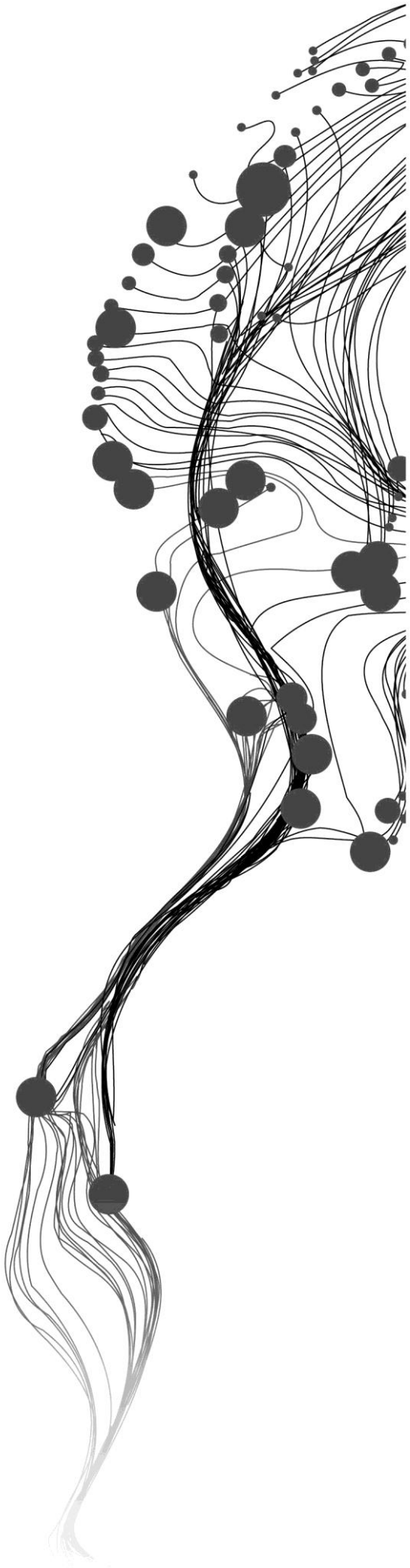
EVALUATION OF ACCESS TO PRIMARY HEALTHCARE

(A CASE STUDY OF DAR ES SALAAM)

DEOGRATIAS D. KALIMENZE

February, 2011

SUPERVISORS:
Dr. S. Amer
Dr. J. Martinez



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Enschede, The Netherlands, February, 2011

Thesis submitted to the Faculty of Geo-Information Science and Earth Observation of the University of Twente in partial fulfilment of the requirements for the degree of Master of Science in Geo-information Science and Earth Observation.
Specialization: Urban Planning and Management

SUPERVISORS:
Dr. S. Amer
Dr. J. Martinez

THESIS ASSESSMENT BOARD:
Chairman: Dr.R.V. Sliuzas
External Examiner: P.F.D. Scheelbeek Msc, MPH

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ABSTRACT

Access to primary healthcare is a primary aim of ensuring quality of life. Many authorities aimed at achieving equitable primary healthcare but achieving the goal has remained a desire for many health planning authorities. Different methodological approaches have been used to evaluate access to primary healthcare. But, in this study access concept composed of accessibility, availability, affordability, acceptability and adequacy were used evaluate access to primary healthcare between different socio economic groups.

Evaluation of access to primary healthcare was done using collected data both primary and secondary data. The primary data was collected using structured households survey and household was the unit of analysis. Therefore, variation of access to primary healthcare was measure using both objective and subjective indicators. Access was evaluated between types of primary healthcare facilities, users of healthcare and identified socio economic groups using network analysis, service area analysis and descriptive statistics. Moreover, the obtained results were compared for evaluation of changes over time and identified socio economic groups. Furthermore, policies objectives were compared with identified issues on access components.

The results showed that, variations exist between settlement types and socio economic groups. The vulnerable households are predominant in informal settlements than formal settlements. But accessibility and acceptability were not problematic in the study area; this was because of implementation of health policy objective on public private partnership. The mixed characteristics of people and beliefs influenced the level of acceptability. Furthermore, long waiting time, drug shortage and human resource inadequacy were major challenges on availability. Furthermore, medication and overall healthcare costs were also challenging factors of affordability to primary healthcare. Unfriendly behaviour of health personnel and medical ability under adequacy perceived to be challenge especially in government facilities than non-government facilities. Furthermore, socio economic groups have shown significant difference between different indicators of access components. Perceptions on waiting time, drug availability, medication cost, possession of health insurance card and medical ability have shown significant differences between socio economic groups, but households belonging to vulnerable groups are the most affected one.

The evaluation of changes over time showed that, government health facilities have remained the main providers of primary healthcare over 15 years. On the same note, affordability and distance remained to be strong motives of attending government facilities and drug availability and distance for non-government facilities. Apart from that, walking also remained to be a major mode of transport used by majority of respondent but more people walk now than as it was in 1995. The identified issues have shown significant variations with policy objectives. Most of issues identified where not well addressed as required from the policy document, only physical accessibility was observed to satisfy the policy objective. Much more has to be done to reduce the identified gap between existing status of PHC and policy documents.

Key words: Access, socio economic status, primary healthcare, dimensions of access, policy, changes overtime.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDIX

ACRONYMS

TSH	Tanzanian shillings
SES	Socio economic status
SEG	Socio economic groups
MoHSW	Ministry of health and socio welfare
PHC	Primary healthcare
HF	Health facility
TIFF	Tagged image file format
MrSID	Multiresolution seamless image data
GIS	Geographic information system
E2SFCA	Enhanced 2 step floating catchment analyses
GPS	Global position system
PDA	Personal digital assistant
GHF	Government health facility
NGHF	Non-government health facility
MEDA	Mennonite Economic Development Association
PHSDP	Primary Health Services Development Programme

1. INTRODUCTION

This study improved existing methodologies on evaluating variation on access to primary health care in Dar es Salaam, Tanzania. The research also looked on the current health policy issues and how planning for primary healthcare is done within the case study. Moreover, it highlighted variables that influence access to primary health care both spatial and non-spatial. Furthermore, the research aimed at evaluating changes on access to primary healthcare, this is done by comparing collected data and available data sets of 1995 and 2000.

1.1. Background information

Provision of adequate and equitable primary health care to users has been health development paradigm for many decades. Access to primary health care is an advancement of attaining high quality of life. The desire to improve people's quality of life has been a central focus for health planners (Lotfi & Koohsari, 2009). In order to ensure all people have access to primary health care an Alma Ata declaration signed in 1978 laying the vision of equity and social justice in global health (Gulzar, 1999; Jatrana & Crampton, 2009). Despite the recognition for the need of well performing health system based on primary health care, achieving equitable access to primary health care has proven difficult to achieve (ibid).

Access to primary health care observed as an important element for an overall population health despite of existing challenges. Many barriers like; financial difficulties, cultural issues, religious beliefs, geographical access, long waiting periods, transport problems, location of health facilities relative to population, long distance, language barrier and other resources reduced the level of health care utilization among the majority in the society (Jatrana & Crampton, 2009; Rosero-Bixby, 2004). These barriers reduce the level of access to primary health care and increase inequalities among different socio economic groups. User characteristics such as income, insurance, need, and psychological factors also impede access to health services (Gulzar, 1999).

User's socio economic characteristics affect the capacity on access to health care and causes health inequalities among the public (Kagamimori, et al., 2009). Access to health facilities has shown variation in different studies. Henricson, et al., (1998) observed a wider dissimilarity on utilization of antibiotics for both general population and children in different geographical locations. On the other hand difference on the use of public health facilities in South Africa has resulted a high mortality rates between neonatal mortality rate and post mortality rates (Rip, et al., 1987). Also, it observed that people belonging to lower socio economic groups have less access to health care compared with those belong to higher socio economic groups (Veugelers & Yip, 2003).

Different indicators both spatial and non-spatial developed for measuring and evaluating access to primary health for each dimensions in access. Spatial indicators used to measure access to primary health care are travel time, travel distance, travel cost, waiting time, number of physician, number of health facilities, population served, number of beds per facility and number of nurse (Guagliardo, 2004; Klemick, et al., 2009; Luo & Qi, 2009; Owen, et al., 2010; Schuurman, et al., 2010; Shrestha, 2010; Wanasinghe, 1995). The non-spatial components of access involve people's perceptions, tendencies, characteristics, and level of satisfaction of users (Gulzar, 1999; Lotfi & Koohsari, 2009; Shrestha, 2010).

Evaluation of factors influencing access to primary health care measured in Dar es Salaam. With increasing population and lower pace of construction of primary health care facilities in the city, average population served

by dispensaries and health centres is more than planned population. Moreover, shortage of human resource, inadequate equipments, physical characteristics, different socio economic characteristics of people and other factors hinder access to health care in the city (United Republic of Tanzania, 2007b). Despite the fact that 90% of people reported to be within 5km from a health facility, there is great variation from one location to another. All this show the relevance of the study to explore other factors influencing access to primary health care in the City.

1.2. Research problem

Access to health care influenced by many components like accessibility, availability, affordability, adequacy, and acceptability. However, many studies focused on addressing the spatial components of access to health care, defining disparities on spatial accessibility and availability of health care (Ahmed, 2005; Guagliardo, 2004; Khan, 1992; Liu, et al., 2009; Luo, 2004; Luo & Qi, 2009; Luo & Wang, 2003; Owen, et al., 2010; Rosero-Bixby, 2004; Schuurman, et al., 2010).Despite of many researches been conducted on spatial components of access to primary health care, still there are more barriers hinder the achievement of global slogan of health for all. Many studies have not discussed affordability to health care, adequacy, and acceptability as factors influencing access to primary health care (Obrist, et al., 2007; Penchansky & Thomas, 1981; Shrestha, 2010). As cities grow most of health facilities are geographically concentrated on one location living other parts with less or no access to primary health care (Liu, et al., 2009). This causes social and spatial inequalities in spatial distribution of health care providers (Guagliardo, 2004). Therefore, the research problem addressed in the study was to modify and apply appropriate methods on evaluating access to primary health care across different socio economic status and compare if changes occurs with time.

1.3. The aim of a study

To evaluate access to primary health care across socio economic groups and compare if changes occurs with time.

Specific Objectives

- To conceptualize access and identify appropriate methods to measure it.
- To identify how to describe and measure socio economic differences.
- To assess variations in access to primary health care across socio economic groups.
- To evaluate if access to primary health care has changed over time.
- To assess in how far health policy objectives correspond to identified variations in access across socio economic groups.

Research Questions

The research questions for objective one

- How can access be conceptualized?
- What are appropriate methods to quantify and measure different dimension of access?

Research questions for sub objective two

- Which variables used to measure socio economic differences?
- How socio economic differences can be identified?

The research questions for objective three

- Which variables used to measure access to primary health care across socio economic groups?
- How can access to primary health care be measured?

Research question for sub objective four

- Does access to primary healthcare changes over time?
- Which indicators have shown major changes?

Research question for sub objective five

- How does current health care policy implemented?
- Do health policy objectives correspond with identified variations across socio economic groups?

1.4. Research framework

This research is built up on five main components that are access concept, household socio economic status, access variations, indicators for comparison and health care policy and planning as shown in Figure 1-1. The five components describe and evaluate access to primary health care in Dar es Salaam and evaluate if changes occurs with time. Additionally, socio economic status is describing the characteristics of users of health facilities that include income, occupation, education, and household size. These variables can prohibit a user to have a high quality healthcare. Access concepts include different dimensions like accessibility, availability, adequacy, affordability, and acceptability. These components are the central focus of the research, but detail description of the concept obtained on section 2.1.3. Variations on access to health care describes if there is equity or inequity on access to health care among different socio economic groups in order to improve the performance of health care planning system and policy formulation.

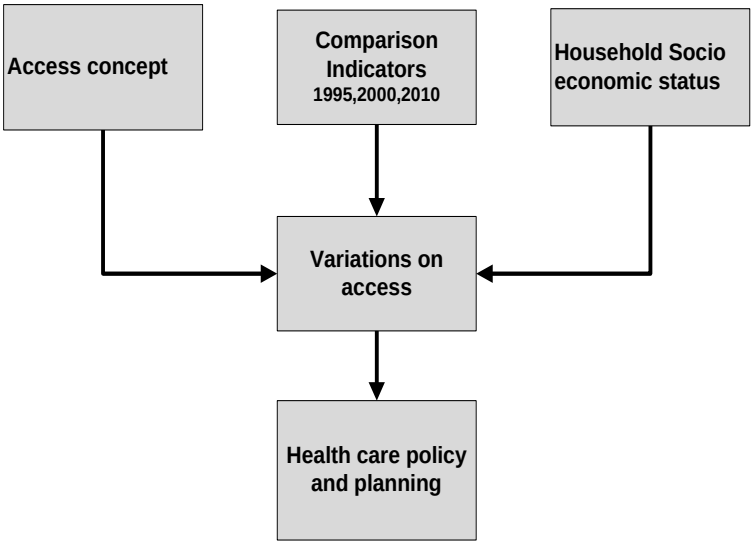


Figure 1-1: A research framework

Thesis structure

Chapter One – Introduction

This chapter describes in short the contents of a research by beginning with background information on access to primary health care. Moreover, the main part of a research composed of a research problem, aim of the research, specific objective and research questions. On the other hand, a research framework described to highlight the major contents involved in the study.

Chapter Two - Literature review on access to primary health care and socio economic status

This chapter describes in detail different definitions and concepts related to access to primary health care and socio economic status are discussed from scientific literatures. The concepts and definitions helped to conceptualize access and identify different variables used to measure access components in the City. Moreover, access to health care across different social economic groups and different methodologies used to quantify and measure different components of access are discussed.

Chapter Three – Urban development in Dar es Salaam

This chapter provides a description of case study on demographic characteristics, socio economic development, physical development, and existing health status in the City. The impact of urbanization on health care provision and access to public and private facilities discussed. Moreover, the existing healthcare system is discussed based on different approaches in developing health care and national policy objectives.

Chapter Four – Research methodology

This chapter explains different methodology used on answering different research objectives through research questions developed. On the research design, detail information on data required, sources of data, methods/techniques for answering research questions mentioned. Mainly, the chapter have three parts Pre fieldwork, fieldwork and post fieldwork.

Chapter Five – Access to primary healthcare

In this chapter, results of different analysis on evaluating access to primary health care through access framework explained. Also, variation on different components of access across different socio economic groups is discussed. On the other hand, policy issues on identified variations on access components are discussed and changes on access to healthcare in the City is also discussed.

Chapter Six – Discussions on findings

This chapter links the results obtained when answering different research questions together with a broader theoretical understanding of concepts related to access to primary health care. Moreover, critical discussions on the success and the limitations of the study discussed.

Chapter Seven – Conclusions and Recommendations

In this chapter, all the findings and discussions summarized and different suggestions on the way forward on improving access to primary health care from Macro to Micro level explained. In addition, recommendations for future improvements and area for further study specified.

2. ACCESS TO PRIMARY HEALTHCARE AND SOCIO ECONOMIC STATUS

This chapter describes in detail different definitions and concepts related to access to primary health care and socio economic status as discussed on scientific literatures. The concepts and definitions helped to conceptualize access and identify different variables used to measure access components. Moreover, access to health care across different social economic groups was discussed. Furthermore, different methodologies used to quantify and measure different components of access is explained.

2.1. Introduction

Provision of adequate primary health care has been a focus of most policy makers and planners for many decades. Many governments needs their citizens to have adequate and equitable access to quality health care, but the achievement of that state has been difficult (Obrist, et al., 2007). The complexity of the concept of access to primary health care contributes to the failure of attain the slogan of health care for all (Khan & Bhardwaj, 1994). Despite all that, access to primary health care considered as the platform for ensuring quality of life and health care for all. The achievement of healthcare for all has been a challenge over time and this was due to complexity nature of the access concept itself, more understanding was required in order to achieve a better status of healthcare and hence enhance quality of life. Definitions and different concepts used to describe access to primary health care explained in the following section.

2.1.1. Definition and Concepts on access to primary health care

Access concept was firstly pioneered by Penchansky & Thomas,(1981) and it was defined as "degree of fit between a client and the healthcare system" (Penchansky & Thomas, 1981, p. 128). Despite of that, access to primary health care was observed in different conceptual framework, which makes it very complex to define. The definition of access is different depending on the context of the study, Obrist, et al., (2007)also discussed this using livelihood insecurity framework where user characteristics were determined to influence access to health care. But, "the most basic problem in defining 'access' is that, both a noun referring to potential for healthcare use, and a verb referring to the act of using or receiving healthcare are used on defining access" (Guagliardo, 2004, p. 2). Moreover, Gulzar, (1999, p. 17) also defined access to health care as " a fit among personal, socio cultural, economic and system related factors that enable individuals, families, and communities to have timely, needed, necessary, continuous and satisfactory health services". The definition describes the importance of having two effective parts in order to have effective access to primary health care. The most important parts for effective access are well-organized health care system and potential users. Furthermore, in a simple way access is defined as "ability to secure a specific set of health care services with certain quality, subjected to a specified maximum level of personal inconvenience and cost while in possession of a specified amount of information" (Oliver & Mossialos, 2004, p. 656). Understanding specific concepts related to access to health care and parties involved helped health planners and policy makers to evaluate the performance of health care systems and measure level of access to primary health care on different areas with different socio economic groups of people.

2.2. Dimensions of access

Many studies have discussed different dimensions and barriers of access to primary healthcare (Amer, 2007; Luo, 2004; Luo & Qi, 2009; Owen, et al., 2010; Penchansky & Thomas, 1981; Perry & Gesler, 2000; Rosero-Bixby, 2004; Schuurman, et al., 2010; Shrestha, 2010). In order to understand the concept of access, the components were discussed independently. The concept describes the main five dimensions of access as Availability, Accessibility, Affordability, Accommodation and Acceptability, '5 A'. The five components of access where discussed first by Penchansky & Thomas, (1981) and since then, the framework was adopted with different researchers working on access to healthcare. Out of five components, accessibility and availability have both spatial and non spatial characteristics while the rest have non-spatial characteristics. Gulzar, (1999), Obrist, et al., (2007) and Shrestha, (2010) also used access concept to explain and evaluate access to healthcare, but the term accommodation used by Penchansky & Thomas, (1981) was replaced to adequacy by Obrist, et al., (2007) with the same meaning. The components were used to evaluate access to healthcare and the performance of healthcare system. The main five access components used for evaluating access to primary health care in Dar es Salaam are defined in detail in next section.

2.2.1. Definition of dimensions of access

The complexity of understanding the concept of access to healthcare needs description of each component. Basing on literature, access components are explained as describe below:

Availability; Refers to the relationship of volume of medical personnel and type of existing service (Gulzar, 1999). This component focus on the supply side where different measurement indictors used are capacity of service, number of beds, equipments, waiting time, quality of care and availability of medications (Aday & Andersen, 1974; Guagliardo, 2004; Klemick, et al., 2009; Obrist, et al., 2007; Shrestha, 2010).

Accessibility; Measured based on location of a facility and where the users come from. It is a friction of space with function of time and physical distance. Usually is measured by spatial distance, travel time, cost of travel, waiting time, mode of transport used to reach the facility and road net work are considered to measure accessibility of people. Road network usually used for computing travel time, calculating travel distance and analyse mode of transport used by uses when accessing health facilities. (Ahmed, 2005; Amer, 2007; Handy, 1997; Khan, 1992; Liu, et al., 2009; Luo & Wang, 2003; Perry & Gesler, 2000)

Affordability; This refers to financial component, which look on the price of service and the ability of user to pay (Gulzar, 1999). There might be enough health facilities closer with sufficient medical personnel but not affordable. In such a situation, user might go to other facility than one closer to them, which healthcare service is not expensive. Factors like possession and coverage of health insurance and other subsidies to lower income or disadvantaged groups incorporated on this dimension (Penchansky & Thomas, 1981; Shrestha, 2010).

Accommodation/Adequacy; This based on users perception on the quality of service provided and how they receive medical care from medical personnel. Moreover it looks on behaviour of service providers from the moment user enter the health facility to the actual treatment from doctors or nurses (Obrist, et al., 2007; Penchansky & Thomas, 1981; Shrestha, 2010).

Acceptability; Look on religious or cultural factors of service users. Social characteristics of users like gender, sex, race, education, and language may determine the level of acceptability of health service provided. If users have similar cultural preference or religion with service providers, this can influence

their acceptability on the facility. Belief, expectations and perception's of people are key elements when evaluating this dimension (Obrist, et al., 2007; Penchansky & Thomas, 1981; Shrestha, 2010).

The five components of access related to access attributes especially potential access and realized access. Potential access explaining the characteristics of the population looking on the available resource (like education level, assets, household income and their perceptions towards medical care) and status of health delivery system in terms of (organization, availability of personnel and types of facilities). Realized access described the actual use of health facility and the relative challenges obtained while utilizing the facility like transport cost, medication cost, service quality, waiting time etc.

For this study, the main focus is on evaluating access to primary health care in Dar es Salaam. Furthermore, user socio economic characteristics helped to quantify both actual use of service and actual resources available to ensure access to healthcare. The list of literatures related to access to health care and its dimensions summarized in Appendix 1 together with different methods used.

2.2.2. Primary health care utilization and quality of care

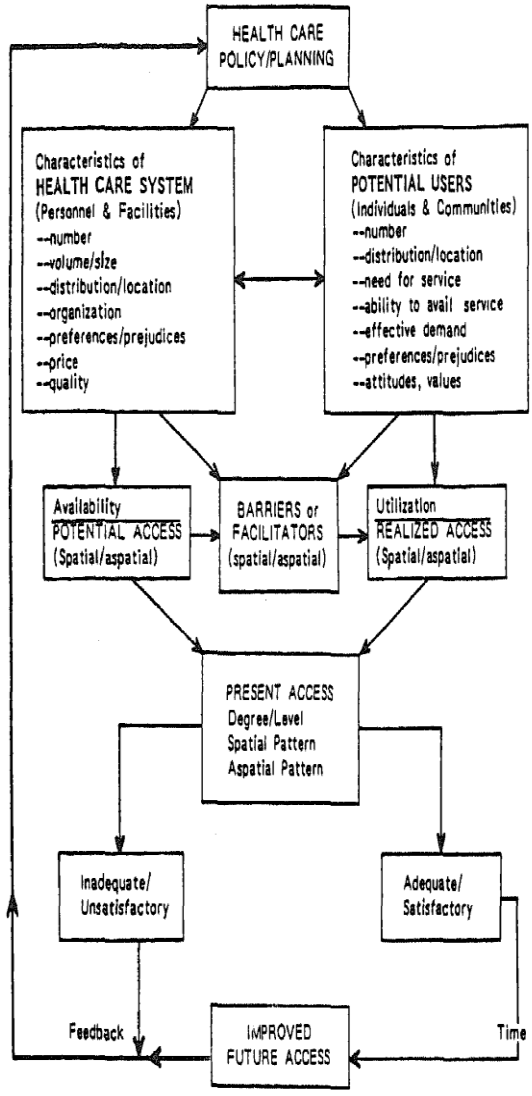
A better understanding of utilization rates of health care used by health planners to improve primary health care delivery. If the need of primary health care realized and access to health care achieved, then the quality of provided observed by evaluating its utilization rate (Gulzar, 1999). Quality of health care measured from the level of satisfaction from potential users of a facility. Understanding health care utilization helps to identify important characteristics related to health system used(Baker & Liu, 2006).
Moreover, quality of health can also be checked using effective access[1] and efficient access[2]. Luck of understanding the previous and current utilization of health care hinder improvement of future primary health care delivery, so realized access is very important for evaluating the level of access to health care.

