3% of the health labor force (Manortey and Acheampong 2016). The doctor and physician assistant population in the Eastern region remains a problem and by

extension the LMKM. It is prudent to address this poor distribution of doctors and physician assistants to facilitate better healthcare service delivery.

5.5 Correlation between population and health personnel

There was a strong positive relationship between only the number of nurses and the population ($r = 0.87$, $p < 0.05$), implying an increase in population was followed by a corresponding increase in the number of nurses in LMKM. A result which shows that the number of nurses in the LMKM are properly distributed across the population. The number of doctors, midwives and physician assistants were not evenly distributed in the municipality as p-values 0.1170, 01422, 0.2627 were recorded respectively. Manortey and Acheampong (2016) observed that there was no variation in number of medical doctors, physician assistants, nurses or midwives across the populations of the districts. All p values obtained for each health worker categories were greater than 0.05 which indicated there was no significant difference in the number of health personnel and population across the Eastern region. This study in effect confirms the poor distribution of health personnel in the Eastern region and specifically the LMKM. It is necessary to institute constructive measures to address the current situation.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

The Lower Manya Krobo is typical rural municipality divided into six (6) sub districts known as Odumase, Agomanya, Oborpa, Akuse, Asitey and Kpong. The district has a total of 16 health facilities which include; hospitals, health centers, CHPS compound, Maternity homes and Reproductive and child health units and 29 supporting centers mainly pharmacies and licensed chemical shops. There are however, inequalities in the distribution and access to health facilities in the municipality. This study observed deficiency in distribution of 45 health facilities, supporting centers and health personnel which in turn has a negative effect on the entire development of the LMKMA total of 285 clinical health workers were found in the municipality. Disadvantaged Sub-districts (Sub-districts with little or no health facilities and personnel) were sighted. From the analysis, Odumase and Akuse which happened to be the urban areas within the municipality had high percentages of clinical health personnel. A ratio of 13201:1 population per single health workers was found for whole municipality which is extremely low. All the administrative personnel were found in hospitals while the other types of facilities were managed by the 'in charges' and often undertook the management with other duties. Generally, there was 15,086 populations per health facility as a facility to population ratio (15,086:1). The health services per facilities were also reviewed in the study and it was observed that there was uniformity in the service delivery according to the type of facility. The various maps demonstrated real disparities in the distribution of health facilities across the municipality. The distribution was inverse to the need where the rural communities disadvantage in accessing health care services. There was a strong positive relationship between the number of nurses and the population while other workforce was not evenly distributed based on the sub district population.

46

6.2 RECOMMENDATIONS

The findings discussed above have revealed that there are inequalities with respect to the distribution and accessibility to health facilities and services in the LMKD. Expansion of Health Infrastructure Government must speed up efforts in renovating, building and equipping more health centers, CHPS compounds and clinics especially in largely rural districts where the availability of these facilities is either low or non-existence. Regarding the distribution of the clinical health personnel, attention should be given to the redistribution of health personnel in other to achieve social justice and to reduce disparity among community members. This could be achieved by providing motivation to the health personnel living in the rural areas. The District Health Management Teams and other partners must put in effort in providing health facilities especially those in the rural communities with utilities such as water supply, electricity and sanitation. Health facilities and supporting centers should be encouraged to purchase their drugs and pharmaceuticals from Regional drug store, and the regional store should make access to drugs easier to stakeholders.

6.3 CHALLENGES AND LIMITATIONS OF THE STUDY

The cost of traveling and time spent in accessing health facilities as well as the difficulty in transport availability have being main challenges accoutered in this study, which is likely to have impacted the number of facilities visited and the amount of data obtained at first hand. Also, the health administrators could not give much time to provide comprehensive responses to the questionnaires.