2.2.3. Conceptual framework for evaluating access to primary healthcare

Access concept framework was firstly developed by Penchansky & Thomas, (1981), the framework combined all barriers affecting access to health care and five components of access were developed including accessibility, availability, acceptability, adequacy and affordability. The framework was later adopted by Obrist, et al., (2007), the concept was used to explain the livelihood assets comprising physical capital (infrastructure, equipment and means of transport), human capita (local knowledge, education and skills), social capital (social networks and affiliations), natural capital (land, water and livestock) and financial capital (cash and credits). In his framework availability of the assets is influenced by uncontrollable factors like "economy, politics or technology, climatic variability or shocks like floods, draught, armed conflict or epidemics" (Obrist, et al., 2007, p. 1586) . All these factors referred as vulnerability context. Vulnerability and livelihood assets determined how users can access healthcare. From access concept, the framework built on supply (health service) and demand (health seeking behaviour) which describes access concept on context of livelihood assets. The relationship between policies, institutions, organizations, procedure, and livelihood assets people can use during vulnerability determines the level of access reached along five dimensions. Moreover, Shrestha, (2010) also adopted the framework and used it to measure variation on access to primary health care across access components.

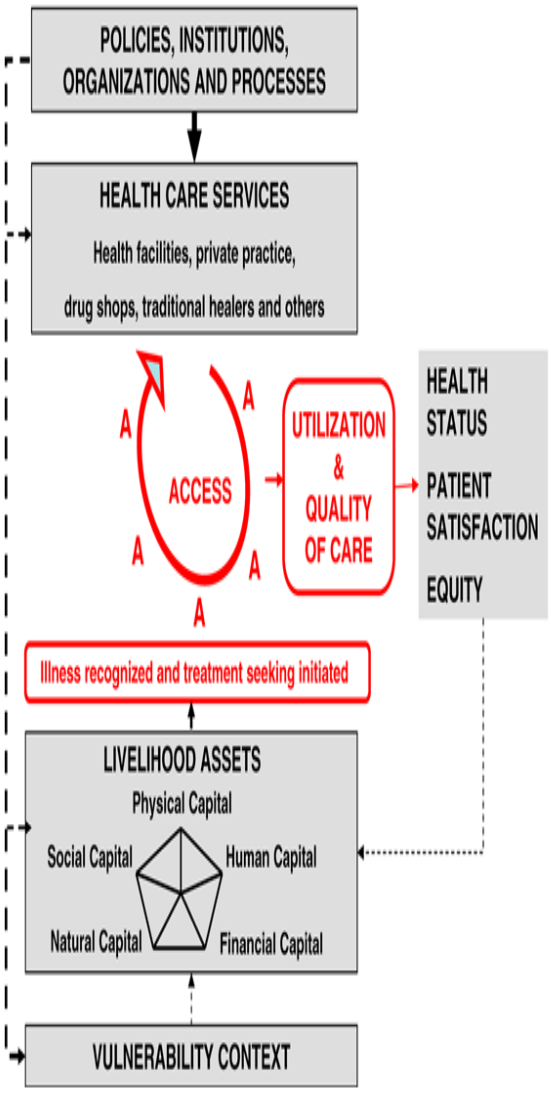
[1]Established when utilization of health services improves health status or consumer satisfaction.
[2]Is accomplished when the level of health status or satisfaction increase relative to the amount of services consumed.

Khan & Bhardwaj, (1994) used a schematic model of access to healthcare, it is conceptualization was based on potential access (availability of health care resources, facilities and personnel) and realized access which related to the actual use of resources to satisfy these needs as described in Figure **2-1** A. Access to health care is highly influenced by the health care system and the characteristics of potential users; these expressed as barriers of facilitators. Access can only be obtained when facilitators overcomes the barriers. Furthermore, access component involves both spatial and non spatial dimensions. Potential (spatial/non spatial) and realized (spatial/non-spatial) access of individual or community measured by degree/level of service attained both spatial and non spatial characteristics used to evaluate the performance of the existing health system.



A

A schematic model of access to healthcare
Source: (Khan & Bhardwaj, 1994)



B

The health access livelihood assets framework
Source: (Obrist, et al., 2007)

Figure 2-1: Access to healthcare framework

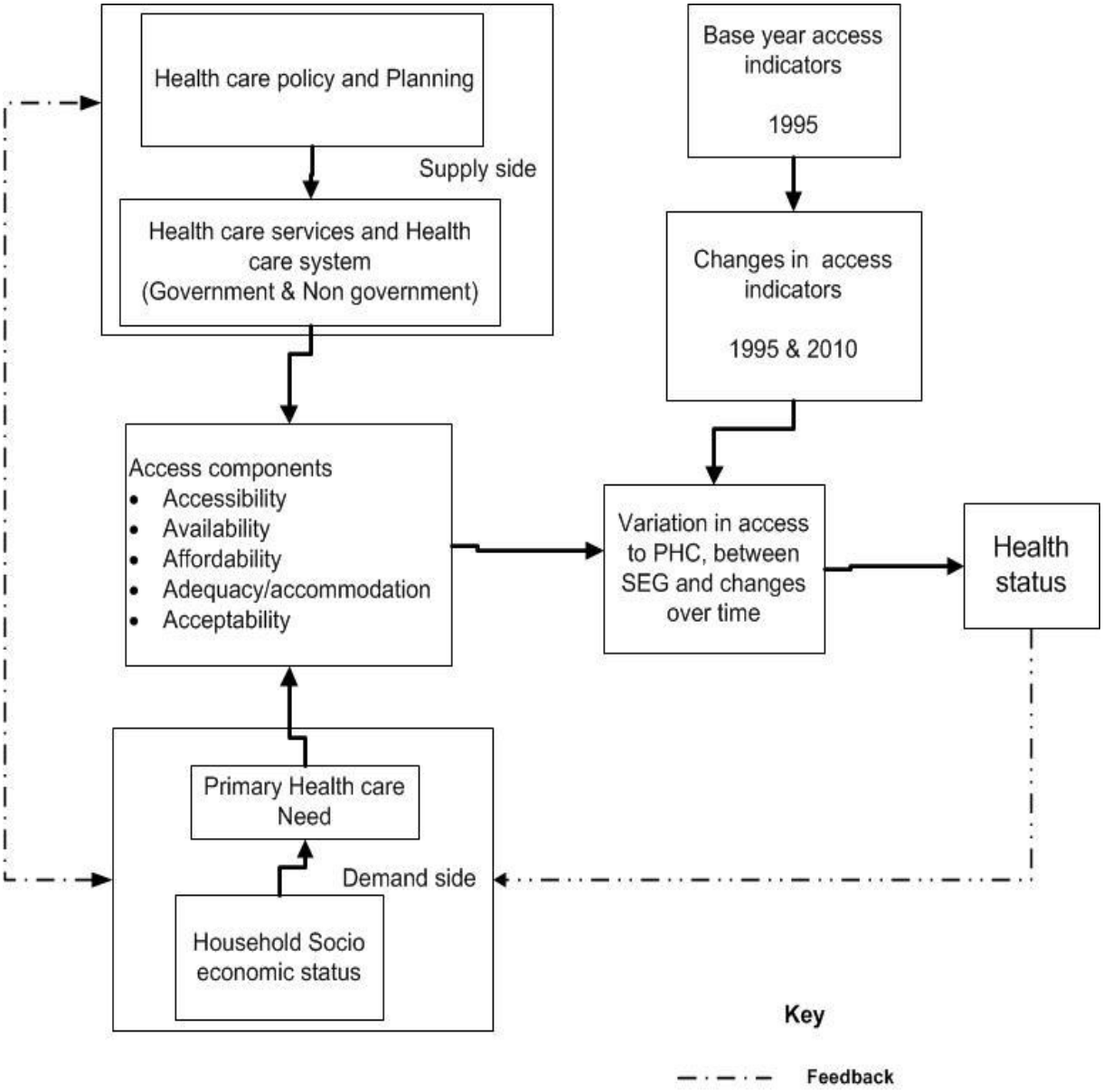


Figure 2-2: A framework for evaluating access to primary health care

With reference of these literatures, the conceptual framework for evaluating access to primary health care was prepared as shown in Figure 2-3. The conceptual framework for the study adopted different elements from two frameworks including macro level as the highest level of health care system as used by Obrist, et al., (2007), Gulzar, (1999) and Shrestha, (2010) .Each factor of dimension of access was measured to evaluate access to primary healthcare. User perceptions on the level of service provided and level of satisfaction used to analyse factors influencing access to primary healthcare. On the other hand, people's perception on both spatial and non-spatial elements of health system was used to evaluate status of access to primary health. The friction of using healthcare providers was evaluated based on user's socio economic status whereby, different socio economic groups were used as influencing factor on accessing healthcare. Variations between socio economic groups was analysed using all five components to examine if different socio economic groups have similar or different access to primary healthcare facilities.

Furthermore, access to healthcare was evaluated with time; this involved the previous data set and the collected data from fieldwork. The comparison over time also highlights the state of access to healthcare facilities and users behaviours changes with time. The combined elements in the framework would determine the health status in the city and compare it with actual implementation of healthcare policy.

2.3. Measure of socio economic status

Socio economic status defined as "access to material, human and social capital represents on the fundamental base of health" (Kagamimori, et al., 2009, p. 2152). Household economic status was measured by income, education level attained in the household and occupation. These indicators were observed to be the main variables used to measure socio economic status of an individual or household. Furthermore, other variables like assets, daily expenditure, housing conditions, household characteristics, and access to infrastructure (water, electricity, sanitation) also used to classify socio economic status (Field, 2000; Veugelers & Yip, 2003; Vyas & Kumaranayake, 2006). In many literature SES has been associated with the level of utilization of health care, however, the observation showed that people who belong to low SES have less access to healthcare and public facilities compared to those belong high SES (Amin, et al., 2010; Lotfi & Koohsari, 2009; Makinen, et al., 2000; Veugelers & Yip, 2003). Nevertheless, measure of SES of household is relatively important for measuring potential health care need and access, especially if it connected with different groups of variables.

2.3.1. Household socio economic status and access to health care

Socio economic differences in the society challenge the motivation of ensuring access to healthcare for all. Different studies show that, a variation on accessing primary healthcare is high between different socio economic groups (Amin, et al., 2010; Makinen, et al., 2000; Wagstaff, 2002; Zhao, 2006). From mentioned literature, poor or disadvantaged groups are faced with more challenges on healthcare utilization than the better off; this creates a wide range of socio economic inequalities in health status. Moreover, access to health services and utilization is low to poor women and children. Also, Makinen, et al., (2000) shows that existing pattern on health seeking among income quintiles indicates, the wealthier population groups have high probability of getting health care when they want than the poor.

Socio economic characteristics are important elements to consider when evaluating access to primary healthcare. Understanding how people overcome different obstacles when seeking healthcare is of high importance for future improvement on access to healthcare.

2.4. Measuring Dimensions of Access to Primary Healthcare

Access concept observed in many literatures as complex element to define and measure. Due to its complexity, the need of developing different measurement indicators to evaluate status of access to primary health care developed (Gulzar, 1999; Khan & Bhardwaj, 1994; Obrist, et al., 2007; Penchansky & Thomas, 1981; Shrestha, 2010). The main objective of the study is to evaluate access to primary health care adopting a conceptual framework developed by mentioned researchers. Applications of different appropriate methods to measure five dimensions of access concept become a focus of this study. Unlike previous researchers, both spatial analysis methods and different statistical methods employed for evaluating spatial and non-spatial components of access concept in Dar es Salaam. Each access component reduced to manageable and quantifiable indicators, which used to evaluate access to primary health care. Indicators clarification and measurements discussed on the next paragraph.

2.4.1. Developing indicators to quantify and measure dimensions of access

Developing indicators for healthcare helps to understand better an existing health care system and provides better basis for generating theories on why differences on access to primary health care exists among the population (Millman, 1993). Furthermore, developed indicators helped to measure and evaluate variations on different components of access framework. The main function of indicators is to simplify the complicated phenomena to a manageable one. Over time indicators provides important information about the direction and changes over time, also can explain a relative status of individual, group of people or system (Millman, 1993).

This study is focused on developing both spatial and descriptive indicators for evaluating access level to primary health care across different socio economic groups, considering all five components of access framework as pioneered by (Penchansky & Thomas, 1981). Potential user characteristics, needs and their perceptions on the health care system are bases of indicator development. In order to evaluate level off access depending on socio economic differences, different indicators like education level, income, household assets, housing condition, and occupation of household head developed (Kagamimori, et al., 2009; Sarpong, et al., 2010; Veugelers & Yip, 2003; Vyas & Kumaranayake, 2006). Travel time, distance travel to health care, cost of transport, mode of transport used, availability of health facilities and personnel are few spatial indicators used for evaluating access to primary health care (Amer, 2007; Guagliardo, 2004; Khan, 1992; Liu, et al., 2009; Lotfi & Koohsari, 2009; McGrail & Humphreys, 2009; Shrestha, 2010).

2.4.2. Analysing and measuring indicators

Analysing and measuring different indicators of access to health care has been a major concern in many scientific literatures on health care (Amer, 2007; Guagliardo, 2004; Khan, 1992; Liu, et al., 2009; Lotfi & Koohsari, 2009; McGrail & Humphreys, 2009; Shrestha, 2010). The advancement of technology and changes on healthcare system challenges researchers, health planners, and policy makers to ensure the slogan of access to all is achieved. Different indicators both objective and subjective were developed to measure levels of access to primary health care. Availability was measured by proportional of facility to population, health personnel to population ratio, distance to closest facility, number of beds/1000 people. Accessibility to health care also was measured using different methods like Logistic regression model, , and travelled time from origin (user) to destination (provider), distance travelled and transport cost used to measure (Guagliardo, 2004; Khan, 1992; Liu, et al., 2009; Owen, et al., 2010; Penchansky & Thomas, 1981; Schuurman, et al., 2010; Wanasinghe, 1995). Realized access indicators used to measure the level of utilization and satisfaction on access to health care. Many researchers have used statistical analysis like cross sectional analysis, correlation matrix, bivariate analysis, and principal component analysis (PCA) for measuring inequalities on utilization of health care among socio economic groups (Amin, et al., 2010; Sarpong, et al., 2010; Veugelers & Yip, 2003). Amer, (2007) and Shrestha, (2010) used two step cluster analysis for categorizing different clusters of socio economic status using both continuous and categorical variables. Different methods have been used to measure and quantify access indicators, based on this research network analysis, service area analysis, descriptive statistics and two step cluster analysis can be used to analyse different indicators.

2.4.3. Application of GIS on measuring access to health care

Advancement of technology, which leads to the use of GIS, has proved to be effective in health planning and measure of access to healthcare. Higgs, (2005, p. 119) acknowledged that "GIS enable researches to input, store, manipulate, analyse and visualize spatial information. Integration of geographic data referenced data from a variety of agencies concerned with health issues is enabling researchers to visualize trends and relationships over space in order to monitor the influence of government policies such as those

aimed at reducing health inequalities". Many literatures explained the use of GIS on measuring spatial components of access framework: accessibility and availability (Amer, 2007; Guagliardo, 2004; Lau & Chiu, 2003; Liu, et al., 2009; Lotfi & Koohsari, 2009; Luo & Qi, 2009; Omer, 2006; Perry & Gesler, 2000).The use of OD matrix, Euclidean distance, network analysis, gravity model and E2SFCA measures are some of few methods used to estimate travel time and providers availability for healthcare provision.

Measures of accessibility

There is a very wide dispersion of facilities (supply) and inhabitants (demand). Due to this mismatch, spatial accessibility becomes a very important aspect when evaluating access to primary healthcare. Generally, accessibility comprises of distance travel time, travel cost and travel distance from origin to destination. Mentioned indicators can be measured using Euclidean distance and network analysis.
Travel impendence

$$Ai = \frac{\text{length(m)} * 60}{1000 * \text{Speed}}$$

Ai = Travel impendence
Length= Road segment (m)
Speed = road speed or walking speed or vehicle speed

Availability measure

Potential access to primary health care was measured in two ways: regional availability and regional accessibility approach. The separation of the two approaches is useful in urban context, where multiple service locations are common; two dimensions considered simultaneously (Khan, 1992; Luo, 2004)

Regional availability

This is concerned with population to practitioner ratio, work force ratio or simply supplies ratios, and costly computed with boarded areas. Census tracts, regions, metropolitan statistical areas, they are using geographical unit of analysis, this expressed as a ratio between number and size of health care manpower or facilities to the potential user population in the defined area (Khan, 1992).

$$LQi = \frac{GPi/Pi}{\sum GPi / \sum Pi}$$

Where: LQi = Location quotient for region i
GPi = Health service in kind of number of physicians, clinics and hospital beds
Pi =The population of region

If the location quotient value is greater than 1 then the region has more than its share of health service capacity compared to its respective share of population. Provider population ratios are simple and easy to implement. Data requirements are minimal and its computations are not cumbersome. This method used to indicate areas with sufficient and insufficient access to health care, distribution of services and labour shortage. The availability of provider to population ratio measured at aggregate level is good for policy analyst as it help on making decision for work force allocation and other resources. In addition, it helps to identify underserved areas by comparing supply between different geographical units of analysis (Ahmed,

2005). Correcting the disadvantage of this method, Luo, (2004) and Luo & Qi, (2009) came up with a new method of demand and supply called floating catchment area (FCA) and Enhanced two step floating area (E2SFCA) respectively. This method improves the internal spatial distribution by applying weights to differentiate travel zone. In order to differentiate accessibility within catchment, multiple travel time zones within each catchment are obtained using the ArcGiS network analyst (Luo & Qi, 2009).

Therefore, this study is focused on application of spatial analysis tools and statistical analysis on evaluating access to primary health care, network analysis, catchment analysis and regional availability methods can be applied to observe if the perceived distance and availability of facilities corresponding with some spatial justifications. Besides, descriptive statistics and comparison analysis performed to evaluate user's socio economic groups and their perceptions on access to primary health care in the City.

2.5. Conclusion

This chapter focused on reviewing different scientific documents by various authors on access to primary health care. Definitions and concepts on access observed to be difficulty, no clear method for measuring access to primary health care. The conceptual frameworks on access components explained by Penchansky & Thomas, (1981), Gulzar, (1999), Obrist, et al., (2007) and Shrestha, (2010) helped to explore more on the model in measuring and evaluate access to health care. The literature contributed to a development of a conceptual framework for this study. Moreover, a study was focused on evaluating access to primary health care using access concept as a central part of a study. On developing a framework of this study, vulnerability context , utilization and Quality of care and livelihood asset on Obrist, et al.,(2007) and Shrestha,(2010) is excluded and household socio economic characteristics become an input factor to five A's and variations on access among different socio economic groups become the product of the framework while the observed health status between SEG become the expected output of the framework. Moreover, at macro level, elements used to define a healthcare system from Khan & Bhardwaj,(1994) was adopted and in cooperated on the conceptual framework.

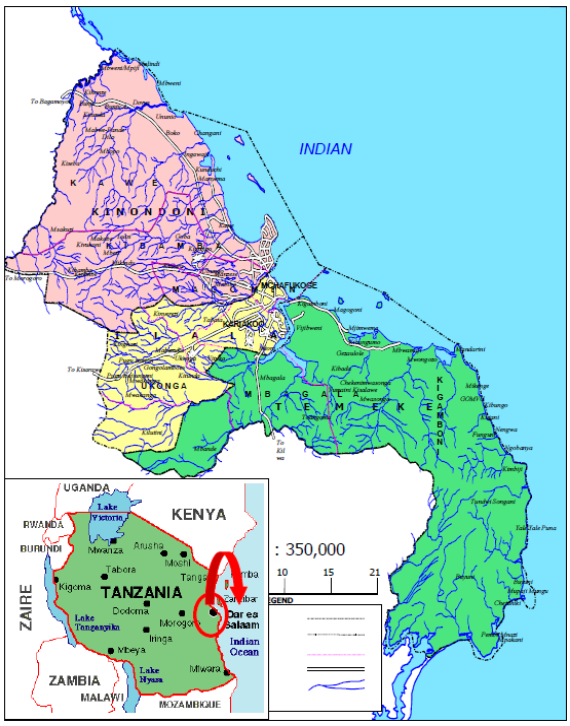
Unlike other researchers used access concept, This study consider both statistical analysis based on perceptions of people and objective indicators measured spatially to justify the perceived distance, travel time, and if the general accessibility or availability perceived conform with actual measurements using spatial analysis tools. Moreover, a study makes a comparison on access changes with time from 1995, 2000 and 2010 .This determined which component of access is more important and dominant among users when seeking for health care.

3. URBAN DEVELOPMENT IN DAR ES SALAAM

This chapter provides a description of case study on demographic characteristics, socio economic development, physical development, and existing health status in the City. The impact of urbanization on health care provision and access to public and private facilities discussed. Healthcare planning system, different approaches in developing healthcare and national policy objectives and standards for access to health care in Dar es Salaam, Tanzania are explained.

3.1. General description and Socio economic development

Dar es Salaam is historically known as a peaceful harbour, the name was originated from Arabic word 'Bandar-ul-Salaam' in (Swahili means Bandariyasalama). The City is located between latitudes 6.36 degrees and 7.0 degrees to the south of Equator and longitudes 39.0 and 33.33 to the east of Greenwich, bounded by the Indian Ocean on the east and by the Coast Region on the other sides. Administratively is composed of three Municipalities, Ilala, Temeke, and Kinondoni. The city made up with 73 administrative boundaries called wards. The total area of Dar es Salaam is 1800 km², 1393 km² island and 407km² covered by water. Temeke Municipality occupies the largest part of available land followed by Kinondoni (Dar es Salaam City Council, 2004).



Source: Dar es Salaam city profile, 2004

Figure 3-1: Location Map of Dar es Salaam

Demographic condition

Dar es Salaam is among the fastest urbanized cities on sub Saharan Africa, it urbanized at 4.3 % but the migration rate is assumed to be 10% (Dar es Salaam City Council, 2004). Based on the 2002 Population and Housing Census, Dar es Salaam had 2,487,288 inhabitants, of whom 1,254,853 were males and the rest females. Kinondoni had the highest population among the three Municipalities in the City, with 1,083,913 inhabitants, followed by Temeke with 768,451 and Ilala with 634,924 inhabitants (United Republic of Tanzania, 2002). Dependency ratio in the city is high as majority of people are within an age of 0 and 29. Moreover, the declines of infants from 0 to 10 years highlight the problem of infant mortality in the city. Due to this more sampled residential areas where from Kinondoni Municipality than other two.

Population density in the City differs from one geographical location to another, but on average population density estimated to be 1793 inhabitants per square kilometer. Informal settlements have higher density than planned residential areas. Density in informal areas is more than 10 times an average population density described in census report 2002 (Dar es Salaam City Council, 2004).

Table 3-1: Distribution of population, population density and area covered per Municipality

	Population	Area (km sq)	Population Density
Temeke	634924	210	3023.4
Ilala	768451	652	1178.6
Kinondoni	1083913	531	2041.3

Source: Dar es Salaam City Profile, 2004

Land use and socio economic activities

Dar es Salaam is divided into three ecological zones namely, upland on western and northern part of the city, middle plateau and low lands (Msimbazi valley, Jangwani, Mtoni, Africana and Ununio). The three ecological zones dominated with informal settlement development that occupies more than 70% of all inhabitants in the City. The major land uses in the city are commercial zone, residential zones, institutions, recreational areas (hotels and open spaces) and industrial zones. Socio economic activities in the city include internal trade, fishing, education institutions, industries, urban agriculture, Tourism and hotel development and informal sector development. All these aimed at attaining the mission of having a community with sustainable socio economic development through proper resource mobilization and utilization. Internal trade, industrial sector, and fishing are the leading sectors in the city; fishing contributes 29% of GDP in the city while internal trade contributes 16%. However, informal sector employed 95% of Dar es Salaam residents (Dar es Salaam City Council, 2004). Since majority of residents are involved in informal activities, access to healthcare between a large groups of population might be affected.

Administrative structure

Administratively, Dar es Salaam city is composed of City Council and three Municipalities of Ilala, Temeke and Kinondoni. All of these units have a Mayor is the head of City and Municipalities and elected by full council which includes all councilors of respective jurisdiction as described in Local government Act 8, 1982. Each Municipality divided into five administrative units including Division, wards, Street, Village and Hamlets. Hamlet is the smallest administrative unit in City and Municipal structure. Municipal councils are responsible authorities for provision of infrastructure development and social services like education, water, sanitation and healthcare services within their area of jurisdiction.

3.2. Existing health situation

Health status in Tanzania is still inadequate despite the remarkable improvement over the years. The performance of healthcare is influenced negatively by shortage of resources that resulted to poor provision of healthcare (United Republic of Tanzania, 2007b). Therefore, Dar es Salaam also experiences poor health status like majority of urban and rural areas in Tanzania. Shortage of qualified health personnel challenges the capacity of healthcare facilities in providing adequate and quality healthcare in the City. Physician or doctor population ratio is 1:18637 (18637 people attended by one physician or doctor)(Dar es Salaam City Council, 2004).This situation highlights the critical state of human resources in healthcare facilities. Furthermore, poor quality of service observed on long queues, congestions in wards, and unavailability of medication describes the level of performance of health system (Dar es Salaam City Council, 2004; United Republic of Tanzania 2010; United Republic of Tanzania, 2007b). Despite of that, more challenges are facing a healthcare system as described by socio economic health indicators in Table 3-2. Irregular availability of drugs and distance to health care is among other factors influence access to health care in the city, especially for people living on sub urban areas. On the other hands, some health facilities serve more people than others which show uneven distribution of health facilities in the City. This case is mostly evidenced in government healthcare facilities than non government facilities.

Table 3-2: Socio economic health indicators

S/N0	Type of Indicator	Ilala	Kinondoni	Temeke
1	Infant mortality (IMR)	100/1,000	115/1,000	115/1,000
2	Under five mortality rate (U5MR)	191/1,000	191/1,000	181/1,000
3	Life expectancy (yrs)	M: 47 /F: 45	M: 49 /F: 51	M: 49 /F: 51
4	Maternal Mortality rate (MMR)	148/100,000	572/100,000	572/100,000
5	Population % access to clean water	48%	48%	50%
6	Population % access to health facility within a radius of 5km	72%	72%	90%
7	Population having acceptable latrine	64%	96%	41%
8	Per capital income	US$ 488	US$ 488	US$ 220
9	Population literacy rate	84.3%	-	82.9%
10	Population per physician	1/18637	1/13055	1/18637
11	Population per health facility	1/5333	1/5397	1/5397
12	Population per nursing staff	1/4000	1/4000	1/4000
13	Total fertility rate	6.50%	6.50%	6.00%
14	Population growth rate	8%	4.8%	4.8%
15	Crude birth rate	25/1,000	30.5/1,000	40/1,000
16	Population per bed	1/2836	1/2000	1/2836
17	Bed occupancy rate	70%	70%	100%

Source: (Dar es Salaam City Council, 2002)

3.3. Health care planning

Understanding the general over view of health planning system and policy objectives on provision of primary healthcare in Dar es Salaam is useful for this study. In this section discussion is on health planning systems used in Tanzania and how the government implement different programmes on enhancing adequate provision of primary healthcare to service users are discussed. Moreover, challenges on carrying out different policy objectives would be discussed.

3.3.1. Health sector reform, health policies and strategies

Tanzania started a health sector reform in 1994 and aims at improving access, quality and efficiency health service delivery. The primary healthcare was adapted as the most cost effective tactics to improve health of the people. The main focus of the reform was strengthening all district health services as well as strengthening and reorientation of secondary and tertiary service delivery in hospitals in support of primary healthcare(United Republic of Tanzania, 2009a; United Republic of Tanzania, 2007b). The health sector reform aimed at strengthening different aspects as mentioned below;
“

- Decentralisation of health services
- Financial reform such as enhancement of user charges in the government hospitals
- Introduction of health insurance and community health funds and
- Public and private partnership reform which encourages private sector to complement public health services ” (United Republic of Tanzania, 2009a, p. 16).

The actual implementation of the health sector reform was effective after local government and public service reform programme started and devolution of power emphasised to be on local authorities in 2001. The devolution of power to local governments aimed at establishing a holistic local government system to achieve a democratic and autonomous institution. All primary healthcare provision and management is managed at local government. The primary healthcare service development programme which aimed at strengthening primary healthcare will be carried out within the local government reform (United Republic of Tanzania, 2009a; United Republic of Tanzania, 2007b). Although the decentralization is formally introduced, local authorities are still not carrying out their responsibilities based on their new authority accrued, the dilemma exist on the roles, functions, and mandates among authorities and responsibility of the nation(Dar es Salaam City Council, 2002).Due to this implementation of different health programmes at lower level might be influenced from the higher level and affect the achievement of provision of quality healthcare to the community.

On the other hand, the financial reform introduced new charges to all public health facilities. This was initiated to the fact that operation cost for public service provision was very high. The cost sharing mechanism was adapted to all public facilities as cost recovery mechanisms to complement the government budget on providing healthcare. All of these were introduced to reduce the operation cost. Therefore, introduction of medication costs and registration cost on public health facilities were the results of the financial reform imposed during health sector reform. Despite of introduction of user charges, the vulnerable groups and the poor where exempted from paying user charges. (United Republic of Tanzania, 2009a; United Republic of Tanzania, 2007b). The vulnerable group includes the elders, pregnant women and children less than 5 years. But, the health policy does not explain how the poor can be identified by providers. Due to that, cost exemption has been in policy documents but no efforts has been made to ensure it is full implementation on both facility types (Mubyazi, 2004).

Furthermore, through health reform private public partnership was introduced following the growing demand for healthcare services. The rapid growth of population and emergence of diseases put pressure on the healthcare delivery system, which needs extra resources and expertise. Shortage of both financial

and human resources to provide service according to the population needs necessitated the government to introduce private health practise for profit(United Republic of Tanzania, 2009a). The introduction of private sector aimed to reduce the burden of delivering healthcare service but the profit element introduced on the provision of that service excludes majority of people who cannot afford the cost of service provided by the private sector and hence the aim of complementing the health service provided by public sector would not be attained as intended.

Additionally, the Ministry of health and Social Welfare (MoHSW) has been reviewing policies and different strategic documents to accommodate the rapid changes on healthcare provision. In 2007 the new health policy was launched after revising the previous national health policy of 1990. The revision of the policy was initiated with ongoing socio economic changes, new government directives, emerging and re-emerging diseases and changes in technology (United Republic of Tanzania, 2007a). The policy outlined various achievements and challenges which faced the health sector. The shortage of human resource was observed to be a major problem which the policy failed to cope adequately with it. But, the policy vision is to have a health society, improved social wellbeing and aimed at facilitating the provision of equitable, quality and affordable basic health services, which are gender sensitive and sustainable(United Republic of Tanzania, 2007a). In order to achieve the mentioned targets the national health policy of 2007 aimed to achieve the following objectives;

“

1. Reduce the burden of disease, maternal and infant mortality and increase life expectancy through the provision of adequate and equitable maternal and child health services facilitate the promotion of environmental health and sanitation, promotion of adequate nutrition, control of communicable diseases and treatment of common conditions.

2. Ensure the availability of drugs, reagents and medical supplies and infrastructures.

3. Ensure that the health services are available and accessible to all the people in the country (urban and rural areas).

4. Train and make available competent and adequate number of health staff to manage health services with gender perspective at all levels. Capacity building of human resource at all levels in management and health services provision will be addressed.

5. Sensitize the community on common preventable health problems, and improve the capabilities at all levels of society to assess and analyse problems and design appropriate action through genuine community involvement.

6. Promote awareness among Government employees and the community at large that, health problems can only be adequately solved through multispectral cooperation involving such sectors as Education, Agriculture, Water, Private Sector including Non Governmental Organization, Civil Society and Central Ministries, as Regional Administration and Local Government, and Community Development, Gender and Children.

7. Create awareness through family health promotion that the responsibility for one’s health rests in the individuals as an integral part of the family, community and nation.

8. Promote and sustain public-private partnership in the delivery of health services.

9. Promote traditional medicine and alternative healing system and regulate the practice" (United Republic of Tanzania, 2007a, p. 8)

This research is related more with objective 2, 3, 4 and 8.In order to implement the policy objectives, the primary health service development programme was developed. The main specific objectives to be addressed by the programme were to rehabilitate, upgrade and establish facilities at PHC level and ensure equity and access of quality healthcare, ensure quality and adequate availability of health human resources, to provide standardized medical equipments, instruments, pharmaceuticals and sundries to all PHC to ensure performance(United Republic of Tanzania, 2007b). However, many different challenges were experienced during the implementation of PHSDP. The experienced challenges are;

- Access to health services

Cost sharing exercise introduced in health service provision has influenced the disadvantaged groups on gaining access to healthcare facilities. Despite of the fact that, the policy recognised the exemption of costs to the poor and vulnerable groups but the effectiveness of the policy to the poor has not shown any positive influence. This has contributed to inequalities on access to healthcare facilities between different socio economic groups.

- Irregular availability of drugs and equipment shortage

The shortage or unavailability of drugs and supplies were observed to be the main factors discouraging access of services at health facilities. On the other hand, medical supplies and equipments were also observed to be critical issues in provision of health service. Due to that, the provision of health service faced different challenges of equity in access to medical supplies and equipments. Also, luck of these facilities reduces the quality of service provided and discourages users to visit the health facility.

- Distance to health facility and long queues

Distance to primary health care is the challenge of accessibility of health facilities in many locations. Generally, about 90 percent of people in Tanzania have access to primary healthcare within 5km.Rural areas are experiencing long distances than urban areas. The household budget survey 2007 revealed that about 75 percent of residents in Dar es Salaam have access to healthcare on less than 2km while in rural areas is less than 6km (United Republic of Tanzania, 2009). Furthermore, long waiting time was also observed as a great challenge to public facilities, this is associated with shortage of health personnel in public sector. Moreover, accessibility and long waiting time are serious issues when seeking healthcare.

3.3.2. Health organization system

Health organization system in Tanzania starts with the Ministry of Health and Social Welfare. The ministry is the overall in charge of healthcare provision in the country. The central role of the ministry is to prepare different policy documents and strategies for implementation from national to district level. Moreover, supervision of all service providers within the country both public and private to ensure they provide services as required. The implementation of health policy and other strategies on improving health condition of users is implemented on different level as described in Figure 3-2. Community health service is the lower level of service provision. At this level every individual has the responsibility of taking care of his/her own health and obliged to participate in addressing and solving health problems using the available resources. Furthermore, it works as a bridge to the closest health facility. Dispensary is the first formal level of healthcare provision in the country. The facility offers outpatient services including reproductive and child health services and diagnostic services. The facility is entitled to serve 6000 to

10,000 people. The higher level is health centre which is the second formal health unit which can serve about 50,000 people and supervise all dispensaries within its catchments area (Division). At district level a district hospital is the highest level and it is the third level on the national hierarchy. All health centres considered it as the referral hospital within their catchments area. Regional hospital is the second level of higher level of health facilities which referred as referral point from district hospitals. The highest service provision level in the country is referral, national or specialized hospitals(United Republic of Tanzania, 2007a). These facilities must have high specialists on different health problems and must have adequate/reliable communication and transport which will enable specialist to perform their duties better.

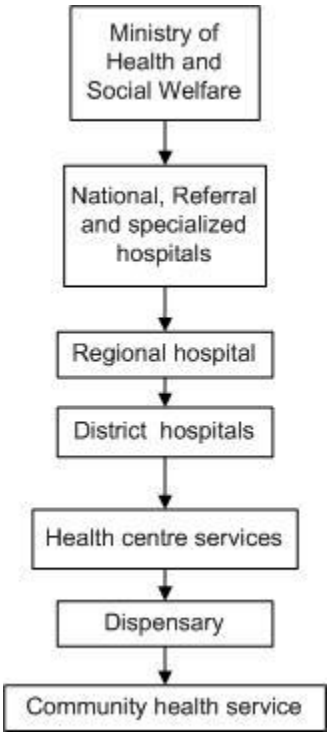


Figure 3-2: Organization structure of health system

Conclusion

The provision of adequate and sustainable healthcare for users is the main focus of the MoHSW and all Municipalities. But, rapid population growth and higher urbanization rates affected the achievement of mentioned objectives. On the other hand, shortage of human resources, economic difficulties, drug shortage and luck of adequate equipments in healthcare facilities observed to be striking challenges. Additionally, implementation of policy objectives as mentioned in the policy has been facing more challenges, but more challenges are faced by disadvantaged groups and the poor than the better off group.

4. RESEARCH METHODOLOGY

This chapter explains different methodology used on answering different research objectives through research questions developed. On the research design, detail information on data required, sources of data, methods/techniques for answering research questions discussed. Mainly, the chapter have three parts Pre fieldwork, fieldwork and post fieldwork.

4.1. Research design

A research design is " the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure" (Kothari, 2004, p. 31). A design provided a conceptual structure in which a research was carried out; it included data collection, measurements, and analysis of collected data. This research considered both qualitative and quantitative information. Dar es Salaam used as a case study area for evaluating access to primary health care. Execution of the study involved both primary and secondary data. Figure 4-1describes the operational plan for carrying out the study and Table 4-1describes required data, sources of data, methods, and what kind of analysis used to answer each research question. The flow diagram included main five sections include literature review (includes understanding concepts of access to primary health care, variations exists, variables for evaluating household socioeconomic status and policy issues on health in Tanzania). Problem analysis includes (defining a problem, objectives and research questions), data capture includes (defining required data and data collection), data analysis and key findings and conclusion and recommendation.

4.2. Fieldwork preparation

Before fieldwork, a base map including all the selected study areas was prepared. The map made from an existing spatial data set on administrative boundaries and ortho photo images of 2002. Ortho photo images was compressed from TIFF format to MrSID so as they can be used in a PDA. Through literature review different indicators for measuring and quantifying both access to primary health care and socio economic status of household were developed. Developed indicators for quantifying and measuring each component of access framework from literatures mentioned in Appendix 4. All relevant equipments for data collection (GPS, Personal digital assistant (PDA), and voice recorder) were prepared on line with questionnaire preparation. The questionnaire consisted of three parts: first part was general information of a household and their socio economic characteristics, second part was on housing condition and access to public facilities (water, sanitation, electricity), and the last part was on household perceptions on primary health care in the city on different components of access framework. The checklist for obtaining health providers opinions on different components of access prepared respectively.

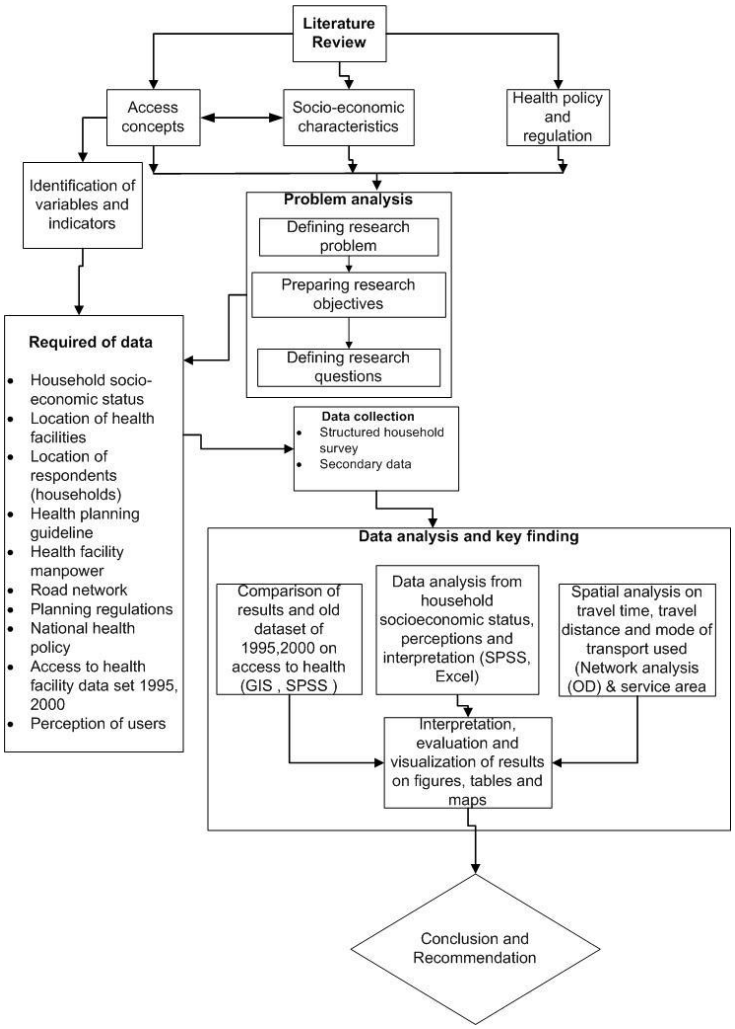
Table 4-1: A research design

Sub Objective	Research question	Required Data	Data source	Method(s)	Analysis
1	How can access be conceptualized?	Literature Empirical studies	-Literature -Empirical studies - Internet	Developing indicators for socio economic characteristics -Developing indicators for each dimension of access	Developing indicators for measuring access
	What are appropriate methods to quantify and measure different dimension of access?	Literature Empirical studies Census data Socio economic data	-Literature -Empirical studies - Internet	-Developing indicators for each dimension of access	Descriptive statistics -Two step cluster analysis -GIS, Network analysis -Correlation coefficient Coefficient matrix
2	Which variables used to measure socio economic development?	-Household socioeconomic data -Census data -Variables for evaluating HSES	**-**Literature -Household -National bureau of statistics - Internet	-Structured household survey	-Descriptive statistics -Correlation coefficient -Coefficient matrix -Two step cluster analysis -Factor analysis
	How socio economic differences can be identified?	Socioeconomic data -Census data -Variables for evaluating HSES	-Literature	Evaluating spatial variation on accessibility	Literature Review
3	Which variables used to measure	Literature	Literature	Analysing which	Literature Review

	access to primary health care across socio economic groups?			component of access is more important on evaluating access to primary health care	
	How can access to primary health care be measured?	Literature Empirical studies Census data Socio economic data	-Literature -Empirical studies - Internet -Structured household survey	Developing indicators for socio economic characteristics -Developing indicators for each dimension of access	Descriptive statistics -Two step cluster analysis -GIS, Network analysis -Correlation coefficient Coefficient matrix
4	Does access to care changes over time?	Analysis of results on perception of access to primary health care	Structured household survey -Secondary data	-Comparison of indicators over time	-Descriptive statistics - ANOVA
	Which indicators have shown major changes?	Analysis of results on access to PHC	Structured household survey -Secondary data	Analysing differences between variables	-Descriptive statistics - ANOVA
5	How does current health care policy implemented?	-Health policy and standards - Planning guide lines	Ministry of health Internet	**-**Studying planning process for PHC in Dar es Salaam	**-**Facility population ratio -Doctor patient ratio -Nurses patient ratio -Medications -Minimum distance/ time

	Do health policy objectives correspond with identified variations across socio economic strata?	-Policy documents and standards - access results across socio economic strata	- Ministry of Health -Household survey	Comparison of policy standards and existing situation	Evaluating policy measure and it is implementation

Figure 4-1: Operational plan



4.2.1. Study areas selection

Study areas were selected based on the previous study by Amer, (2007). Dar es Salaam is comprised of three Municipalities, Ilala, Kinondoni, and Temeke, all in total make 73 administrative boundaries called wards. The unit of observation and primary data collection was a household. Amer, (2007) sampled thirty first residential hexagon in 22 administrative boundaries out of 73. But, due to limited time for fieldwork and financial resources only 15 residential hexagons were selected for this study. The residential hexagons were used as study areas for primary data collection in the City. Sampled residential areas were selected using different criteria like non-existence of primary health care within a study area, location of study area, population, socioeconomic heterogeneity, and existing land use. The existing data set and Google earth images were used to determine the physical accessibility of sampled residential areas, land use, and socioeconomic heterogeneity. Furthermore, residential areas located far from each other and in sub-urban areas were excluded due to financial constraints to minimize transport costs and travel time. Moreover, physical accessibilities of sampled areas through public transport and any other means of transport were prioritised. Inclusion of different socio economic characteristics was the main aspect of selection of sample areas as the study intended to evaluate user perceptions on primary health care between different socioeconomic groups.

Selection of sampled residential areas was considered areas with high population, unplanned settlements, and planned settlements. Most of sampled areas were informal settlements because 70 percent of inhabitants in Dar es Salaam are living in unplanned settlements. About 18 percent of selected areas are from planned settlement and 82 percent from informal settlements. The 15 study areas were select from thirteen wards out of twenty-two wards used by Amer, (2007). But with limited time and financial resources only 11 residential areas were visited. Figure 4-3 shows the selected residential hexagons for household survey.

4.2.2. Sampling strategy

Depending on limited resources for fieldwork, both time and financial, purposive sampling method used to select residential hexagons used as study areas. Eleven residential hexagons out of 31 were selected based on the criteria described on case study selection. Moreover, a sample size of 60 households was selected randomly from each sampled residential area for primary data collection. The random sampling provides equal chance to every member to be selected in the study area; this simplified inference of obtained results to the large population. Within 11 case study areas, 600 households were surveyed. The collected sample represents 2.5 percent of all households living on selected areas. In addition, all surveyed households were geo coded using hand GPS and was later used to estimate travel time to healthcare facilities visited.

4.3. Fieldwork

4.3.1. Primary data collection

Household survey was used to collect both household socio economic characteristics and their perception on access to primary health care in the city looking on different dimensions of access to primary health care. About 15 hexagons were selected for data collection, but only 11 different sampled areas were visited for primary data collection using structured household questionnaire. The actual data collection was stated on 24th September to 6th October 2010. Before the actual household survey, training for enumerators was conducted as shown in Figure 4-2 and the questionnaires were discussed in detail with fieldwork enumerators to have a common understanding of the questions and expected answers from each question. But, due to limited time, the pilot survey executed on the first day at Sinza E Street to check the understanding of the questionnaire by the enumerators, familiarize the team with questions, and observe reactions from respondents and estimating time spent on interviewing one respondent. Furthermore, a pilot survey helped to understand the gaps within the questionnaire and make necessary changes on the questionnaire before massive data collection. The criteria for a respondent was set to be head of household, wife or husband or any adult person within the household who knows family issues including family daily expenditure. On average, the time spent for interviewing one respondent was ranging from 18 to 30 minutes depending with respondent ability to understand and answer different questions asked. Appendix 4 show visited case study areas. To ensure credibility and accuracy questionnaire were check in the field after data collection as shown in Figure 4-5. Moreover, before visiting any site, Mtaa leaders were consulted for authorisation before the actual data collection as shown in Figure 4-4. The list of sampled areas is shown in Appendix 2.