REFERENCES

abdelhafiz, a. & abdel-samea, m., 2013. gis for health services. , pp.1396–1405.

adedayo, a. & yusuf, r.o., 2012. health deprivation in rural settlements of borno state, nigeria. *journal of geography and geology*, 4(4), pp.52–61.

alake, m., 1991. spatial accessibility to public maternal health care facilities in ibadan , nigeria . , pp.13–28.

anon, 2015. health resources availability mapping system (herams) health facilities report health cluster - turkey. (august).

anon, report on gis and public health spatial applications " disease ecology is inherently integrative and spatial , and gis public health services branch queensland health.

bampoky, c., 2013. can clean drinking water and sanitation reduce child mortality in senegal ? , 6.

black, m. et al., 2004. using gis to measure physical accessibility to health care. *world health organization*, 3–4, pp.1–22.

buor, d., 2004. *accessibility and utilisation of health services in ghana*, available at www.nivel.nl.

crane, k. & skinner, b., although there is no common definition for mapping, it is, generally, a methodology used to link community resources with an agreed upon vision, organizational goals, strategies, or expected.

diderichsen, f., 2004. resource allocation for health equity : issues and methods. , (september), p.38.

fisher, r.p. & myers, b.a., 2011. free and simple gis as appropriate for health mapping in a low resource setting : a case study in eastern indonesia. , pp.1–11.

frankenberg, e., 1995. the effects of access to health care on infant mortality in indonesia. *health transition review*, 5(2), pp.143–163.

gamper-rabindran, s., 2008. the impact of piped water provision on infant mortality in brazil : a

    quantile panel data approach.

hadley, j. & cunningham, p., 2003. availability of safety net providers and access to care of

    uninsured persons. , pp.1527–1547.

hill, k., 2015. the effect of water and sanitation on child health : evidence from the demographic

    and health surveys 1986 – 2007.

isafe, d. among under five c. and h.w.t. and et al., 2012. diarrhoea among underfive children and

    household water treatment and safe storage. *muhimbili university of health and allied*

    sciences, school of public health and social sciences.

ismaila, a.b. & usul, n., 2013. a gis-based spatial analysis of health care facilities in yola, nigeria.

    , (c), pp.46–53. available at:

    http://www.thinkmind.org/index.php?view=article&articleid=geoprocessing_2013_3_10_30

    028%5cnhttp://www.thinkmind.org/download.php?articleid=geoprocessing_2013_3_10_30

    028.

kara, f. & egresi, i.o., 2013. *accessibility of health care institutions : a case study by using gis*,

kim, s., spatial inequality and economic development : theories , facts , and policies. , (16).

kwarteng, a.g., 2016. ensign college of public health , kpong , eastern region , ghana an analysis

    of the distribution of healthcare facilities and health personnel in the eastern ensign college

    of public health , kpong , eastern region , ghana an analysis of the distribution. (may).

madu, i.a., case study the underlying factors of rural development patterns in the nsukka region of

    southeastern nigeria.

manortey and acheampong, 2016. a spatial perspective to the distribution of healthcare facilities

    and health personnel in the eastern region of ghana.

ofosu, d.k., 2012. *assessing the spatial distribution of health facilities in the eastern region of*

ghana.

ojakaa, d., olango, s. & jarvis, j., 2014. factors affecting motivation and retention of primary

health care workers in three disparate regions in kenya. *human resources for health*, 12(1),

p.33. available at:

http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=4097093&tool=pmcentrez&rend

ertype=abstract.

osires, 2010. lower manya krobo municipality. , p.189.

patel, a. & waters, n., 2012. using geographic information systems for health research.

application of geographic information systems. available at:

http://www.intechopen.com/books/export/citation/endnote/application-of-geographic-

information-systems/using-geographic-information-systems-for-health-research.

rannan-eliya, r.p.; c.b.-v.a.k.n., 1999. the distribution of health care resources in egypt:

implications for equity. *boston, ma, data for decision-making project, international health

systems group, harvard school of public health*. available at:

https://www.hsph.harvard.edu/ihsg/publications/pdf/no-81.pdf.

saeed, b.i.i., 2013. assessing the influential factors on the use of healthcare : evidence from ghana.