Figure 4-2: Training enumerators left and looking for a study area in Msasani on right

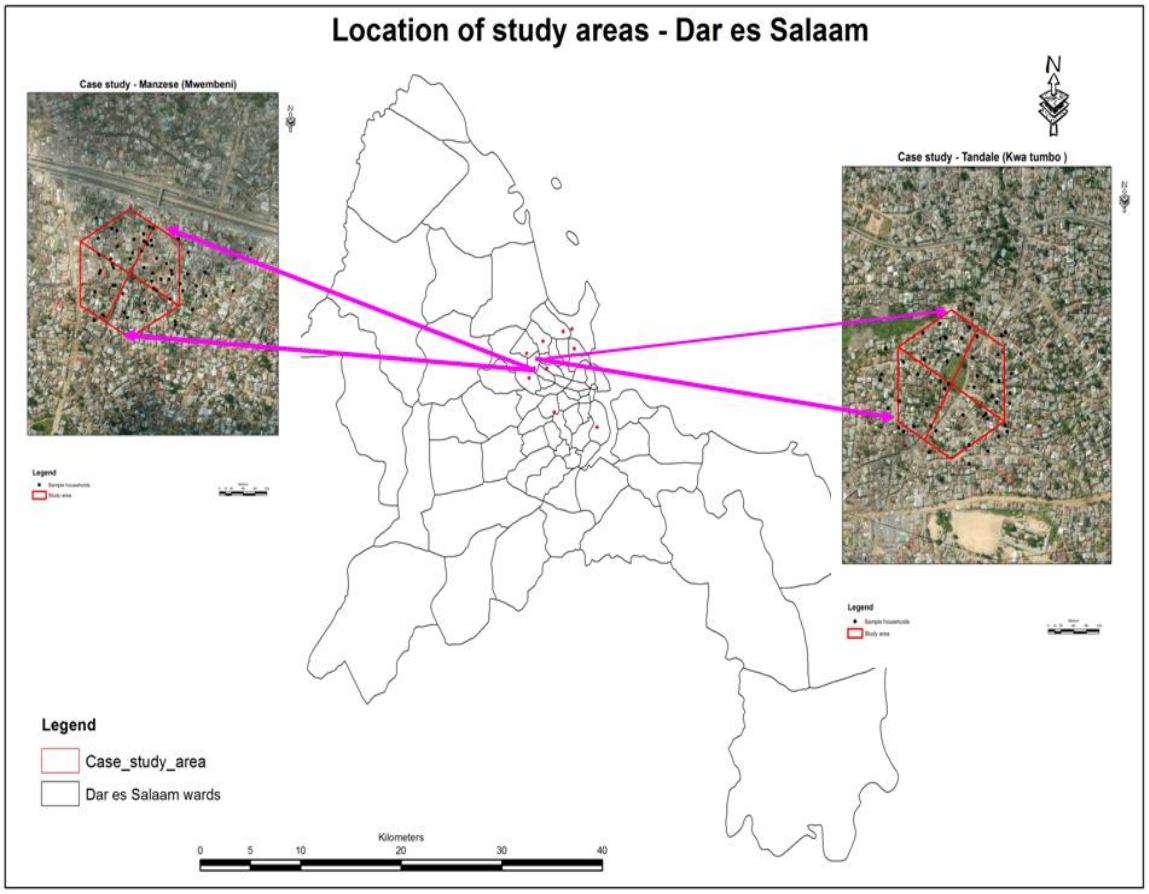


Figure 4-3: Study area locations in Dar es Salaam

Figure 4-4: Seeking authority at Mtaa level and waiting area at Mwananyamala hospital left and right respectively

Figure 4-5: Feedback and quality check of questionnaire after fieldwork and Questionnaire administration, left and right respectively

4.3.2. Secondary data collection

Obtaining secondary data from Municipal health officers was very difficult due to bureaucratic processes and protocols. Despite of the bureaucratic process imposed, responsible persons were not available whenever visited. All Municipal health officers were involved on general election preparations. Primary health service development programme 2007 – 2017, Health strategic plan III 2009 - 2015, health sector performance profile 2010 and other documents mentioned on Appendix three were obtained from Ministry of health and Social welfare department of Policy and Planning and other sources during fieldwork.. Census population data per ward and street and household budget survey data acquired from National bureau of statistics (NBS). The general knowledge on primary health care planning system gained from planning officer from ministry of health and social welfare.

4.3.3. Limitations during fieldwork

The main limitations and difficulties experienced during fieldwork were;

- Lack of physical boundaries of case study areas was a great challenge on ensuring the selected respondents are only within the study area
- Due to absence of current high-resolution images, orientation and identification of study areas was difficult and took time. Map interpretation skills and hand GPS used for orientation and identification of study areas by comparing coordinates on the map and acquired coordinates from hand GPS. Moreover, local knowledge was used to identify unique features or landmark objects like open spaces and cemeteries for orientation.
- Primary data collection always started late because of bureaucratic processes from Ward offices and Mtaa leaders offices. Sometimes we had to wait until the responsible person is available.
- Documents concerning Municipal primary health care implementation plan/ tactics and primary data collection from health officials was not successful due to the fact that responsible persons where involved on general election preparations. Furthermore, limited time and financial resources did not allow daily visit to respective Municipalities.
- Mapping of all new facilities mentioned by respondents was not possible because of shortage of transport funds and time available for data collection.

4.3.4. Post fieldwork

Collected data from field work using questionnaires were processed and converted to digital format. Entered data was checked for consistence and coding errors based on specific sampled residential area. After each half of the sampled household within a residential area, comparison was made and box plot was used to explore the date entered. Identified outliers and coding errors were rectified before going on the next step. In addition, all secondary data need for this study was re organised and spatial data which had different projection was transformed to arc 1960 to harmonise the spatial reference before actual use of the data. Moreover the existing road network was check for consistence using various topological rules and was cleaned before the actual use of the data set for farther analysis.

5. ACCESS TO PRIMARY HEALTHCARE

In this chapter, household socio economic characteristics, classification of socio economic groups and results on different analysis on evaluating access to primary health care through access framework is explained. Moreover, variation of different components of access across different socio economic groups is highlighted. Furthermore, discussion of findings in existing status of access to primary health care and health policy would portray health situation in the city. Moreover, discussion on changes of access to primary healthcare is also explained.

5.1. Household characteristics and socio economic status

The central aim of this chapter is to evaluate access to primary health care in the study area across socio economic groups. Before going to details, it is better to have a clear description of the sampled population. Moreover, it is also very important to understand methods and techniques used to classify socio economic groups among the selected households.

Household characteristics

Household characteristics are important element for getting a general insight of respondents. In total, a sample of 602 households was collected and explored to understand different characteristics of variables among sampled households. While evaluating collected data, one percent of the sampled residential households had extreme values and coding problems. Because of identified inaccuracies, the data were excluded for further analysis. Regardless of not including one percent of a sample, sufficient sample size of 594 households was used to explain household characteristics. The average household size of sampled respondents was 5 people per household. About 37 and 36 percent of households head followed primary and secondary education percent respectively. In addition, mother's education level was observed to be very low, 71 percent of wives among sampled households had primary education. Despite of primary education being dominant to household heads, 42 percent of sampled households spent between 10,000 and 15,000 (TSH) daily. This expenditure showed a clear relationship with employment status of the households. Self employment was a dominant employment status of majority of household heads and it occupies 65 percent of all respondents. This reveals that few people among sampled residential areas have formal employment and probably informality is a dominant characteristic of majority of respondents.

Furthermore, access to sanitary facilities was among many elements asked from households. The use of pit latrine was observed to be very high, 75 percent of respondents use pit latrines as Table 5-1 describes. Moreover, concerning access to basic infrastructure like water and waste disposal facilities, most of respondents (65 percent) were receiving water through vendors and majority of respondents neither have waste disposal facilities like septic tank nor connected to sewer line. Furthermore, household asset ownership has showed variation between the sampled households, but majority of respondents possess television while few possess refrigerators. Other assets asked from respondents

were car, motorcycle, sewing machine, bicycle but few respondents reported to own them. Detailed household characteristics are shown in Table 5-1.

Table 5-1: Percentages of household characteristics

Household characteristic	Percentage
Mothers education level	
Primary education	71
Secondary education	12
University education	17
Highest education level	
Primary education	37
Secondary education	36
University education	26
Household expenditure (TSH)	
less than 5000	11
5000 to 10,000	38
10,000 to 15,000	42
Above 15,000	9
Sanitation facilities	
Flush toilet	25
Pit latrine	75
Access to infrastructure	
Piped water	13
Vendors	65
Public tap	19
Wells	3
Waste disposal facilities	
Sewer line	26
Septic tank	7
None	67
Asset possession	
Refrigerator	35
Television	63
Car	6
Motorcycle	5
Bicycle	9
Sewing machine	6

Classifying household socioeconomic status

The previous section described the general characteristics of sampled households. This part aims to describe in details how different household characteristics are separated to different socio economic groups. The groups obtained will later be used to evaluate access to primary healthcare in Dar es Salaam between different socio economic groups.

Different methods have been used to classify different aspects and socio economic groups by different author (Amer, 2007; Okazaki, 2006; Rutstein, 2008; Satish & Bharadhwaj, 2010; Shrestha, 2010; Vyas & Kumaranayake, 2006). Socio economic classification using individual variables like income, occupation and education level is considered as oversimplification of reality (Amer, 2007) Moreover, other methods like scoring approach which includes different variables and weighting the variables was not optimal and the weighting process of variables considered subjective (ibid). Additionally, factor analysis using principal component analysis as reduction factor has been used by many researchers to develop a wealth index which used to classify different households into various socioeconomic classes. But, this method has limitation of using only binary data and continuous data (Andy, 2009; Filmer & Pritchett, 2001; Liou & Ding, 2002; Rutstein, 2008; Vyas & Kumaranayake, 2006). Therefore, the two step cluster analysis method was adopted for this study due to its capability of handling large and mixed data sets of both continuous and categorical variables. Moreover, the capability of organising observations into separate groups where members within a group share comparable properties make it more useful for this study than other methods (Amer, 2007; Okazaki, 2006; Satish & Bharadhwaj, 2010; Shrestha, 2010).

Step I: Selection of variables

Before using a two step cluster analysis, a series of analysis were performed to evaluate both categorical and continuous variables to be used. Descriptive statistics was used to check variation of occurrence among different variables. This helped to identify variables which can contribute to classification of sampled households. Variables with limited differences were excluded to be used on further analysis. To ensure appropriate variables are selected, two different statistical methods were performed preliminary to identify significant difference among variables. First, the Pearson correlation coefficient was done for each continuous variable. The variables which showed high correlation and were significant at $P < 0.05$ were included for further analysis. Secondly, the Pearson Chi square test was performed per each categorical variable. The variables which had expected values greater than 5 and significant at $P<0.001$ were included in the analysis. This maximise the distribution of Chi square and goodness of fit between variables. These methods were used to identify appropriate variables to use in classification of socio economic groups using the two step cluster analysis. The identified variables for further analysis are described in Table 5-2.

Step II: Classification of socio economic groups

Classification of sampled households was done using a two step cluster analysis. This is an exploratory technique that has been widely used for classifying large dataset with mixed attributes (Okazaki, 2006; Satish & Bharadhwaj, 2010). In addition, Amer, (2007, p. 133) described it as "an explanatory tools which classifies a set of observations into a mutually exclusive unknown groups with a combination of continuous and categorical variables". Therefore, socio economic clusters were computed using categorical variables, log- likehood distance measure between variables and Schwarz's Bayesian criteria (BIC) as clustering criteria. Due to slight variations on different variables from the households, classification was not straight forward because of slight variations in the variables. In order to ensure that quality clusters are obtained seven iterations were performed by entering and removing both categorical and continuous variables on the two step cluster using SPSS (PASW) 18. After doing several iterations, cluster analysis was performed using six categorical variables described in Table. All continuous variables had little or no influence to the cluster quality and classification of socioeconomic groups. Due to that the variables were excluded as input

variables in the two step cluster analysis. Automatically two clusters were determined by two step cluster analysis and the cluster quality was observed to be sufficient for further classification as shown in Figure 5-1. Generated clusters were later named using different socioeconomic characteristics summarized in Table 5-3.

Figure 5-1: Cluster quality

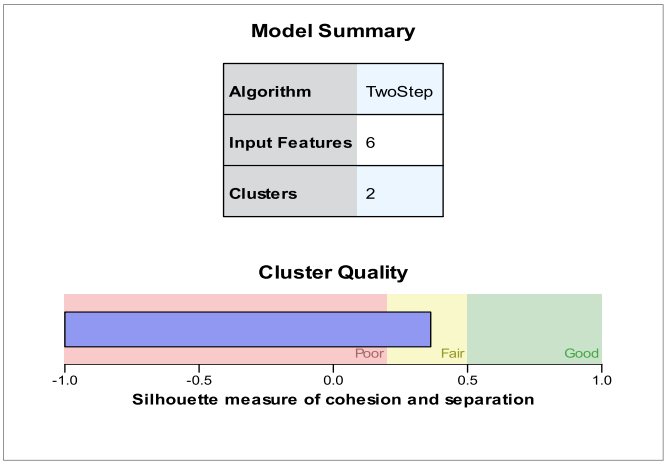


Table 5-2: Categorical variables used for cluster analysis

Variables	Categories
Household waste disposal	(1)Septic tank (2) Sewer line (3) None
Type of toilet	(1) Flush toilet (2) Pit latrine
Highest education level in household	(1) Primary education (2) Secondary education (3) College or University education
Ownership of refrigerator	(1) No (2) Yes
Household daily expenditure	(1) Less than 5000 (2) 5000 - 10,000 (3) 10,000 - 15,000 (4) Above 15,000
Ownership of television	(1) No (2) Yes

Table 5-3: Statistic of socioeconomic characteristics per householder cluster

		Cluster characteristics frequency (%)	
		Cluster 1	**Cluster 2**
Socio economic indicators	**Overall frequency (%)**	N = 389 (65.5%)	N = 205 (34.5%)
Household composition			
Average household size	**5.4**	5.4	5.6
Percentage of infants (0-4 yrs)	**13**	14	11
Crowding (average)	**2**	2	2
Percentage of dependants	**44**	46	41
Female headed families	**9**	12	4
Household education level			
Primary education	**37**	46	21
Secondary education	**36**	40	30
College or university	**27**	14	49
Household occupation			
Unemployment	**16**	17	13
Self employment	**64**	68	60
Permanent employment	**20**	15	27
Employment ratio	**0**	0	0
Household expenditure (TSH)			
Less than 5000	**11**	15	3
5000 to 10000	**38**	43	27
10000 to 15000	**42**	38	50
15000 and above	**9**	4	20
Access to infrastructure			
Septic tank	**26**	0	76
Sewer line	**7**	0	21
No waste disposal	**67**	100	3
Pit latrine	**75**	100	26
Flush toilet	**25**	0	74
Electricity	**76**	68	92
Household asset possession			
Television	**63**	52	83
Refrigerator	**35**	23	58

The first cluster was composed of about 66 percent of all respondents. Demographically, the group was characterised with a household size of 5 persons and high percentage of dependants above average. In addition, female head families observed to have a higher percentage in the group compared with the second cluster. Additionally, majority of head of house had primary and secondary school education and self employment was a dominant type of employment (68percent). Moreover, unemployed level is higher compared with the second cluster and majority of respondents spent less than 5000TSH. Access to infrastructure and asset possession among this group was observed to be very low compared to an average value from sampled population. Also, none of the household within this cluster had neither a flush toilet nor connected to a public sewer line as described further on Table. After evaluating all social economic characteristics in the cluster, the cluster was named as a vulnerable socio economic group.

The second cluster is smaller in size, it occupies (34percent) of total respondents from sampled residential areas. The group is composed of higher percentage of households with university education (49 percent). Demographically, the household composition is made by large household size slightly above average (5.6) while the percentage of dependants (41) is slightly lower than an average percentage of sampled population. Household daily expenditure in this cluster is higher compared with a first cluster as 20 percent of households spent more than 15,000 TSH daily and 27 percent of household heads are permanently employed. Furthermore, possession of physical assets and access to infrastructure in the cluster was higher than average compared to the previous cluster. Based on socio economic characteristics observed, the cluster was named as a better off socio economic group. Different characteristics used to classify the groups highlighted on Table 5-4.

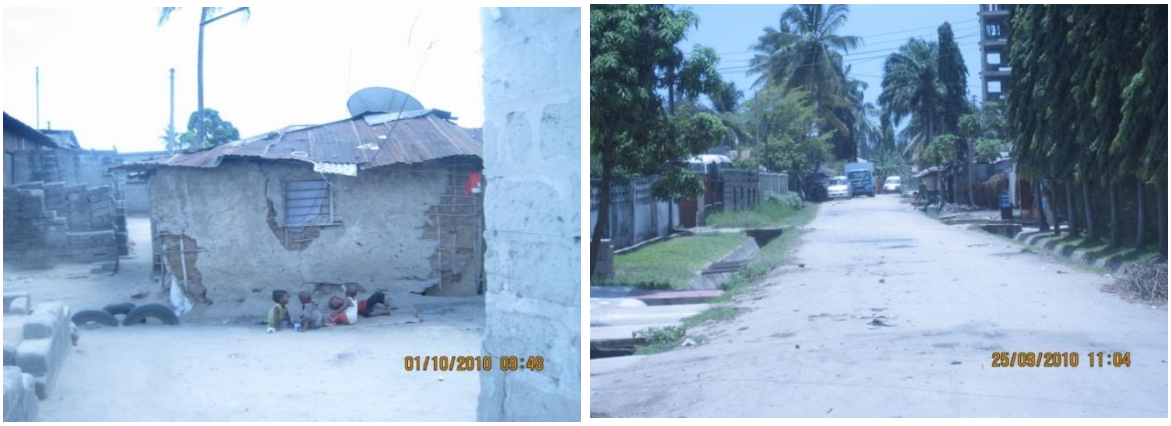


Figure 5-2: Socio economic heterogeneity on case study areas, informal and formal residential area, left and right respectively

Table 5-4: Socio economic clusters and their characteristics

Vulnerable households (Cluster 1)	Better off households (Cluster 2)
Household composition • Household size is the same as an average size (5.4) • Number of infants is above average • Higher percentage of dependants above average (46 percent) • Percentage of female headed families is above average (12 percent)	**Household composition** • Household size is above average (5.6) • Number of infants is below average • Percentage of dependants is slightly lower below average (41percent) • Percentage of female headed families is far below average (4 percent)
Level of education • Mainly primary and secondary education	**Level of education** • Mainly secondary and University education
Household occupation • High percentage of unemployment is above average • Low employment ratio below average	**Household occupation** • Low percentage of unemployment below average • High employment level is above average
Household Expenditure • Higher percentage spent less than 5000, far above average • Lower percentage far below average spent above 15,000 TSH daily	**Household Expenditure** • Lower percentage spent less than 5000, far below average • High percentage above average spent more than 15,000 TSH daily
Access to infrastructure and asset possession • Poor access to infrastructure, far below average • Low asset possession, far below average	**Access to infrastructure and asset possession** • Good access to infrastructure, far above average • Higher asset possession level, far above average

The identified socio economic groups are used for further analysis in the following sections in this study. Informal settlement areas have more people in a vulnerable group than better off group. Buguruni informal settlement has the highest number (92 percent) of respondents within the vulnerable group compared to the rest of sampled residential areas in the City as shown in Figure 5-3. Most of informal settlements in Dar es Salaam are characterised with poor infrastructure, lack of adequate and quality drinking water, sanitation problems, and poor waste management facilities, poor housing condition as shown in Figure 5-2 and high density of both building and inhabitants (UN HABITANT, 2010). Therefore, the mentioned characteristics might contribute to the vulnerability of identified vulnerable group.

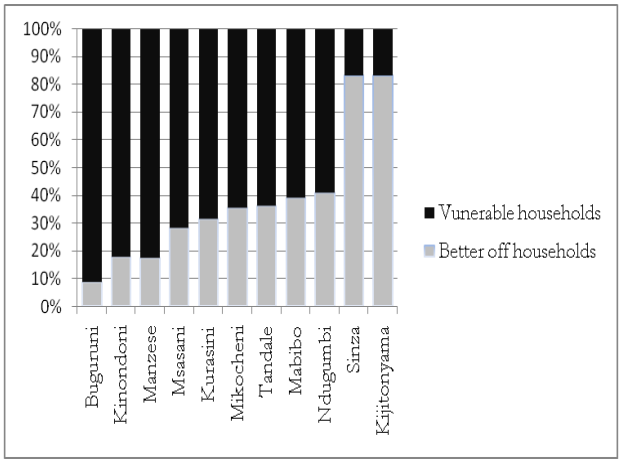


Figure 5-3: Percentage of socio economic status per sampled residential areas

In addition, informal settlements consists higher percentage of vulnerable socio economic groups between the sampled residential areas in Dar es Salaam as shown in Figure 5-4. This association is statistically significant (Pearson Chi-square P< 0.001). This shows that socio economic groups are significantly different between settlement types. Therefore, respondents living in planned settlements are most likely to have better life than respondents living in informal settlements.

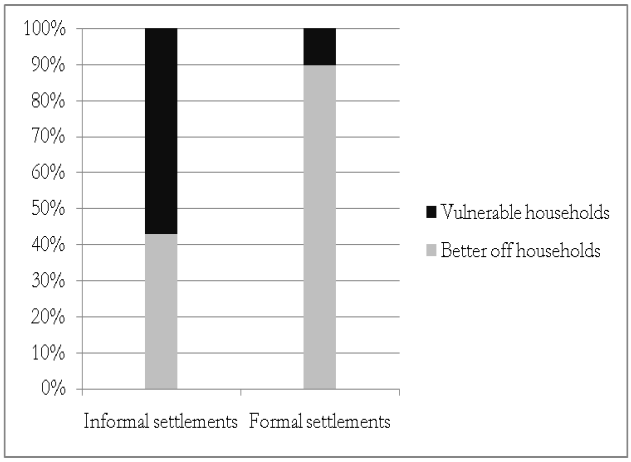


Figure 5-4: Distribution of socio economic groups per settlement type

5.2. Measuring dimensions of access to primary health care

In this section different dimensions of access to primary healthcare are measured. Dimensions with both spatial and non spatial elements were measured using spatial analysis and descriptive statistics. Therefore, the use of different methods provided more opportunities of observing variations among dimensions of access and also to evaluate perceptions of different respondents on access components. For this study evaluation of health facilities was limited to government and non government facilities. The non government facilities combined different types of health facilities like Voluntary based, Faith based, Private and Occupation.

5.2.1. Accessibility to primary healthcare

This part describes physical accessibility to different primary healthcare facilities in the City. Mode of transport used and travel impedance in terms of distance, travel time and walking time are main elements of this section. Network analysis was used to estimate walking time, travel time by public transport and distance from respondents (Origin - demand) to destination (visited healthcare facility) instead of considering only the perceived distance and time.

Mode of transport

Generally, the majority (68 percent) of respondents walk when visiting primary healthcare facility of their choice as shown in Figure 5-5. Moreover, public transport is used by 25 percent of respondents and 4 percent used private cars. Other means of transport (hired motorcycle, private motorcycle, bicycle and taxi) were not commonly used only 2 percent reported to use either of the modes. Therefore, the less used modes were excluded on further comparisons. The comparison in mode of transport used between facility types showed some differences. Many respondents (80 percent) visiting non government health facilities walk compared with users of government facilities as shown in Figure 5-6. Moreover, respondents visiting government facilities use public transport more than non government facilities users. This situation might be caused by availability of non government providers within short distance than government healthcare facilities.

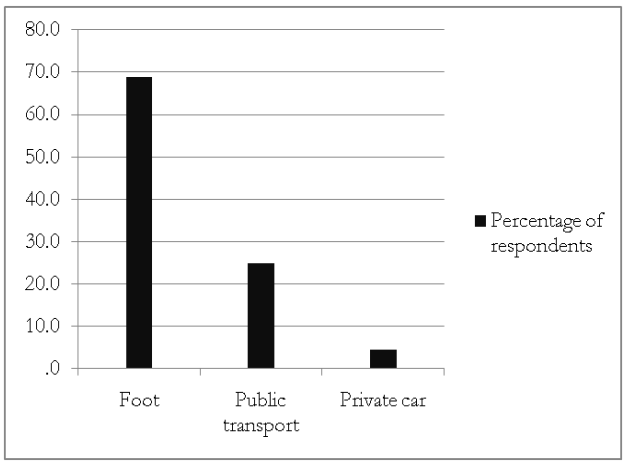


Figure 5-5: Modes of transport used to access healthcare facilities

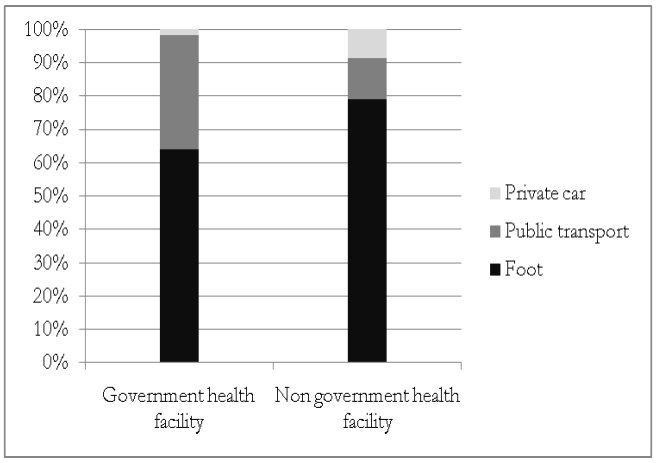


Figure 5-6: Mode of transport used per health facility type

Travel time

To measure spatial accessibility to primary healthcare, many studies have used Euclidean distances and network analysis (Amer, 2007; Guagliardo, 2004; Owen, et al., 2010; Schuurman, et al., 2010; Yiannakoulias, et al., 2009). In order to have realistic estimation of travel time from demand (origin) to supply (destination), a network analysis was adopted for this study. Walking time speed was estimated to be 4km/h based on local knowledge, the estimation was also used by Amer(2007) and Owen, et al., (2010). Moreover, public transport travel time was estimated based on road speed, hierarch and length of road segment. The speed for major road was assumed to be 45km/hr and all feeder roads assigned a seed of 15km/hr. The estimated speed was later used to estimate public transport travel time and walking time from demand (respondents) to supply (health facilities).

Moreover, estimation was done to visited healthcare facilities. The numbers of health facilities visited by respondents were 84. Due to limited time and financial resources discussed in section 4.3.3, 37 new health facilities visited by respondents were not geo coded. Therefore, walking time and public transport travel estimates were computed to 47 health facilities attended by 446 respondents.

Estimated walking time from each sampled residential area to destination points were obtained using the process described in Appendix 7. The estimated travel time showed that, around 63 percent of respondents walk not more 30 minutes to their facility of their choice while 4 percent walk more than an hour attending the health facility. This indicated that physical accessibility was not a problem for majority. Figure 5-7 shows that more of people walk a shorter distance, but when walking time increases people shifted to public transport.

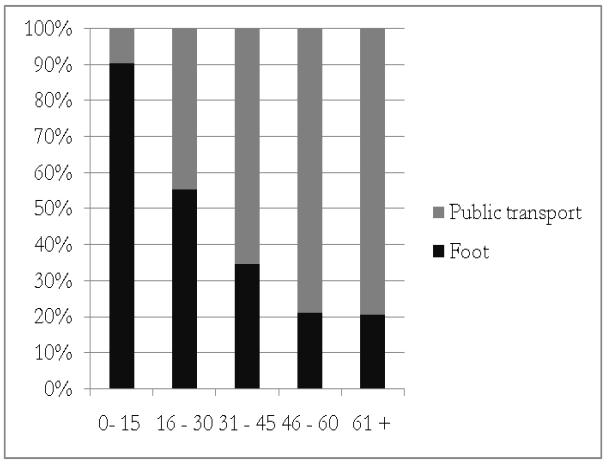


Figure 5-7: Estimated 15 minutes walking interval and mode of transport used

5.2.2. Availability of primary health care

Availability refers to a relationship between number of healthcare facilities available and types of services offered with respect to the need of the population. Drug availability, equipments availability, type of facility people visit, waiting time before getting service, human resource availability and availability of healthcare are indicators used to measure availability. About 60 percent of respondents reported to visit government healthcare facilities and others use non government facilities. In addition, about 65 percent of respondents visited government health facilities reported drug shortage as shown in Figure 5-8. The shortage is associated with financial difficulties faced by the government compared to the amount of people government facilities serves. Moreover, human resource availability was a challenge on government healthcare facilities as shown in Figure 5-9. This is a serious challenge facing public sector due to shortage of financial resources for training and employment. In the case of equipment availability people perceived non government facilities have better equipment and laboratory facilities than public health facilities as described in Figure 5-10. In sufficient financial resources in public facilities does not allow purchasing better equipments to meet their demands as compared to private facilities which serves few people. Additionally, long time spent waiting for healthcare service on both public and private facilities mentioned as a serious problem. The detail description of waiting time at disaggregated level between facilities type is discussed on next paragraph.

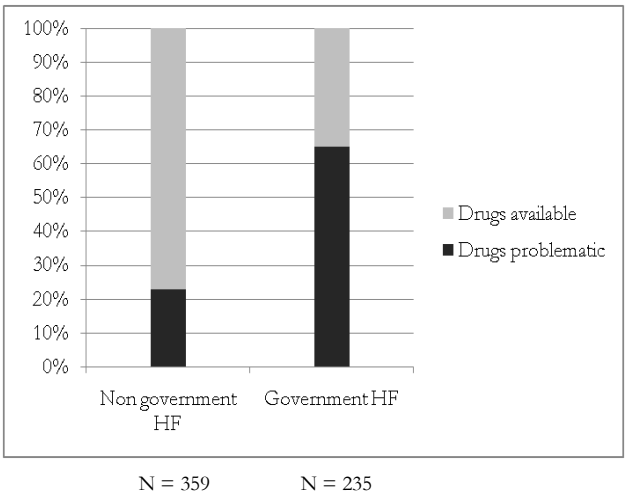


Figure 5-8: Perception on availability of drugs per health facility type

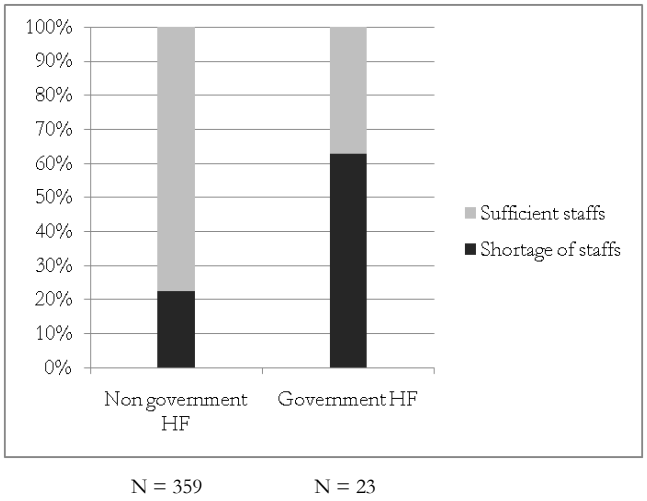


Figure 5-9: Perception on health personnel availability per health facility type

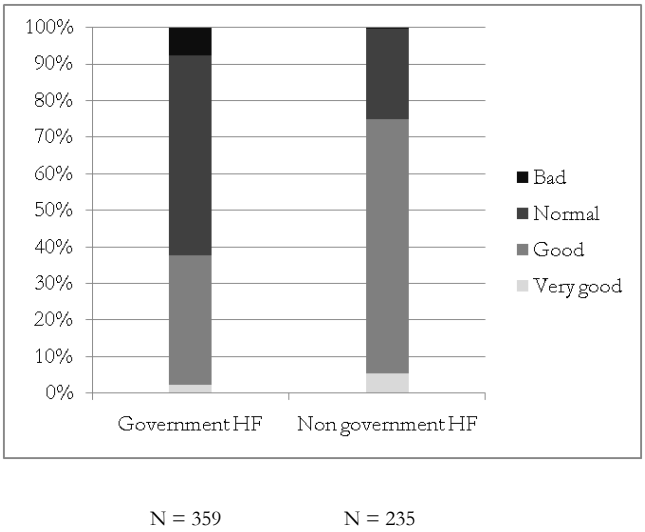


Figure 5-10: Perceptions on equipment availability per health facility type

Waiting time in healthcare facility

Generally, perception on waiting time was a problem as 29 and 28 percent of respondents perceived to be long and very long respectively. Perceived waiting time ranged from 2 to 540[3] minutes. Later, perceptions on waiting time were compared between facility types. Figure 5-11**: Perceptions on waiting time per health facility type** shows that an average waiting time in government facility and non-government facility observed to be 119 and 40 minutes respectively. This shows that people visiting non government facilities experience shorter waiting time compared with government facilities users. Moreover, when perceptions were measured using 5 Likert scale between facility types as shown in , respondents attended government facilities perceived waiting time very long (32 percent) than non government facilities users as shown in Figure 5-11.

[3] Waiting nine hours before receiving any healthcare might look strange but in reality it happens, this is due to extreme shortage of healthcare providers in relation to number of patients especially in government facilities.

Table 5-5: Descriptive statistics of perceived waiting time per health facility type

		Waiting time in minutes		
Visited facility for PHC	% of Households	Minimum	Maximum	Average
Government facilities	60.4	2	540	119
Non-government facilities	39.6	2	300	40
Overall waiting time	100	2	540	88

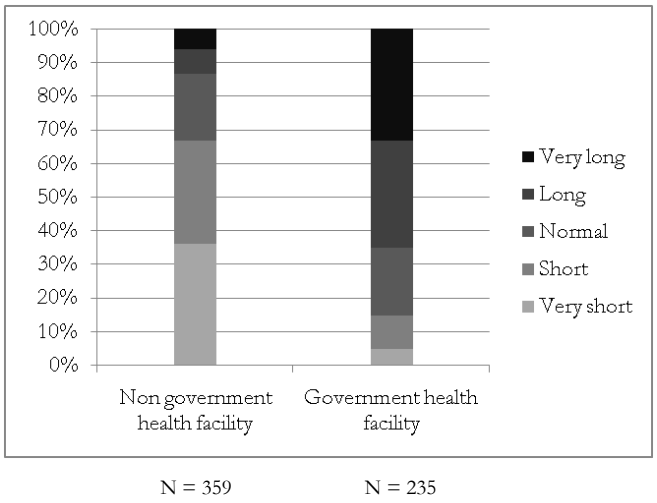


Figure 5-11: Perceptions on waiting time per health facility type

Providers of healthcare

Different indicators like population facility ratio, physician to population ratio, number of providers and number of bed per 1000 people was used to measure availability (Guagliardo, 2004; Liu, et al., 2009; Wanasinghe, 1995). Due to unavailability of data availability for this study was measured by considering availability of providers. The existing road network (2002), centroids of sampled residential areas and available health facilities from an existing data set (2002) and new health facilities identified on fieldwork (2010) were used to compute a service area analysis. Therefore, different walking time intervals were assumed from 15, 30, 45, 60 and 240[4] minutes and residential centroids were used as a starting point of service area analysis. Also, polygons were merged with zone of equal estimated travel time; a detail of the process is shown in Appendix 8. The principle used to evaluate availability of providers was making distance zones (walking time) from centroids of sampled residential areas as shown in
Figure **5-12**. From each walking time zone the number of providers was computed. This process was used to all 11 sampled residential areas as shown in Figure 5-13. The execution of the process resulted to a service area map as shown in Figure 5-13. This analysis was used to calculate potential providers within each walking time threshold and the results are described in Table 5-6.

Generally, availability of health facilities from sampled residential areas have shown differences between estimated walking time and facility levels. Government health facilities are less available than non

[4] Estimated maximum time people can walk to healthcare facility

government facilities as shown in Table 5-6. Moreover, comparison on level of healthcare facilities available cumulatively, non government facilities are more available than government facilities. Despite of being available, non-government facilities are less used (40 percent) compared to government facilities (60 percent). Therefore general availability shows that there are sufficient providers within a reasonable walking distance. But availability of government facilities within short time walking distance limited compared with non government facilities.

Table 5-6: Cumulative availability of providers per walking time

Estimated walking time (minutes)	Government health facilities (Cumulative)			Non-government health facilities (Cumulative)			Total GHF	Total NGHF
	Ho	Hc	Ds	Ho	Hc	Ds		
0 - 15	0	1	2	4	0	46	3	50
16 - 30	3	1	5	6	0	111	9	117
31 - 45	3	1	6	9	0	145	10	154
46 - 60	3	1	9	11	2	194	13	207
61 - 240	5	3	26	16	6	289	34	311

Key:

Ho = Hospital GHF = Government health facility Ds = Dispensary

Hc = Health centre NGHF = Non-government health facility

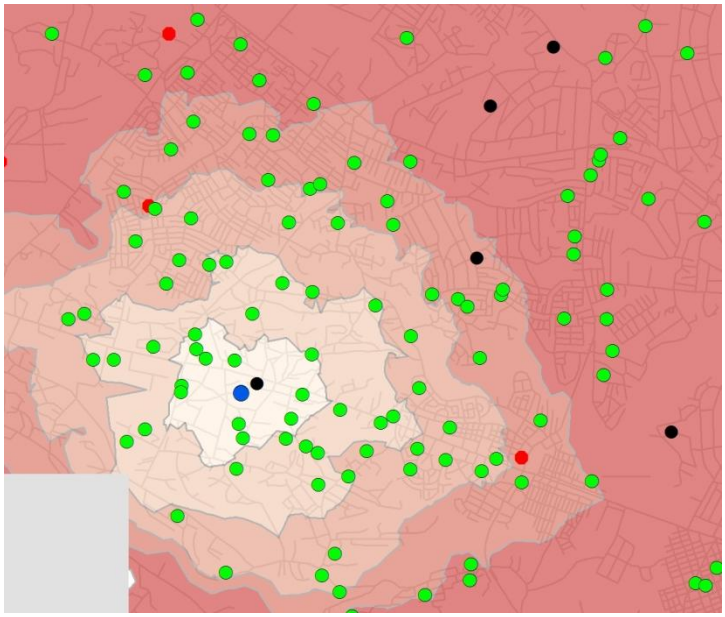


Figure 5-12: Evaluation of number of providers per walking distance

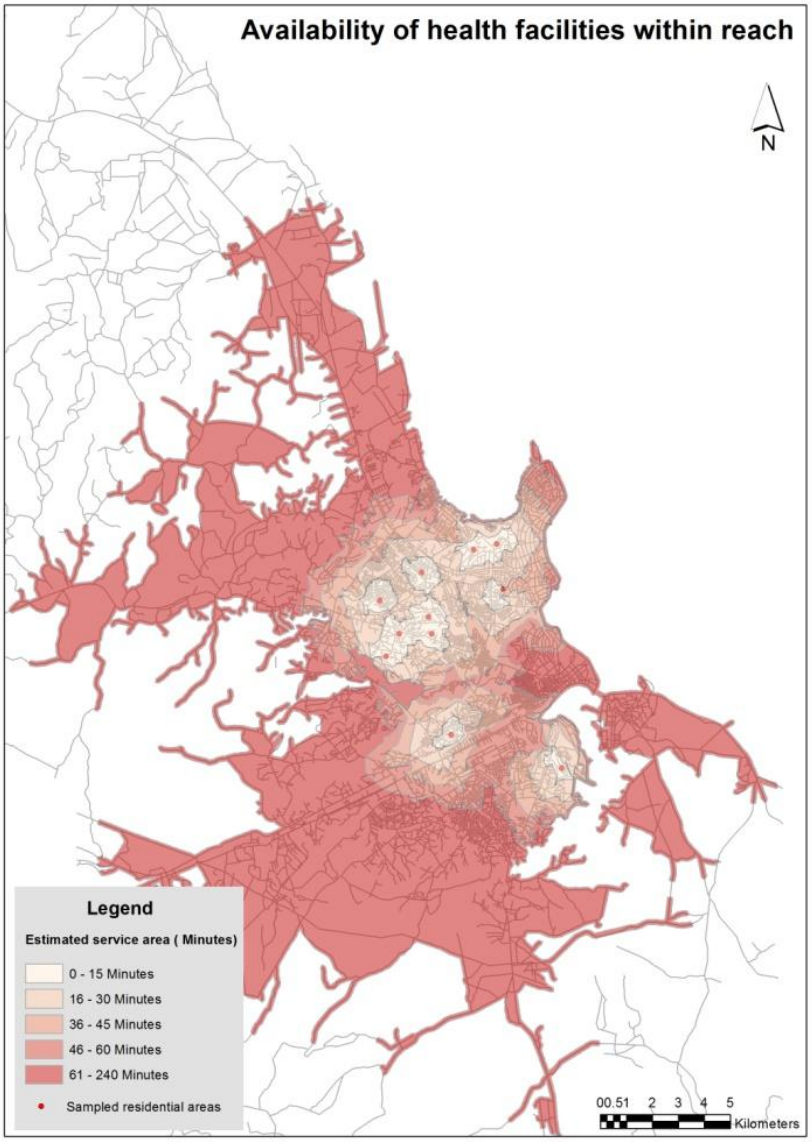


Figure 5-13: Availability of health facilities per walking time interval

5.2.3. Affordability of primary health care

Affordability is referred as a price of service user incurred when seeking primary health care. It is measured by both direct and indirect costs users face when seeking healthcare. Possession of a health insurance card was among many indicators used to evaluate affordability to healthcare. The sampled residential households revealed that 92 percent of respondents do not have health insurance card. Therefore, we can conclude that, majority of respondents are not permanently employed and if employed they do not have enough awareness of national health insurance card. Regardless of type of health facility visited, registration cost and doctors cost was perceived normal by majority, 53 and 49 percent respectively. Despite of that, still a considerable number of people 28 and 20 percent perceived as expensive. Given the observed facts, generally registration and doctors costs was not problematic to most users but a considerable number of people perceived it as a challenge. Medication and total health costs were perceived expensive compared to other costs as shown in Figure 5-14. The cost of medication is influenced by the cost sharing programme initiated to recover the operation costs of healthcare services.

Furthermore, perceptions on total cost of healthcare provision were compared between facility types. Many respondents (47 percent) used non government health facilities perceived total cost of healthcare as expensive as shown in Figure 5-15. Moreover, 47 percent of government health facilities users perceived cost as normal but 40 percent of respondents perceived it as expensive. Therefore, overall cost of healthcare was perceived to be a problem in both facility types; however, cost in non government facilities is higher than in government health facilities.

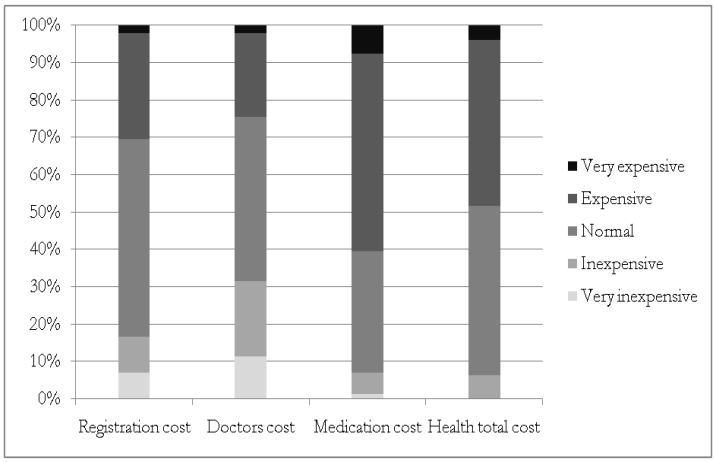


Figure 5-14: Perceived indicators on affordability in health facilities

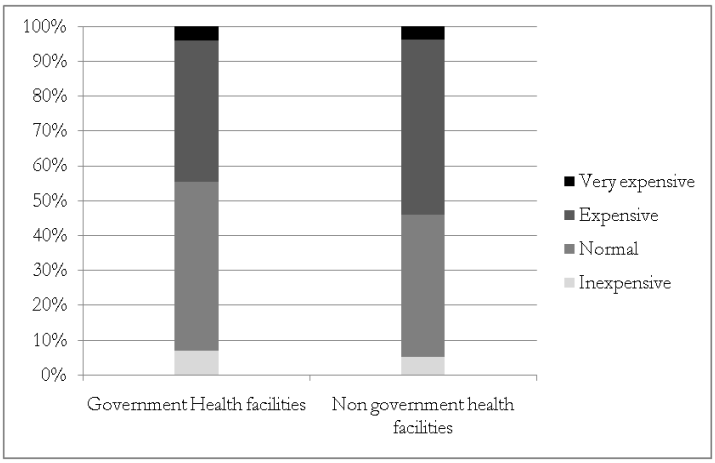


Figure 5-15: Perceived total cost per health facility type

5.2.4. Acceptability to primary health care

Acceptability was measured using user perceptions on how healthcare services are organised and how providers interact with patients. The perceptions on cultural reasons, religious factor and gender preferences from respondents were used to measure the level of acceptability. User's perceptions on cultural and religious reasons when choosing healthcare facilities shows that, 99 and 100 percent of respondents does not consider any cultural reasons and religious factors respectively when visiting healthcare facilities. Therefore, cultural and religious factor has no influence on the level of acceptability to healthcare in selected sampled areas. The mixed culture and diversity of religious beliefs has reduced the

magnitude of acceptability. Additionally, gender preference over medical personnel was also asked. Majority of respondent's amount to 86 percent does not have any preference on specific gender. However, 20 and 10 percent of respondents using government and non government health facilities respectively, showed their preference on gender in health personnel as shown Figure 5-16. Therefore, gender preference is still an important factor on measuring the level of acceptability. But, 11 percent of females showed their preference to female doctors or nurses and 5 percent of male preferred male doctors. As a result, gender preference was not a problem as majority does not prefer a specific gender when seeking healthcare as shown in Figure 5-16. However, more females showed preferences of being treated by female doctors; this might be because of natural reasons or for specific conditions like when giving birth or parental care. Generally, gender preference is not an important factor considered by majority when seeking healthcare, neither on public health facilities nor private health facilities.

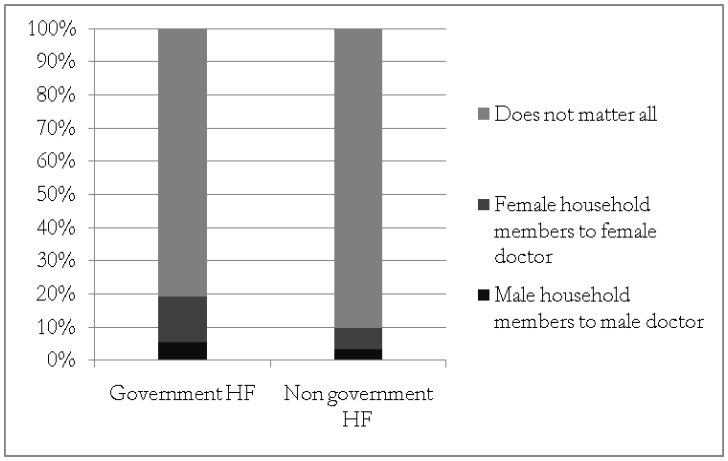


Figure 5-16: Percentages of gender preference per health facility type

5.2.5. Adequacy to primary health care

Adequacy to primary healthcare was measured from respondent's perception on primary healthcare cleanness, open hours, health personnel behaviour and medical ability of visited healthcare facilities. A 5 Likert scale was used to capture people's feelings on visited healthcare cleanness. About 67 percent of respondents said facilities are clean and at the same time 15 and 14 percent observed to be very clean and normal respectively. Only, three percent of respondents perceived the facilities to be dirty. From the results we can say that cleanness was not a problem from all users of healthcare even though few people reported to be dirty. Moreover, opening hours of healthcare facilities was also perceived to be okay by 96 percent of respondents.

In general, health personnel behaviour was reported by 84 percent of respondents to be good. When was compared between facility types, a slight difference was observed especially on government facilities where a large proportional of respondents complained on unfriendly behaviours of personnel than in non government facilities as shown in Figure 5-17. Therefore, perception on medical ability between facility types was not a problem on both facility types. Generally, user's perception on unfriendly behaviour between facility types was not a problem. However, 22 percent of respondents used government were not satisfied with human personnel behaviour. Therefore, unfriendly behaviour is still a strong element in

government health facilities. Poor enforcement of laws, regulation and negligence on professional ethics and code of conducts among health personnel might be contributing factors of such behaviours. In general, trust on medical ability was perceived okay as 58 percent of respondents positively said to be good and 36 percent normal. Perception in medical ability between facility types showed differences, more people (74 percent) using non government facilities reported medical ability as good and government facility users (50 percent perceived also good as shown in Figure 5-18. However, 5 percent of government facility users were not satisfied with the medical ability. Therefore, medical ability in both facilities was not a serious problem even though a significant difference in perception between users observed.