, 4(1), pp.12–20.

sulemana, a. & dinye, r.d., 2014. access to healthcare in rural communities in ghana: a study of

some selected communities in the pru district. , 2(4), pp.122–132.

tatem, a.j. et al., 2014. mapping for maternal and newborn health: the distributions of women of

childbearing age, pregnancies and births. *international journal of health geographics*, 13(i),

p.2.

umar, j. & bolanle, w., 2015. locational distribution of health care facilities in the rural area of

ondo state. *british journal of education, society & behavioural science*, 11(1), pp.1–8.

available at: http://sciencedomain.org/abstract/10198.

vissandjée, b., barlow, r. & fraser, d., 1997. utilization of health services among rural women in

gujarat, india. *public health*, 111(3), pp.135–148. available at:

http://www.publichealthjrnl.com/article/s0033350697005726/fulltext [accessed april 21,

2016].

yonek, j. & hasnain-wynia, r., within c hicago ' s 77 c ommunity a reas about this report.

APPENDIX

APPENDIX 1: QUESTIONNAIRES
ENSIGN COLLEGE OF PUBLIC HEALTH
BERETE Ansoumane
TOPIC: MAPPING OF HEALTH RESOURCES IN LOWER MANYA MUNICIPALLITY IN THE EASTERN REGION OF GHANA.
SUPERFVISOR: DOCTOR JULIANA Enoss
QUESTIONNAIRES

1	SUB DISTRICT NAME			DN
2	FACILITY NAME			FN
3	POPULATION PER SUB DISTRICT			PPD
4	CORDONATE	1 LATITUDE 2 LONGITUDE 3 ALTITUDE		CORD
5	Type of Health facility	1- Hospital 2- Clinic 3- CHPS 4- Pharmacy 5-Licensed chemical drug shop 6 -Health center 7-Maternity center 8-Others		THF
6	WATER	1- PIPE 2- TANK 3-Unprotected wells		Wat
7	SANITATION(TOILET AND WASHING)	1- Available 2- not available		SANIT
8	ELECTRICITY	1-National electricity 2-back up 3-both		ELECT

9	COMMUNICATION	1-Telephone network 2-satellite internet 3 -Others		COMM
HUMAN RESOURCE AVAILABILITY				
10	TOTAL WORKFORCE	1- Doctor Physician assistant 2- Field technician 2- DENTIST 3-ENROLLED NURSES 4-GENERAL NURSES 5-COMMUNITY H NURSES 6-Midwives 7-pharmacist 8-Pharmacist technician 9-Biomedical scientist 10-Lab technician		TW
ADMINISTRATIVE				
		1-Meanized 2-Casual		
		1-health system administrators	Yes…No…Nber……	
		2Administrator manager	Yes…No…Nber……	
		3-Executive officer	Yes…No…Nber……	
		4-Accountants	Yes…No…Nber…..	
		5-Auditors	Yes…No…Nber……	
		6-Finance	Yes…No…Nber…..	

		officer 7-Audits officer 9-Eastate officer 10-Procurement officer 11-Store supply officer	Yes…No…Nber…… Yes…No…Nber….. Yes…No…Nber…… Yes…No…Nber……	
Supportive staff				
		1-Cleanest 2-Security men 3-Washmen 4-Drivers		
11	DRUG SUPPLY	1-Regional medical store 2-Open market Supported by NGO 3-Other partner (specify)		DS
SECTION C EQUIPMENT				
12	Ambulance	1- functioning 2-Not functioning 3- Not available		AMB
13	X ray	1 -functioning 2- Not functioning 3-Not available		X ray
14	Type of road	1-Highway 2-Street 3-Non drivable		TOR

APPENDIX 2 : HEALTH SERVICES CHECK LIST

No	SERVICES	Yes/No
1	Death and Birth registry	
2	Diagnosis and Treatment of malaria	
3	Diagnosis and treatment of TB	
4	Availability of free condom	
5	Prevention-PTME	
6	Antenatal care	
7	Skilled care	
8	Essential new-born care	
9	Basic emergency obstetric care	
10	Postpartum care	
11	Comprehensive abortion	
12	Emergency contraception	
13	Hypertension treatment	
14	Diabetes treatment	
15	Mental health care	
16	Lab services	
17	Blood bank	
18	Comprehensive emergency care	