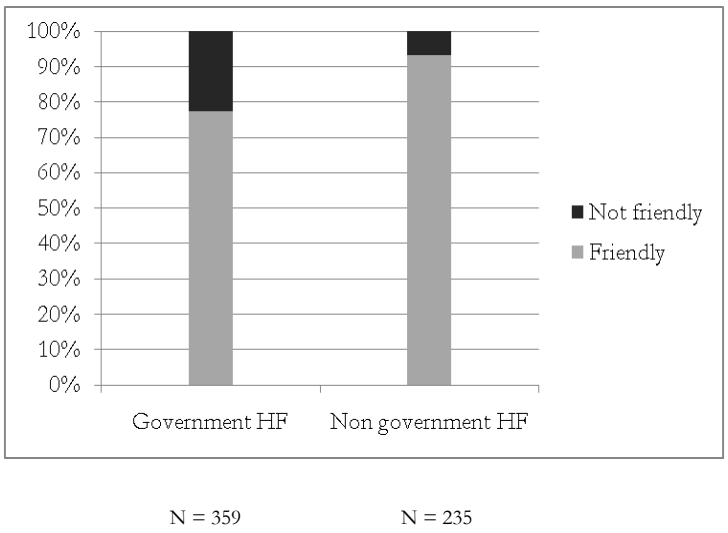


Figure 5-17: Perceptions on friendly behaviour of health personnel per facility type

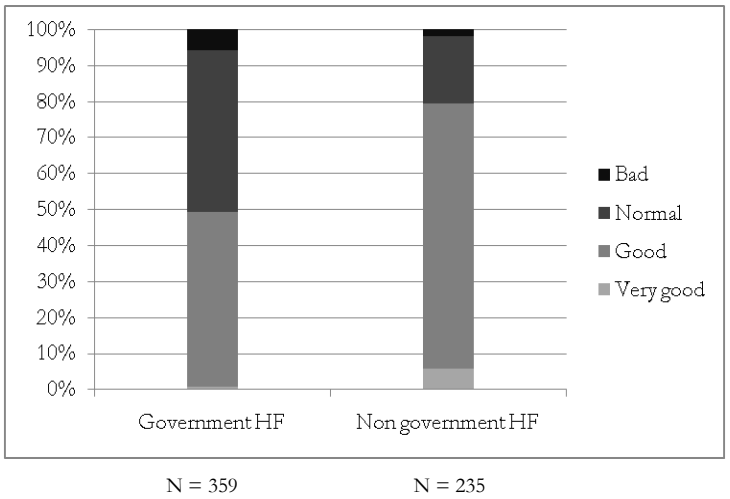


Figure 5-18: Perceptions on medical ability per facility type

5.2.6. Perceived overall satisfaction to PHC

Primary healthcare users were asked on their general perception on healthcare facilities they attend. A 5 liker scale was used to acquire their perceptions. Many respondents (40 percent) were satisfied with the service provided but, 39 percent of respondent perceived it as normal. This shows that the level of service provided in the city is not of higher level to satisfy majority of users. Furthermore, the satisfaction level was checked between government facilities and non government facilities. The comparison revealed that, majority of respondents (52 percent) visiting non government facilities were satisfied with the level of service provided but government health facility users were not satisfied as 46 percent of respondents perceived to be normal. Therefore, people using private facilities are more satisfied with PHC service provided than people attending government facilities. Therefore, this shows that more people are general satisfied with the facility they attend regardless of existing challenges facing them as users.

5.3. Access components scores

The summary score for measuring different variables of access to primary healthcare was developed using perceived and estimated variables. These scores were developed using 16 variables, all were scaled from 0 to 1. The scaled variables were weighted equally to each indicator as shown in appendix 6 and later standardized using score (i) = Score/ Maximum score for benefit components and cost score = 1- (score-lower score/higher score) to obtain a standardized score for each component of access. Accessibility and affordability were measured as cost components accessibility or affordability. Other components of access were measured as benefit variables. Therefore, the obtained scores were used as a representative value of access components. The number of indicators used and their weighting values are shown in Appendix 6.

A slight variation was observed when scores were compared with types of health facility using spider web. Figure 5-19 shows how people's perception on access components with facility type. Physical accessibility scores to facility types are significantly higher. The result shows that accessibility was not problematic and the level of accessibility did not show any difference between facility types. Moreover, the location of sampled residential areas influenced the level of accessibility in facility types. The availability scores between facility types have shown a remarkable difference. Non government facilities scored higher than government facilities. This also reflects the results discussed in section 5.2.2 where most of indicators were perceived satisfactory on non government facilities than government. Affordability score was lower compared with all other access components and both facilities scored similar. The similarity in affordability scores between facility types is because; most of indicators did not show strong difference between facility types. But, individual factor like medication cost which had more effect has been overshadowed with other factors especially in non government facilities. Acceptability has the highest score than all other access components and it is not different between facility types. Respondents using different facility types had homogeneous perceptions on acceptability indicators which resulted to its highest score. Moreover, majority of respondents does not consider neither cultural nor religious reasons when they choose to visit any facility for primary healthcare. Adequacy also did not show any difference between facility types, these scores fits well the observed results of indicators as discussed in 5.2.5. The only indicator which showed a difference was unfriendly behaviour. Generally, limited variation was observed from the scores, only availability has shown dissimilarity. Therefore, access to healthcare is much different on availability of healthcare than other components regardless of individual indicators which have shown significant differences between facility types. Moreover, a slight variation on socio economic characteristics and locations of sampled residential areas contributed to similarities in most of access components.

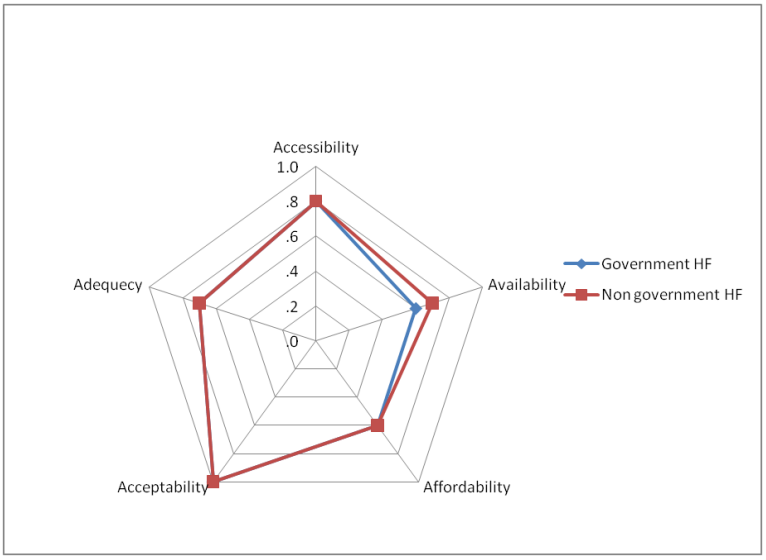


Figure 5-19: Summary scores in access components and facility type

Conclusion

The five components of access to PHC have shown different variations for some indicators. Physical accessibility was not a problem to majority of healthcare users and walking was the major mode of transport used by majority. Furthermore, long waiting time, shortage of drugs and human resource shortage was the main challenges in availability of healthcare. Despite of that, medication cost and overall cost were perceived as major challenges in affordability of PHC. In addition, acceptability of healthcare was not a problem in a study area but adequacy has shown slight difference on medical ability. Moreover, access components have shown limited variations between facility types using access component scores.

5.4. Evaluation of access to primary health care between different socio economic groups (SEG)

In the previous section different access dimensions were discussed in general. In this, access components are discussed and evaluated with different socio economic groups. The main aim of this section is to evaluate if access to primary healthcare varies between different socio economic groups. Moreover, in this section, we look on differences among indicators of access components. But only indicators which have shown a significant difference between SEG are reported in this section.

5.4.1. Accessibility to primary healthcare between SEG

A variation in accessibility between socio economic groups is evaluated using estimated walking time. To measure this variation, an independent T-test was used to see if there is significant difference between estimated walking time and socio economic groups. An independent sample test ($t = -1.415$, $df = 433$, $P > 0.05$) was performed using estimated walking time traveled. The result shows that there is no significant difference between the two socio economic groups on walking time to healthcare facility of their choice. Therefore, both vulnerable and better off households have similar walking time from sampled residential areas. Moreover, Figure 5-20 was used to compare mode of transport and facility types between SEG. The figure also reveals that, there is a slight difference between the two groups on mode of transport and types of facility different group use. Therefore, this justifies the statistical analysis that accessibility between SEG is not different.

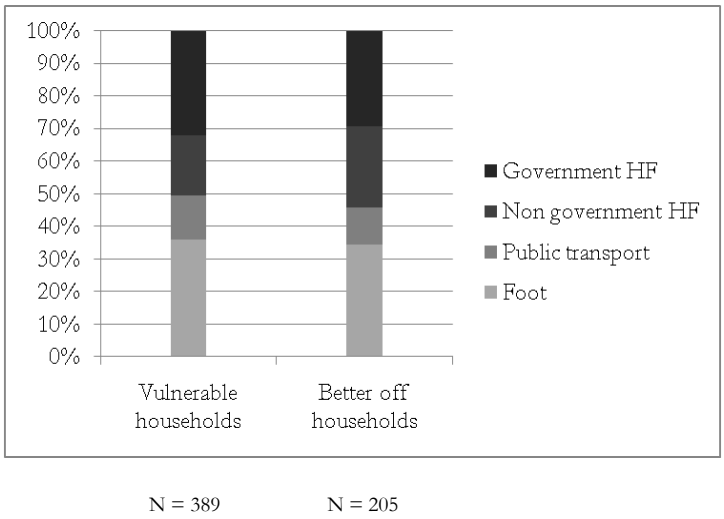


Figure 5-20: Percentage of transport modes and type of facility visited between SEG

5.4.2. Availability of primary healthcare between SEG

In the previous section different indicators for measuring availability to primary healthcare were examined in details. The same indicators are used to identify suitable variables for evaluating variations between SEG. Both descriptive statistics and Chi square test are used to analyse the indicators.. Furthermore, a non paramentric measurement (Chi square, Cramer's value V= 0.214 and 0.133 respectively,P< 0.001) showed that, there is a significant variations between socio economic groups on perceived waiting time and drug availability. The result describes that, vulnerable households are experiencing long waiting time and shortage of drugs when visiting health facilities than better off households. Moreover, majority of respondents in a vulnerable group use governement health facilities as shown in Figure 5-21. This variation of SEG between drug availablity and waiting time is a function of type of facility used. Table 5-7 shows that, users of governemnet healthcare facilities are experiencing long waiting time and drug shortage regardless of their socio economic group. Therefore, Inequality between the socio economic groups observed because of incapacity of vulnerable households to afford the cost of visiting non governemnt facilities compared to better off household.

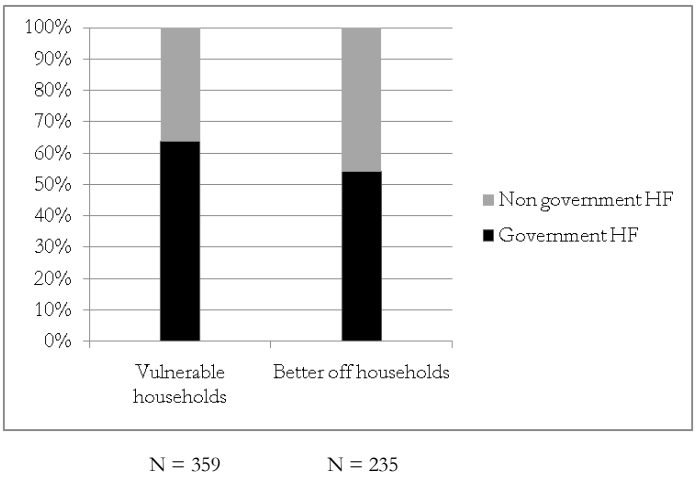


Figure 5-21: Socio economic group per facility type

Table 5-7: Availability indicators per socio economic group

Indicators	Vulnerable households		Better off households		Significance level	Cramer's Value
Perceived waiting time	Government	Non government	Government	Non government		
Very short	2	2.7	4.5	36.2		
Short	6.5	20.6	6.3	41.5	Significant	
Normal	10.1	20.6	14.4	10.6	P< 0.001	0.214
Long	36.7	19.1	46.8	4.3		
Very long	44.8	12.8	27.9	7.4		
Drug availability						
Drug problematic	83.1	16.9	84.6	15.4	Significant	0.133
Drug available	47.6	52.4	40	60	P< 0.001	

0 cells (.0%) have expected count less than 5

5.4.3. Affordability to primary healthcare between SEG

The level of affordability between different socio economic groups was examined using descriptive statistics and non parametric measures for categorical variables (Chi square). These are used to examine significant differences of indicators between identified socio economic groups. The registration cost, medication cost, health insurance card, doctors fee, total health cost are indicators used to measure affordability of healthcare. The results of a non parametric test (Chi square) on indicators are summarized in Table 5-8. The results show that, medication cost and possession of health insurance card have shown significant difference between SEG. Majority of households (58 percent) in a vulnerable group perceived medication cost to be expensive. The financial inability among the vulnerable group might be a main reason of their perception because they cannot afford to attend non government facilities. Moreover, possession of a health insurance is a security and assurance of access to PHC. But just minority (17 percent) of all respondent had insurance. Respondents with insurance card are most likely to be public workers. Therefore, medication cost and health insurance card possession are important indicators for evaluating the level of affordability among respondents with different socio economic status.

Table 5-8: Chi square test for affordability indicators per SEG

Indicators	Vulnerable households	Better off households	Significance level	Cramer's Value
Health insurance card	Percentages	Percentages		
I have insurance card	2.6	17.1	significant	0.261
I do not have insurance card	97.4	82.9	P<0.001	
Medication cost				
Very inexpensive	1.8	0.5		
Inexpensive	3.6	9.8	significant	
Normal	26.7	42.9	P<0.001	0.241
Expensive	57.8	43.4		
Very expensive	10	3.4		

0 cells (.0%) have expected count less than 5

5.4.4. Acceptability between SEG

Different variables have been used as measures of acceptability to primary healthcare. To evaluate if acceptability to primary healthcare vary between SEG, descriptive statistics and Chi square tests are used for different categorical variables. Cultural factors and religious factors beliefs were not significantly different between socio economic groups. Therefore, both SEG does not consider any cultural or religious factor when seeking PHC. This shows that mixed nature of various cultures and religious in sampled residential areas influenced the performance of these indicators. In addition, gender preference has shown a wide spread of variables between socio economic groups but the existing difference was not statistically significant. Therefore, both groups have similar preferences on gender even though a slight difference was observed but was not significant. From these results, we can conclude that, acceptability to primary healthcare does not vary between different socio economic.

5.4.5. Adequacy between SEG

A chi square test is used to determine significance of indicators on adequacy between socio economic groups. Table 5-9 shows the results of descriptive statistics and Chi square test. Three variables (cleanliness, open hours and friendly behaviour) did not show any difference between socio economic groups and were statistically insignificant between socio economic groups. Besides, respondent perceptions on medical ability between SEG have shown a clear difference, between socio economic groups. Both socio economic groups perceived medical ability is good to the facilities of their choice. Also more respondents (67 percent) in a better off households expressed that impression. This perception can be related with the type of facilities better off households visit as described in Table 5-9. Therefore, variations in perceptions between SEG is relate to type of a facility visited. Most of respondents visited non government health facilities perceived medical ability as good than those attended government facilities regardless of their socio economic status.

Table 5-9: Chi square result for adequacy per SEG

Indicators	Vulnerable households (%)		Better off households (%)		Significance level	Cramer's Value
Medical ability	Government	Non government	Government	Non government		
Very good	0.4	3.5	1.8	9.6		
Good	45.2	68.8	55	80.9	Significant	
Normal	49.6	26.2	35.1	7.4	P< 0.001	0.207
Bad	4.4	1.4	7.2	2.1		
Very bad	0.4	0	0.9	0		

0 cells (.0%) have expected count less than 5

5.4.6. Overall satisfaction to PHC between SEG

The overall satisfaction to primary healthcare is different between socio economic groups. The variations are measured using descriptive statistics and non parametric test (Chi square). The results show that, vulnerable households are generally satisfied with an overall primary healthcare than better off group as shown in Figure 5-22. Furthermore, the statistical test Chi Square (Cramer's value V= 0.123, P>0.001) was used to evaluate variations. The results revealed that, there is no significant difference between socio economic groups on overall level of satisfaction. As a result, both social economic groups perceived to have similar level of satisfaction from primary healthcare facilities they attend.

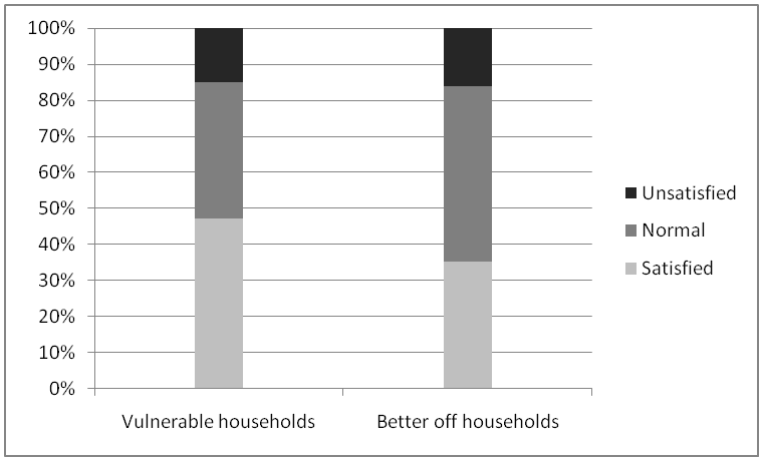


Figure 5-22: Perceived overall satisfaction level between SEG

5.5. Access components scores between SEG

Moreover, when scores were compared between socio economic groups, both groups did not show variation on level of accessibility which also justify the previous finding that, walking time and mode of transport used between the two groups was not different. This relationship was statistically insignificant as described in section 5.3.1. Acceptability has shown high scores from both socio economic groups as Figure 5-23 shows. This is because, most respondents regardless of their socio economic status does not consider cultural, religious and gender preferences when choosing a facility to attend. As a result, both groups seem to be satisfied with the current situation with respect to acceptability. Moreover, affordability scores are medium and both SEG have the same score. This is because; majority of respondents has similar characteristics from sampled residential areas. Moreover, both medication cost and overall cost of healthcare did not show large differences as discussed in Figure 5-14 and Figure 5-15. Despite both socio economic groups having the same availability score, individual indicators like waiting time, drug availability and human resource shortage had a significant difference as described in section 5.2.2. The scores over shadows some indicators and hence similarities over all variables is observed. On the same note, adequacy also scored lower. This might be due to insignificant of three indicators of adequacy. Moreover, medical ability also did not show a strong variation between SEG, but variation was between facility types as shown in Table 5-9. Therefore, this summary scores show that, there is limited variation of socio economic groups among sampled residential areas and people's perceptions in different access components.

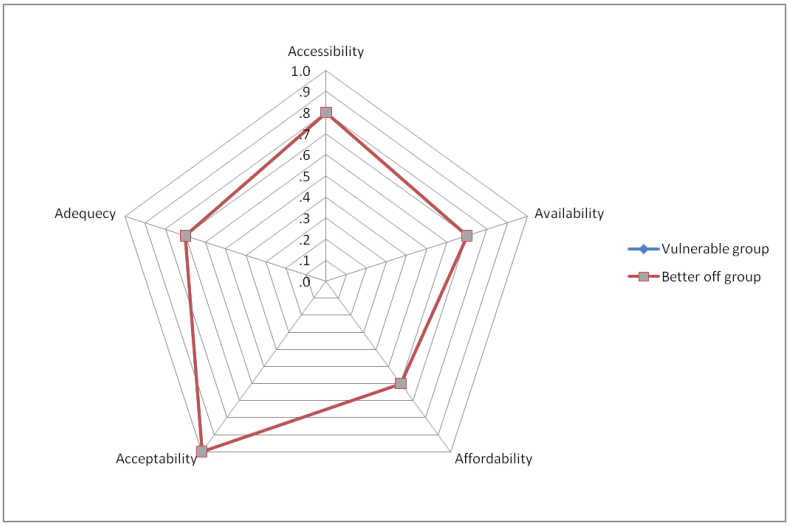


Figure 5-23: Summary scores on access components and SEG

Conclusion

Household socio economic groups have shown differences among different indicators of access components. Long waiting time, drug shortage, medication cost, possession of health insurance card and medical ability are the main indicators shown significant difference between SEG. However, accessibility and acceptability did not show any variation between SEG. Both groups had insignificant difference on estimated walking tine and mode of transport used. Moreover, indicators of acceptability did not show any variation between socio economic groups. Therefore, socio economic characteristics have influence on access to primary healthcare but there other factors influencing access.

5.6. Does access to primary healthcarechange over time?

This section aimed at comparing different components of access to primary healthcare and identifies changes over time. These variations were observed by comparing collected data and available secondary data collected in 1995. The earlier data selected in the same areas are used for comparison purpose. The existing data is not fully compatible with collected data, but few indicators are used for comparison. After selecting the required subset in the data file, about 488 households obtained from all 11 sampled residential areas. Based on the available data set, changes over time were evaluated based on access components with few available indicators. Transport mode used, general motives for visiting health facility, user of health facility and availability of health facilities levels within walking distance are used for comparison.

5.6.1. Accessibility to primary healthcare

Changes in accessibility are evaluated using modes of transport used and estimated travel time to different types of health facilities. Table 5-10 show that mode of transport used has changed over time. More facilities have been opened since 1995 which reduced the friction of distance too healthcare. This is justified by comparing existing data set and new dataset from Mennonite Economic Development Association (MEDA). Healthcare facilities in Dar es Salaam have increased by 38 percent from 1995. Therefore, more people are walking when visiting different healthcare facilities while the use of public transport and private car is declining. This change is accelerated with availability of healthcare within short distance. Moreover, implementation of health policy on public private partnership also has an influence on

opening of healthcare facilities. For a long time walking shows to be a stable mode of transport majority of residents use, even though public transport also have shown insignificant change over 15 years. Despite of this changes, but walking have remained the major mode of transport used by majority.

Table 5-10: Changes on mode of transport used

	Household survey 1995		Household survey 2010	
Mode of transport	N	%	N	%
Foot	257	52.5	409	68.9
Public transport	179	36.7	148	24.9
Private car	49	10.1	26	4.4

5.6.2. Availability and affordability of healthcare

Change in availability is measured using types of health facilities people visit and different motives on choice of health facility were used to evaluate changes over time. The use of health facilities both private and public have marginally changed after 15 years. The level of affordability and competency among government health facilities make it stronger and needed more by the general public. This change can also be contributed by construction of new facilities which serve more people. Despite all, the effect of health sector reform in introducing private public partnership in complementing public facilities on provision of healthcare still does not show much impact over 15 years as Table 5-11 shows. This shows that government facilities are still strong focal point which attracts more people than the private sector. This is because of affordability of healthcare provided from government facilities and referral possibilities.

Table 5-11: Changes on the use of health facility type

	Household survey 1995		Household survey 2010	
Facility type	N	%	N	%
Government	217	55	359	60
Non government	171	45	235	40

Despite the above mentioned, this paragraph is explaining the main motives of choosing a PHC. Figure 5-24 show the main motives for choosing both government and non government facilities. Motives on choosing healthcare facility have changed slightly from 1995 to 2010 from both facility types. People visiting government facilities in both years considered cost of health service more than distance to a facility they attend. The motive on cost in 1995 was very high as compared to 2010. This indicates that despite of cost, currently people have other motives like less crowding which was not considered previous. Moreover, introduction of user charges in government facilities has contributed lower motivation on cost as it was in 1995. But, drug availability and distance to facility have not changed over time as the main motives of visiting non government facilities. Besides, less crowding have shown a slight decline, this is because non government facilities are experiencing shortage of human resource as well but not as government facilities. On the same note, more people have considered cost in non government facilities as their motive than 1995.Generally, the motive for choosing healthcare facilities have not shown a remarkable difference over 15 years. This shows that, the mention factors are the most driving force of effective use of healthcare facilities in a study area. As a result of lower cost in government facilities more people use it regardless of other limitations as discussed previously.

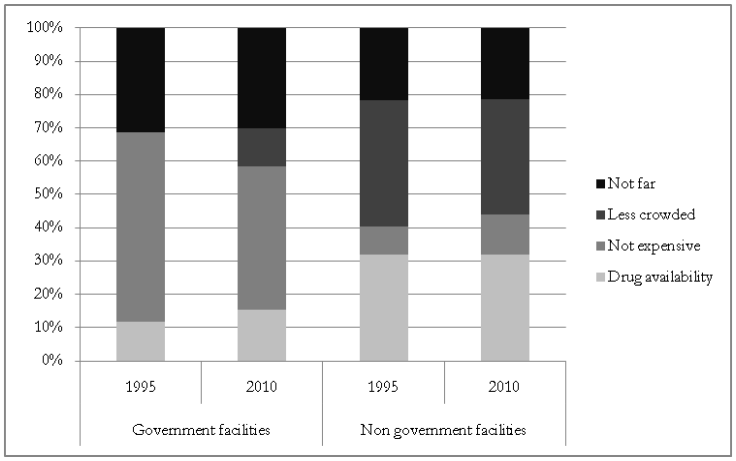


Figure 5-24: Main motives for visiting healthcare facilities over time

Conclusion

Access to healthcare has shown some differences and similarities over a long period of time. Accessibility to healthcare has shown some improvement where by users are now walking shorter distances to healthcare of their choice. Furthermore, walking has remained a major mode of transport used by majority when visiting healthcare. This is facilitated with availability of many providers within shorter walking distances especially dispensaries which is the mostly used health facility level. People's motives on visiting a healthcare facility had remained unchanged for facility types, but less crowding observed to be a new motive among government healthcare users. Additionally, government health facilities have remained to be a magnetic force which attracts more people than non government facilities. What does the policy say about observed issues in access? The next section describes more on the mentioned issues in relation to health policy.

5.7. Existing policy objectives and identified variations on access

The Ministry of health and Social Welfare (MoHSW) is the government agency responsible for monitoring and evaluating implementation of the health policy. The implementation of the health policy and other health programmes for providing healthcare are implemented by Regional and Local government authorities, voluntary agencies, faith based organisations, occupational and private sector through public private partnership. The policy objectives mentioned in section 3.3.1 have shown variations on different components of access to primary healthcare. The policy objective aimed at ensuring healthcare services are available and accessible to all has not been attained as expected. Availability of drugs, long waiting time before service and shortage of health personnel shortage are still the challenges for policy implementation. More people are still experiencing long waiting times when seeking healthcare, and this has been observed to be critical on government facilities. Users of healthcare facility can wait up to 2hours on average before attended by health personnel. However, non government facilities are also facing this problem but the magnitude is lower. Even though the policy aimed at making available competent and adequate health staff, financial shortages and inadequate training institutions to satisfy the requirement is still a challenge. Therefore, shortage of health personnel is still a challenge for ensuring quality healthcare and reducing waiting time experienced by patients. Moreover, physical accessibility to primary health facilities satisfied the threshold of 5km to health facility. Majority of respondents (63 percent) from sampled residential areas can access a facility within 30 minutes walking distance. Despite that, 72 percent of respondents have access to dispensaries within 2km. This facility level is more accessible within a shorter distance than other levels of health facilities. From selected residential areas accessibility performed better but this might not be the case in the whole Dar es Salaam.

Furthermore, the government through the national health policy introduced user charges as financing strategy to complement the cost incurred by the government and private providers in delivering healthcare service. Due to this, affordability to healthcare was observed to be a problem for most of respondents especially on medication cost and general cost. Moreover, people using private facilities perceived the costs to be more expensive than in public facilities. This is due to a profit mechanism used by private facilities to operate. This situation creates limitation to the disadvantaged group to benefit from the private services initiated to complement the public sector on healthcare service delivery. Besides, health insurance card possession was used as an indicator of affordability, but minority reported to have it, 92 percent of respondents not have health insurance. This shows that majority of residents are not well informed on different mechanisms they can use to ensure medical protection before they fall sick. This also showed that, the level of awareness over health insurance among users is very limited.

Inequality in access to primary healthcare has been observed between different socio economic groups. Vulnerable socio economic groups do not have access to better medication and experience longer waiting times compared to the better off group. Furthermore, affordability on medication cost is a problem among the vulnerable group and majority do not possess health insurance cards. All this together creates inequality on access to primary healthcare between groups. The policy objective on ensuring access to health is accessible for all regardless of their socio or economic status was in the lower level of it is implementation. Moreover, the national health policy identified exemption of user charges to vulnerable groups (children under 5, the aging, pregnant women and disabled) and the poor but how the poor can be identified has not been explained. This remained as a dilemma to disadvantaged people seeking healthcare in any primary healthcare facility. Unavailability of specific guideline for identification provides more opportunities to better off households to access better healthcare and leave aside the poor and vulnerable groups who are majority.

When evaluating access to healthcare from 1995 to 2010, several remarkable observations described the strength of the public sector on delivering healthcare to the general public. Despite the fact that, the national health policy through health sector reforms promoted public private partnership in the delivery of health service. But a little has been achieved from the private sector as compared to public sector. Public health facilities have remained the most visited healthcare facilities over 15 years as described in section 5.4. This highlights the need of rethinking about the level of service offered by non government facilities or the profit oriented mechanism adopted by the private sector instead of service delivery to the general public. Moreover, the primary aim of public private partnership should be evaluated to see if the implementation of the policy was effective.

Conclusion

For selected study areas, most of policy objectives have not achieved as mentioned in the national health policy. The level of service provided to healthcare users is still unsatisfactory where by shortage of human resource, drug shortage and long waiting time affects majority of healthcare users especially the vulnerable and the poor. Moreover, cost of healthcare provided has remained to be a critical challenge facing users. On the other hand, ineffectiveness of public private partnership contributed to weaken the performance of the government health facilities as more people cannot afford to use non government healthcare facilities. Therefore, the primary aim of public private partnership of complementing public sector on healthcare service provision was not attained as expected. All identified issues and challenges are discussed in detail in the next chapter.

6. DISCUSSIONS ON FINDINGS

This chapter links the results obtained when answering different research questions together with a broader theoretical understanding of concepts related to access to primary healthcare. Moreover, critical discussions on the success and the limitations of the study discussed.

6.1. Sub objective 2: Measure of socio economic status

This section aimed at measuring socio economic status of household characteristics. The reviewed literature have shown that, socioeconomic variables like access to water, dwelling house characteristics (building material), access to electricity, household income, expenditure, education level and asset possession used to measure household socio economic status (Amer, 2007; Sarpong, et al., 2010; Shrestha, 2010; Veugelers & Yip, 2003; Vyas & Kumaranayake, 2006). This literature supports the fact of using socio economic variables for classification of socio economic groups. The same variables were used for classification o socio economic groups. Based on that, respondent's socio economic characteristics were classified using a two step cluster analysis. The functional capacity of handling large data set with mixed variables makes it suitable for this study. This advantage has been observed also by Amer, (2007), Satish & Bharadhwaj, (2010) and Shrestha(2010). Moreover, the two step cluster analysis requires more preparation of variables and measure the level of similarities between variables is important for formation of clusters (Wong, 2006).The cluster analysis observed as a most useful tool for classification of socio economic groups. The results were realistic, identified vulnerable households (71 percent) were living in informal settlement. Therefore, the homogeneity identified in clusters reduced variations between other variables.

In-line with the process, two different clusters were obtained from categorical variables mentioned in Table 5-2. Limited clusters were obtained due to homogeneity of sampled residential. Therefore, socio economic clusters were named using different socio economic characteristics but the naming was somehow subjective because the process depended only on the percentage of people with a certain characteristic in the cluster. The classification showed that, majority of respondents (66 percent) belonged to a vulnerable group and 35 percent the better off group. When comparison was made with settlement types, a statistical test was significant, showing that more vulnerable households are dominant in informal settlements than in formal settlement. The nature of informal settlements in Dar es Salaam, justify the vulnerability of households belonging to a vulnerable group. Lack of sanitary facilities, poor access to water, lack of electricity, high density and poor housing conditions are the main characteristics faced by vulnerable groups.

Due to homogeneity among variables and sampled residential areas, access score between SEG was similar for all five components of accessibility, availability, affordability, adequacy and acceptability.

6.2. Sub objective 1 and 3: Access to primary healthcare between socio economic groups

Access concept and different methodological approaches used have been discussed in section 2.2. Different methods and concepts read in section 2.2 were used to conceptualise the framework for evaluating this study.

Physical accessibility in access to primary healthcare has showed different variations in much literature (Amer, 2007; Liu, et al., 2009; Omer, 2006; Owen, et al., 2010). However, slight variations have been

observed also in this study. Generally, a network analysis was estimates that 63 percent of respondents can access a healthcare within 30 minutes. Moreover, the household budget survey 2007, also described around 75 percent of households have access to dispensary/health centre within less than 2km (United Republic of Tanzania, 2009). Therefore, physical accessibility was not a major issue in this study. This has been contributed by implementation of the health policy through public private partnership where more facilities have been opened and a physical barrier was reduced. Socio economic groups did not show any difference in walking time.

Availability of quality primary healthcare has been a challenge to many locations (Liu, et al., 2009; Owen, et al., 2010; Perry & Gesler, 2000). Shortage of health personnel, availability of drugs, availability of equipment and long waiting time were observed as great challenges on primary healthcare provision in a study area. This situation is influenced by financial shortage faced by a public healthcare sector on their ability to supply drugs, equipments and training adequate and skilled health human resource. Furthermore, human resource scarcity in non government sector appears less problematic and less constrained on service provision than government facilities. Both facility types are facing inadequate personnel to meet the need of healthcare users. Moreover, the intensity of shortage of staff has been described in Table 3-2. The scarcity of health personnel in government facilities contributed by health workers leaving the public sector and join with private sector for better financial benefit and better working conditions. Moreover, social economic groups have shown some differences where by vulnerable households faces more challenges than the better off. The challenges are accelerated by financial difficulties which forces people to use government healthcare facilities which are also faced with shortage of human resources and financial shortage to provide adequate drugs. But, the policy identified the vulnerable and the poor to be exempted from user charges, however, this has not been enforced yet and there is no mechanism imposed for identification of the poor. Due to this dilemma, the poor and vulnerable group are still facing challenges when seeking healthcare.

Together with availability of healthcare, affordability to primary healthcare observed as a problem especially on medication cost and the overall cost. This situation becomes more serious on non government facilities than public facilities. More than 50 percent of non government facility users complained on high medication cost and the overall cost charged. The increased cost in non government facilities becomes unaffordable to general public. This can be caused by absence of price regulations on non government providers as it is on government facilities. However, the profit making mechanism adopted during health sector reform also contributes to this cost escalation. Therefore, the increase in health cost on non government healthcare facilities reduced the number of users and adds the burden to government facilities. As a result, government facility serves 60 percent of all respondents from sampled residential areas. On the other hand, the primary aim of complementing the public sector on healthcare provision has no meaning if profit making becomes more important than peoples need. This also has contributed to significant difference between vulnerable and better off households. Poor households have little capacity to purchase medication and they perceived it to be expensive than the better off households. Moreover, access to health insurance card among the vulnerable was insignificant as compared to better off cluster. Despite the fact that, health policy has exemption of user charges to vulnerable groups and the poor but none mentioned to be exempted. This highlights that, majority of people are not aware and no effort has been made to implement it especially for the poor.

Acceptability and adequacy have been used in different literature to evaluate the level of access to primary healthcare (Novartis Foundation, 2008; Obrist, et al., 2007; Penchansky & Thomas, 1981; Shrestha, 2010). Cultural and religious factors as measure of level of acceptability in healthcare provision did not show any significance in the study areas. This is due to the facts that, sampled residential areas have mixed have mixed cultures and different religious beliefs. These beliefs are not considered when seeking primary

healthcare facilities. Moreover, inadequate of health human resource in both public and private facilities in the city, justified the insignificance of gender preferences when seeking primary healthcare. This was not different when comparison was made between different socio economic groups. Therefore, both groups had similar perception on mentioned issues and acceptability was not a problem for this study. Unfriendly behaviour and medical ability were found to be dominant factor on measuring adequacy to primary healthcare. This situation was dominant on government healthcare facilities than non government. The unfriendly behaviour of health personnel can be associated with frustration, overworking, management issues on following professional ethics and code of conduct or unhappiness of payments and working conditions. This has been also observed in South African health system as reported in South African Human Right Commision,(2009). Provision of good healthcare is still a striking challenge to most of healthcare providers, and achieving quality healthcare need qualified and competent staffs, adequate equipments, sufficient drugs, manageable cost and strong management.

6.3. Sub objective 4: Changes in access to healthcare over time

Over fifteen year, access to healthcare in sampled residential areas has shown some changes and similarities in different variables of access. Walking has remained the major mode of transport used by majority of residents when visiting healthcare facilities. However, more people are now walking as compared to 1995 while few people us public transport and private car than 1995. This mode shift has been facilitated with the implementation of health policy on public private partnership which facilitated opening of more private healthcare facilities. Despite the effective implementation of public private partnership, government health facilities have remained to be strong focal point for provision of healthcare to majority of residents. The use of private health facilities have declined while government facilities still attracts more people than it was fifteen years back. However, a comparison of HBS 2007 and 2001 also reflected more use of public facilities than it was in 2001(United Republic of Tanzania, 2009b). Generally, people's motives on choosing healthcare facilities have not shown a remarkable difference over 15 years. Health service cost and physical accessibility are strong variables motivates users to use public health facilities. This shows that, the mentioned factors are the most driving force for effective use of healthcare facilities in a study area. This is observed in government facilities where majority visit because of affordability compared to non government facilities.

The implementation of user fee charges on government facilities reduced the affordability motive, but still more people can afford government fee than costs on non government health facilities. The motives on non government health facilities users have remained to be drug availability, proximity and less crowed. Drug availability and distance have remained unchanged while the motive on less crowed have slightly changed. This change is due to shortage of health human resources in both sectors, this also contributes to more waiting time which in turn resulting to overcrowding.

6.4. Sub obective 5: Existing policy issues and observed state of access

Observed state of access to primary healthcare is reflected in existing health policy established by MoHSW. Physical accessibility to healthcare, availability of healthcare and affordability are the main elements highlighted in the health policy. The health policy objective focused on ensuring healthcare facilities are accessible and available to all regardless of socio economic group has partly implemented. Physical accessibility has shown to meet the policy standard as majority of people have access to a health facility less than 5km. Moreover, policy objective on availability of healthcare have not performed well due to lack of qualified human resource, drug availability and availability of equipments are still major limiting factors for implementation of healthcare and health reform. This has resulted to long waiting time and poor quality of service in both government and non government health facilities. But, this situation is

more critical in government facilities which serve the large population than non government facilities. Furthermore, shortage of financial capacity in training more health professionals has been a striking challenge to achieve the policy objective. However, the increased number of retired health professionals with reduced civil service employment escalates the shortage of health professionals. So, this shows that the attainment of the policy objective on having sufficient and well trained professionals at all levels is still a great challenge to achieve.

Despite the challenges on availability of healthcare, cost on healthcare was among the challenges observed facing most of respondents. The introduction of user charges to complement the government financing ability has resulted to cost increased to healthcare users. This situation is more on private sector as they operate under profit making mechanism, this make private sector expensive to majority of users. In addition, the intended aim of complementing the government facilities on healthcare provision is not attained as a result more people still use government healthcare facilities. The policy issue on cost exemption was not well implemented as none of respondents reported to be exempted from healthcare costs. However, the policy does not clearly explain who the poor are and how they can be identified. Lack of awareness among primary healthcare users on exemption of user charges influenced the level of access to healthcare facilities among the vulnerable and the poor. Additionally, lack of clear policy guide line and definition of who is the poor and who not make it more difficult to implement.

Health policy concerning the national health insurance was found not well implement as majority of respondent reported not to have health insurance. The possession of a health insurance policy provides protection and confidence of being able to have access to healthcare. However, this is provided only to employee in the formal sector which excludes majority of people. Therefore, this shows that awareness on the existence of national health insurance to formal employee and community health fund for general public is very low. Besides, health professional behaviours especially on government facilities were reported to be unfriendly. This can be a result of lack of implementation of professional ethics and code of conducts among workers. However, over working, frustration, low payment and unhappiness on working conditions could also be the contributing factors to such behaviours. This has been also mentioned as barriers to human resource improvement in poverty and human development report (United Republic of Tanzania, 2005). Therefore, awareness on health insurance and community health funds to majority of people my help to promote access to healthcare among the disadvantaged.

The policy issue on promoting public private in health service delivery has not been successful after 15 years. More facilities have been opened which have reduced friction of distance and increase the availability of providers. But the intended aim of complementing government health facilities on healthcare provision has been declining. More people now are using government health facilities than it was in 1995 as described in Table 5-11. Potential for profit lather than need have been a deciding factor on expansion of non government healthcare facilities in study area, due to this, the burden on healthcare provision is still on government facilities. Additionally, low trust, competence and excessive cost on non government health facilities contributed to its lower performance and acceptance among the general public. Despite short comings, government health facilities still attract more people. This is because of competence, trust, ability and affordable services provided to the general public. All this shows the ineffectiveness of the adopted system on reducing the burden of service provision from government facilities.

7. CONCLUSIONS AND RECOMMENDATIONS

In this chapter, all the findings and discussions are summarized and different suggestions on the way forward on improving access to primary health care suggested. In addition, recommendations for future improvements and area for further study specified.

7.1. Conclusions

This research was focused on evaluating access to primary healthcare using access components and users socio economic characteristics. Therefore, socio economic characteristics were used to classify different socio economic groups used to measure if variations exist on access to primary healthcare. Dar es Salaam was used as a study area for this study. Conceptualization of this research was built on accessibility, availability, affordability, acceptability and adequacy, on contrast with many studies using only physical accessibility and availability. The following sections describes conclusion on the finding of the research addressing the aim of this research by answering sub objectives.

7.1.1. Sub objective 2: Measure of socio economic status/differences

Socio economic characteristics are important elements for understating people's perceptions Furthermore, the two step cluster analysis is a powerful explanatory tool which is most useful for classification of large data sets. Moreover, socio economic variables have show significant differences between settlement types even though the variation between sampled residential areas was limited. Study of people's perceptions on PHC between different locations with different characteristics can give better understanding of variations between socio economic and their perceptions on access components. Additionally, informal settlements were dominated with majority of vulnerable households while better off households concentrated in formal settlements. The statistical test showed that, there is a strong relationship between household's characteristics and type of settlement they come from.

7.1.2. Sub objective 3: Access to primary healthcare between socio economic groups

On measuring different indicators of access components, different variations were observed. Physical accessibility was not a problem as majority of respondents had an opportunity to attend the facility of their choice within shorter walking time. Furthermore, drug availability, health human resource, availability of equipments and long waiting time are problematic on both facilities, even though more dissatisfaction was on government healthcare facilities. Furthermore, affordability of primary healthcare also observed to be a problem, especially medication cost and overall costs of healthcare. The costs were higher for non government facilities users than government users. But, acceptability was not a problem in the sampled residential area because of mixed nature of people with mixed culture and religious beliefs. Unfriendly behaviour under adequacy was observed to be a problem especially in government health facilities than non government facilities.

On the other hand, noticeable variations were observed between socio economic groups on waiting time, drug availability, medication cost, health insurance and medical ability. The vulnerable groups faced more challenges on mentioned indicators than the better off group. Financial difficulties among the vulnerable groups reduced the ability of users to access healthcare facilities especially in non-government facilities.

The overall satisfaction level to primary healthcare is influenced by different indicators of access components. But, generally, user of non-government facilities reported to have higher level of satisfaction while majority of government users reported to normal. Moreover, factors related to availability, affordability and adequacy was problematic in the study area which affected the level of satisfaction of users. Accessibility and acceptability was not a problem in a study area and hence contributed positively on people's satisfaction. On the other hand, the level of satisfaction between socio economic groups was statistically insignificant, where by all socio economic groups had similar satisfaction levels on primary healthcare facilities they visit.

7.1.3. Sub objective 4: Changes on access to healthcare over time

The sub objective was to evaluate if access to primary healthcare changed overtime in 11 sampled residential areas. Changes on the mode of transport used to visit healthcare facility showed that, majority of people walk more when visiting healthcare than as it was 1995. Other modes of transport like public transport and private car were not mostly used. This change was influenced by policy change and health sector reform which allowed public private partnership in healthcare provision. Despite of increased number of providers, government healthcare facilities have remained to be a strong service provider than non-government health facilities. Affordable cost and proximity to primary healthcare have remained to be strong motives for users visiting government healthcare facilities while drug availability and less crowding are dominant reasons for attending non-government healthcare facilities. Furthermore, the uses of healthcare facility levels have change overtime, dispensaries are still the mostly used level of healthcare facility. This resulted to the decline of number of providers on the higher level as a result of under consumption.

7.1.4. Sub objective 5: Existing policy issues and observed state of access

The fifth sub objective aimed to assess how the health policy objectives correspond with identified issues between socio economic groups. Considering heath policy objective on ensuring physical accessibility and availability of healthcare to all, accessibility was found to satisfy the policy objective as majority had access to PHC within short walking time. On contrast, availability of healthcare was problematic where drug availability, shortage of human resource, long waiting time and availability of equipments report to be a problem. Scarcity on financial resource on government facilities hampered the implementation of capacity building and training to bridge the gap of human resource in health sector. On the other hand, a significant variation was observed between socio economic groups on waiting time and drug availability. The ineffective implementation of this policy objective affected more vulnerable households than better off households. But, availability of providers was not a problem and more had access to healthcare within a short distance. Affordability was also reported to be problematic generally and between socio economic groups. The vulnerable groups experienced affordability problems than better off groups; this variation was specifically on medication cost and overall healthcare cost. Despite the exemption of user charges to the vulnerable group and the poor in the policy document, it is implementation had remained ineffective. Therefore, creating awareness to the general public and formulation of mechanism of identifying the poor and vulnerable groups is important for ensuring the disadvantaged have access to healthcare.

7.2. Recommendations

Based on research findings, limitation of data availability and methodological limitations experienced for this study, there are a number of issues recommended for future research development as described below;

- The limitation of human resource information limited other analysis to be performed .There spatial comparison on variation of access can be evaluated using availability of data on human resources from each healthcare, detailed spatial methodologies like E2SFCA can be used to evaluate the level of accessibility and availability of healthcare facilities.

- Evaluation of people's perceptions on access components between central located areas and peri urban areas. This will help understand the spatial differences and variation on access to PHC. Moreover, more samples can be collected from different locations to have a wider comparison.

- Analysis of variation on access to PHC can be evaluated in a disaggregated scale on provider's types. In this study aggregation was done between government and non-government (private, occupation, faith based and voluntary). The comparison of level of access to healthcare at disaggregated level of providers and facility types would help to understand better utilization of healthcare facilities based on SEG.

7.3. Policy recommendation

- The study revealed that, more than 15 years the burden of patients on public sector is increasing despite of introduction of non-government health facilities to complement the public sector. Therefore, rethinking over the effectiveness of the public private partnership would give way on new mechanism to be used so as to reduce the burden to public facilities and ensure better primary healthcare for majority than minority.

- To ensure healthcare is accessible to majority, MoHSW should consider provision of community health insurance scheme. This will accommodate majority of healthcare users who are not government employee. Also, the reform will provide more opportunities to the disadvantaged to have confidence on accessing primary healthcare and might reduce variation on access between socio economic groups. Furthermore, preparation of identification cards for the poor will reduce contradiction on who is legible to receive exemption.

Provision of equitable access to primary healthcare for all is a challenge faced many authorities to accomplish. To manage that, financial resource need to be properly balanced among many requirements for healthcare provision. The large number of health providers is useless without adequate health personnel, sufficient drugs, equipments and other necessary supplies. The strengthening of healthcare system would help to ensure access to all five components of access to majority of people in need. More efforts should be made from healthcare providers and policy makers to ensure access to healthcare is well accessed by majority of the population regardless of their socio economic status. But more emphasize should be also to the vulnerable groups and the poor who does not have financial means for alternative healthcare.

Above all, the findings of this study have explained existing variations on access to primary healthcare from wider perspective using access components. The results pin point the most challenging aspect on ensuring access to primary healthcare for all regardless of socio economic status. Moreover, dominant factors on access to healthcare were highlighted with the comparison after 15 years. These findings might

be of use for health planners and policy makers for further improvement of healthcare system and healthcare provision in Dar es Salaam.

LIST OF REFERENCES

Aday, L., & Andersen, R. (1974). A Framework for the Study of Access to Medical Care. *Health ServicesResearch 9, 3*, 208–220.

Ahmed, S., J. (2005). *Improving access to public health care services : a case study on Dar es Salaam, Tanzania.* ITC, Enschede.

Amer, S. (2007). *Towards spatial justice in urban health services planning : A spatial - analytic GIS - based approach using Dar es Salaam, Tanzania as a case study.* Utrecht University, Utrecht.

Amin, R., Shah, N. M., & Becker, S. (2010). Socioeconomic factors differentiating maternal and child health-seeking behavior in rural Bangladesh: A cross-sectional analysis. *International Journal for Equity in Health, 9*.

Andersen, R., & Aday, L. (1978). Access to medical care in the US: Realized and potential. *Medical Care, XVI*(7), 533-546.

Andy, F. (2009). *Discovering statistics using SPSS* (Third ed.). London: SAGE Publication Ltd.

Baker, J., & Liu, L. (2006). The determinants of primary health care utilization: a comparison of three rural clinics in Southern Honduras. *GeoJournal, 66*(4), 295-310.

Dar es Salaam City Council. (2002). *Minimum Health Package of Health and Related management Activities*. Dar es Salaam: Dar es Salaam CityCouncil.

Dar es Salaam City Council. (2004). *Dar es Salaam City Profile.*

Field, K. (2000). Measuring the need for primary health care: an index of relative disadvantage. *Applied Geography, 20*(4), 305-332.

Filmer, D., & Pritchett, H., L. (2001). Estimating wealth effects without expenditure data or tears: An application to educational enrollments in states of India. *Demography, 38*(1), 115 - 132.

Guagliardo, F. M. (2004). Spatial accessibility of primary care: concepts, methods and challenges. *International Journal of Health Geographics, 3*, 1- 13.

Gulzar, L. (1999). Access to Health Care. *Journal of Nursing Scholarship, 31*(1), 13-19.

Handy, S., L. (1997). Measuring accessibility:an exploration of issues and alternatives. *Environment and Planning A, 29*, 1175 - 1194.

Henricson, K., Melander, E., Mölstad, S., Ranstam, J., Hanson, B. S., Rametsteiner, G., et al. (1998). Intra-urban variation of antibiotic utilization in children: influence of socio-economic factors. *European Journal of Clinical Pharmacology, 54*(8), 653-657.

Higgs, G. (2005). A Literature Review of the Use of GIS - Based Measures of Access to Health Care Services. *Health Services & Outcomes Research Methodology, 5*, 119 - 139.

Jatrana, S., & Crampton, P. (2009). Primary health care in New Zealand: Who has access? *Health Policy, 93*(1), 1-10.

Kagamimori, S., Gaina, A., & Nasermoaddeli, A. (2009). Socioeconomic status and health in the Japanese population. *Social Science & Medicine, 68*(12), 2152-2160.

Khan, A., . A. (1992). An integrated approach to measuring potential spatial access to health care services. *Socio-Economic Planning Sciences, 26*(4), 275-287.

Khan , A. A., & Bhardwaj, S. M. (1994). Access to health care. A conceptual framework and its relevance to health care planning. *Eval Health Prof, 17*(1), 60 - 76.

Klemick, H., Leonard, K. L., & Masatu, M. C. (2009). Defining Access to Health Care: Evidence on the Importance of Quality and Distance in Rural Tanzania. *American Journal of Agricultural Economics, 91*(2), 347-358.

Kothari, C. R. (2004). *Research Methodology: Methods and Techniques* (Second ed.). Delhi, India: New age international limited.

Lau, J. C. Y., & Chiu, C. C. H. (2003). Accessibility of low-income workers in Hong Kong. *Cities, 20*(3), 197-204.

Liou, F. M., & Ding, C. G. (2002). Subgrouping Small States Based on Socioeconomic Characteristics. *World Development, 30*(7), 1289-1306.

Liu, Y., Wong, S. Y., & Jin, T. (2009). Equality of Spatial Access to primary health services for Singerpore's baby boomers *Asian Population Studies, 5*(2), 171 - 188.

Lotfi, S., & Koohsari, M. J. (2009). Measuring objective accessibility to neighborhood facilities in the city (A case study: Zone 6 in Tehran, Iran). *Cities, 26*(3), 133-140.

Lowe, J. M., & Sen, A. (1996). Gravity Model applications in health planning: Analysis of an urban hospital market*. *Journal of Regional Science, 36*(3), 437-461.

Luo, W. (2004). Using a GIS-based floating catchment method to assess areas with shortage of physicians. *Health Place, 10*, 1 - 11.
Luo, W., & Qi, Y. (2009). An enhanced two-step floating catchment area (E2SFCA) method for measuring spatial accessibility to primary care physicians. *Health & Place, 15*(4), 1100-1107.
Luo, W., & Wang, F. (2003). Measures of spatial accessibility to health care in a GIS environment: Synthesis and a case study in the Chicago region. *Environment and Planning B: Planning and Design, 30*(GEOBASE), 865-884.
Makinen, M., Waters, H., Rauch, M., Almagambetova, N., Bitran, R., Gilson, L., et al. (2000). Inequalities in health care use and expenditures: empirical data from eight developing countries and countries in transition. *Bulletin of the World Health Organization, 78*(1), 55-65.
McGrail, M. R., & Humphreys, J. S. (2009). Measuring spatial accessibility to primary care in rural areas: Improving the effectiveness of the two-step floating catchment area method. *Applied Geography, 29*(4), 533-541.
Millman, M. (1993). *Access to Health Care in America*. USA: National Academies Press.
Mubyazi, G., M. (2004). The Tanzanian Policy on health-care free waivers and exemptions in practice as compared with other developing countries: Evidenced from recent local studies and international literature *East African Journal of Public Health, 1*(1), 1 - 10.
Novartis Foundation. (2008). *Creating access – for better health*. Switzerland.
Obrist, B., Iteba, N., Lengeler, C., Makemba, A., Mshana, C., Nathan, R., et al. (2007). Access to Health Care in Contexts of Livelihood Insecurity: A Framework for Analysis and Action. *PLoS Med, 4*(10), 1584 - 1588.
Okazaki, S. (2006). What do we know about mobile Internet adopters? A cluster analysis. *Information & Management, 43*(2), 127-141.
Oliver, A., & Mossialos, E. (2004). Equity of access to health care: outlining the foundations for action. *Journal of Epidemiology and Community Health, 58:*, 655-658.
Omer, I. (2006). Evaluating accessibility using house-level data: A spatial equity perspective. *Computers, Environment and Urban Systems, 30*(3), 254-274.
Owen, K., K, Obregón, E., J, & Jacobsen, K., H. (2010). A geographic analysis of access to health services in rural Guatemala. *International Health, 2*(2), 143-149.
Penchansky, R., & Thomas, W. (1981). The concept of access. Definition and relationship to consumer satisfaction. *Medical Care, XIX*(2), 127-140.
Perry, B., & Gesler, W. (2000). Physical access to primary health care in Andean Bolivia. *Social Science & Medicine, 50*(9), 1177-1188.
Rip, M. R., Keen, C. S., & Woods, D. L. (1987). Intra-urban variations of neonatal and post-neonatal mortality in a developing city. *Social Science & Medicine, 25*(8), 889-894.
Rosero-Bixby, L. (2004). Spatial access to health care in Costa Rica and its equity: a GIS-based study. *Social Science & Medicine, 58*(7), 1271-1284.
Rutstein, O., S. (2008). The DHS wealth index: Approaches for Rural and Urban areas. *Demographic and Health Research*(60), 1-21.
Sarpong, N., Loag, W., Fobil, J., Meyer, C. G., Adu-Sarkodie, Y., May, J., et al. (2010). National health insurance coverage and socio-economic status in a rural district of Ghana. *Tropical Medicine and International Health, 15*(GEOBASE), 191-197.
Satish, S. M., & Bharadhwaj, S. (2010). Information search behaviour among new car buyers: A two-step cluster analysis. *IIMB Management Review, 22*(1-2), 5-15.
Schuurman, N., Berube, M., & Alorie A., C. (2010). Measuring potential spatial access to primary health care physicians using a modified gravity model. *Canadian Geographer / Le Géographe canadien, 54*(1), 29-45.
Shrestha, J. (2010). *Evaluation of access to primary healthcare : a case study of Yogyakarta, Indonesia*. ITC, Enschede.
South African Human Right Commision. (2009). *Public Inquiry: Access to healthcare services*. South Africa: South African Human Right Commision.
UN HABITANT. (2010). *Informal Settlements and Finance in Dar es Salaam,Tanzania*. Nairobi: UN-HABITANT.
United Republic of Tanzania. (2005). *Poverty and Human Development*. Dar es Salaam.
United Republic of Tanzania. (2009a). *Health Sector Strategic Plan III: July 2009 - June 2015*. Dar es Salaam: Ministry of Health and Social welfare.
United Republic of Tanzania. (2009b). *Poverty and Human Development* Dar es Salaam.
United Republic of Tanzania (2010). *Health Sector Performance Profile*. Dar es Salaam: Ministry of Health and Social Welfare.

United Republic of Tanzania. (2002). *Population and Housing Census*. Dar es Salaam: National Bureau of Statistics.
United Republic of Tanzania. (2007a). *National Health Policy*. Dar es Salaam: Ministry of Health and Social Welfare.
United Republic of Tanzania. (2007b). *Primary Health Services Development Programme: 2007 - 2017*.
United Republic of Tanzania. (2009). *Household Budget Survey*. Dar es Salaam: National Bureau of Statistics.
Veugelers, P. J., & Yip, A. M. (2003). Socioeconomic disparities in health care use: Does universal coverage reduce inequalities in health? *Journal of Epidemiology and Community Health, 57*(GEOBASE), 424-428.
Vyas, S., & Kumaranayake, L. (2006). Constructing socio-economic status indices:how to use principle components analysis. *Health Policy and Planning, 21*(6), 459 - 468.
Wagstaff, A. (2002). Poverty and health sector inqualities. *Policy and Practise, 80*, 97-105.
Wanasinghe, Y., A., D., S. (1995). Spatial variations in the provision of health care facilities in Sri Lanka. *Health & Place, 1*(4), 235-242.
Wong, C. (2006). *Indicators for urban and regional planning : the interplay of policy and methods*. London and New York: Routledge.
Yiannakoulias, N., Svenson, L., & Schopflocher, D. (2009). An integrated framework for the geographic surveillance of chronic disease. *International Journal of Health Geographics, 8*(1), 69.
Zhao, Z. (2006). Income inequality, unequal health care access, and mortality in China. *Population and Development Review, 32*(GEOBASE), 461-483.

Appendix 1: Empirical references on access dimensions

Author and year	Context of study	Dimensions in Access					Measures	Methodology/ Operationalization used
		Accessibility	Availability	Affordability	Adequacy/accommodation	Acceptability		
Penchansky & Thomas, (1981)	Concept of access in health policy *United States*	✓	✓	✓	✓	✓	S/O	-Multiple regression analysis -Correlation coefficient - factor analysis
Andersen & Aday , (1978)	Access to medical care; USA	✓	✓	✓	-	✓	S/O	-Descriptive statistics -Multiple regression analysis - Factor analysis -Correlation coefficient
Gulzar, (1999)	Access to health care	✓	✓	✓	✓	✓	S/O	-Indices - Rates -Ratios
Lowe & Sen(1996)	Health planning	✓	✓	-	-	-	O	-Gravity model - Chi square -Correlation coefficient -Covariance matrix
Khan & Bhardwaj, (1994)	Access to health care (conceptual framework)	✓	✓	✓	✓	✓	S/O	-Access typology - Qualitative index
Guagliardo, (2004)	Spatial accessibility to primary care	✓	✓		-	-	O	-Gravity model - Two step floating catchment analysis - Kennel density
Amer, (2007)	Spatial justice in urban health	✓	✓	✓	-	-	S/O	-Two step cluster analysis

	service planning							-Pearson correlation coefficient - ANOVA - Statistical analysis - Flow map -GIS - 'What if'
Obrist, et al., (2007)	Access to health care in a context of livelihood insecurity	✓	✓	✓	✓	✓	S/O	-Multivariate Analysis -Outcome on health status -Patient satisfaction and equity
Shrestha, (2010)	Evaluation on access to primary health care	✓	✓	✓	✓	✓	S/O	-Descriptive statistics -Coefficient of variation -Two step cluster analysis - Correlation matrix -Standardized score
Liu, et al., (2009)	Equality of spatial access to primary health serve	✓	✓	-	-	-	O	-Two step floating catchment area(2SFCA) -
Luo & Qi(2009)	Spatial accessibility to primary care physicians	✓	✓	-	-	-	O	-Gravity model -Enhanced 2 step catchment floating area
Schuurman, et al., (2010)	Measuring spatial access to Primary health care physicians	✓	✓	-	-	-		-Gravity model -Kernel density estimation

Key

- ✓ Included in the literature
- S/O Both subjective and objective
- - Not included in literature
- O Objective

Appendix 2: Visited study areas in Dar es Salaam

Site ID	Ward Name	Street Name	Status	Data collection date
7126	Sinza	Sinza E	Planned	23/09/2010
7126	Sinza	Sinza E	Planned	24/09/2010
6845	Kijitonyama	Mpakani "A"	Planned	25/09/2010
7600	Tandale	Kwatumbo	Unplanned	27/09/2010
7878	Manzese	Mwembeni	Unplanned	28/09/2010
7142	Kinondoni	Biafra	Unplanned	29/09/2010
7883	Ndugumbi	Kagera Mikoroshini	Unplanned	30/09/2010
8261	Mabibo	Jitegemee	Unplanned	01/10/2010
6479	Mikocheni	Mikocheni A	Unplanned	02/10/2010
6390	Msasani	Bonde la Mpunga	Unplanned	04/10/2010
10549	Kurasini	Shimo la udongo	Unplanned	05/10/2010
9794	Buguruni	Madenge	Unplanned	06/10/2010

Appendix 3: Secondary data collected

Type of Data	Description	Data format	Source of data
Demographic data	Household budget survey 2007	Document (Hard copy)	National bureau of statistics (NBS)
	Population data 2002	PDF file	National bureau of statistics (NBS)
	Population data 2007	Excel file	National bureau of statistics (NBS)
	Household budget survey data 2007	Soft copy (SPSS file)	National bureau of statistics (NBS)
	Household budget survey data 2001	Soft copy (SPSS file)	National bureau of statistics (NBS)
	Census report 2002	Hard copy part of the whole document	National bureau of statistics (NBS)
	Poverty and human development report	Document (Hard copy)	National bureau of statistics (NBS)
Primary health care	Primary health services development programme 2007- 2017	Document (hard copy)	Ministry of Health and Social Welfare
	National Health Policy 2007 (Swahili version only)	Document (hard copy)	Ministry of Health and Social Welfare
	National Health Policy 2003 (English version)	Document (soft copy pdf format)	Ministry of Health and Social Welfare
	Health sector strategic plan III 2009 – 2015	Document (hard copy)	Ministry of Health and Social Welfare
	Health sector performance profile report 2010	Document (hard copy)	Ministry of Health and Social Welfare
	Socio political dynamics of service delivery in Tanzania	Document (soft copy)	Ardhi University
	National primary health care supervision guideline 1999	Document (soft copy pdf format)	Ministry of Health and Social Welfare
	Minimum package of health and related management activities (MPHMA) 2003	Document (soft copy pdf format)	Ministry of Health and Social Welfare
	Health facilities in Tanzania	Excel file	MEDA Geodata through Ifakara institute for medical research
Spatial data	Administrative boundaries; District boundaries and ward boundaries	GIS data vector format_shapefiles	National land use commission (GIS unit)
	Ocean	GIS data vector format_shapefiles	National land use commission (GIS unit)

Appendix 4: Indicators for measuring access dimensions

Access component	Indicators from empirical studies
Accessibility	• Travel time • Travel distance • Transport cost • Mode of transport • Minimum travel time • Distance to the closest facility • Waiting time for transport
Availability	• Type of facility • Availability of drugs/medication • Availability of equipments • Physician population ratio • Availability of qualified staff • Treatment and quality of service • Number of beds/1000 people • Waiting time • Facility population ratio • Number of health providers
Affordability	• Cost of service • Ability to pay • Existing health insurance • Registration cost • Clients knowledge on price
Adequacy/Accommodation	• Appointment system • Working hours (open hours) • Telephone services • Trust on medical staffs • Friendly personnel
Acceptability	• Culture and religion • Gender preference • Common language or friendship • User attitude to a facility

Appendix 5: Household Survey Questionnaire, September – October 2010

Municipality…… Interviewer name……..

Ward name ……. Date …….

Questionnaire number……. Coordinates ……..…….

Duration ……

This survey intended for collecting information for evaluating access to primary health care in Dar es Salaam, Tanzania. The interview will focus on understanding household socio economic characteristics/status and perceptions on access to primary health care. Any information spoken or written will be treated with high confidentiality. Your honest comments and cooperation on answering different questions about your household characteristics and evaluating access to primary health care will highly be valued.

Note: A respondent should either be a head of house, wife/husband, or any household member who knows a household status.

Household socio economic information

Interviewer: I will start this interview by asking you some questions related to your household information. This interview will take us at least 40 minutes

<table>
<tr><td>A</td><td colspan="2">General information of respondents</td></tr>
<tr><td>A.1</td><td>Respondent gender</td><td>Male:_____ Female:_____</td></tr>
<tr><td>A.2</td><td>Position in a family</td><td>Head of a family _____ Yes, _____ NO
_____ Husband, _____ Wife
_____ Other, specify: _____</td></tr>
<tr><td>A.3</td><td>Family status</td><td>Both parents ___
Female headed family ___
Male headed family ___</td></tr>
<tr><td>A.4</td><td>Household size by age
[Write the number of people living in the house for no less than 1year]</td><td><table><tr><td>Age</td><td>No.</td><td>M</td><td>F</td></tr><tr><td>Below 4 years</td><td></td><td></td><td></td></tr><tr><td>5-14 years</td><td></td><td></td><td></td></tr><tr><td>15-44 years</td><td></td><td></td><td></td></tr><tr><td>45-59 years</td><td></td><td></td><td></td></tr><tr><td>60 years above</td><td></td><td></td><td></td></tr></table></td></tr>
<tr><td>A.5</td><td>What is the highest education level in the household?</td><td>___ No education
___ Adult education
___ Primary education
___ Ordinary secondary education</td></tr>
</table>

<table>
<tr><td></td><td></td><td colspan="4">___ High level secondary education
___ College/University education</td></tr>
<tr><td rowspan="3">A.6</td><td rowspan="3">Household employment status</td><td colspan="4"></td></tr>
<tr><td>Household members</td><td>No employment</td><td>Self employment</td><td>Temporary employment</td></tr>
<tr><td>…….
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……</td></tr>
<tr><td>A.7</td><td>How much is your average expenditure per day?</td><td colspan="4">____less than Tsh 5000
____ 5000 – 10,000
____ 10,000 – 15,000
____ 15,000- 20,000
____ Above 20,000</td></tr>
<tr><td>A.8</td><td>In which socio economic group can you say your household belongs?</td><td colspan="4">____ Wealthy
____ Moderate/Comfortable
____ Poor
____ Very poor</td></tr>
<tr><td>A.9</td><td>What types of assets the household possess? [indicate each item passed in the house]</td><td colspan="4">_____ Car
_____ Bicycle
_____ Television
_____ Motorcycle
_____ Sewing machine
_____ Refrigerator
Others _____</td></tr>
<tr><td>B</td><td colspan="5">Housing condition</td></tr>
<tr><td>B.10</td><td>Status of house</td><td colspan="4">Owned: _____ Rented: _____, Others: _____</td></tr>
<tr><td>B.11</td><td>Settlement status</td><td colspan="4">Planned: _____ Unplanned: _____</td></tr>
<tr><td>B.12</td><td>Number of rooms occupied by household</td><td colspan="4">Bedroom: _____ Kitchen _____
Toilet/Bathroom: _____ Others: _____</td></tr>
<tr><td>B.13</td><td>What material is the house constructed of?</td><td colspan="4">Type: Cement bricks: _____ Mud bricks: _____
Mud and Poles: _____ Concrete _____
Others: _____</td></tr>
<tr><td>B.14</td><td>What type of toilet does your household use?</td><td colspan="4">Flush toilet ___ Pit latrine _____ Open air (no toilet) _____</td></tr>
</table>

B.15	Waste water disposal (sewage waste)	Septic tank _____ Sewer line _____ None _____
B.16	What is your household main source of water?	Piped water: _____ Buying from vendors: _____ Public tap _____ Open wells: _____
B.17	Do you have electricity in your house?	Yes: _____ No: _____

Existing health care facility

Interviewer: I will now ask you about your perception on status of primary health care facilities usually visited by your household members.

C	**General information on access to health care**	
C.20	Do you know any health facility close to you?	☐ Yes ☐ No
C.21	How many facilities do you have within your reach?	No. / facility names / location 1 2 3 4
C.22	What type of health facility do members of your household visit?	*[Tick the visited PHC]* Hospital: ____ Health Centre: ____ Dispensary: ____ Traditional healers: ____ Others: _____
C.23	What is the name of the visited facility?	_____ ____ Where is it located? *[Ask for ward name, street or any landmark close to a facility]* _____ ____
C.24	Is the visited facility public or private facility?	***[Tick the type of facility visited]*** Public: ____ Go to Question 22 Private: _____ Go to Question 23
C.25	Why did you not go to a private facility, can you	**[Rank the reasons from 1,2,3 …. depending on their importance]**

	give reasons?	Expensive: _____ Low service quality: _____ Unfriendly behaviour:_____ Religious/cultural factor: _____ less crowded/less waiting time: ____ Very far from home: _____ No medications/ drugs: _____ Open hours: _____ Others:_____
C.26	Why did not you go to public primary health care?	**[Rank the reasons from 1,2,3 …. depending on their importance]** Expensive: _____ Low service quality: _____ Unfriendly behaviour:_____ Religious/cultural factor: _____ less crowded/less waiting time: ____ Very far from home: _____ No medications/ drugs: _____ Open hours: _____ Others:_____
C.27	What are the main reasons for visiting the facility?	**[Rank the reasons from 1,2,3 …. depending on their importance]** Not far from home:_____ Less crowded:_____ Not expensive: _____ Availability of drugs:_____ Recommended by a friend/relative:_____ Friendly personnel:____ Longtime knowledge: _____ Others:_____
C.28	Is there any primary health care facility close to you?	Yes: _____ No:_____
C.29	How far is the primary health care facility visited usually by household members?	Distance (km); _____ Travel time (minutes): _____ (normal condition) _____ (with traffic jam, if any)
C.30	How do you reach primary health care facility?	***[If more than one means of transport used, indicate time for each]*** Foot: _____ Go to C.28 Bicycle : _____ Go to C.28 Motorcycle : _____ Go to C.28 Private car: _____ Go to C.28 Hired motorcycle: _____ Go to C28 and 29 Taxi:_____ Go to C.28 and C.29 Public transport (Daladala): _____ Go to Question C.28 and C.29
C.31	What do you think about the distance to the facility?	___ Very near ____ Near ____ Normal ____Far ____ Very far
C.32	How many minutes do	

	you use to reach public transport?	_____
C.33	How long do you normally wait before getting service after reaching the facility?	Time in minutes: _____ How do you think about waiting time? ___ Very short _____ Short ____ Normal ____ Long ____ Very long Does the facility have a proper waiting area? Yes: ____ No: ____
C.34	Does the facility provide drugs after prescription?	Yes; ____ No: ____ If no, how far do you go to buy prescribed medicine? ___Very near ___Near ____ Normal ____ Far ____ Very far
C.35	Does your household have health insurance card?	Yes: ____ No:____ If no why? _____ __
C.36	What do you think about the following costs?	
	Registration cost	Very inexpensive___ Inexpensive___ Normal___ Expensive ___ V ___
	Doctor's fee	Very inexpensive___ Inexpensive___ Normal___ Expensive ___ V ___
	Medication cost	Very inexpensive___ Inexpensive___ Normal___ Expensive ___ V ___
	Traveling cost to health facility	Very inexpensive___ Inexpensive___ Normal___ Expensive ___ V ___
	Total cost	Very inexpensive___ Inexpensive___ Normal___ Expensive ___ V ___
C.37	Does your household manage to pay all the cost of health care?	Yes: _____ No: _____ If no why:_____ _
C.38	Does your household feel welcome in the facility you visit?	Yes: _____ No: _____ If no, why? …… …
C.39	Do you consider any cultural or religious preference in	Yes: _____ No: _____ If yes, what is it? …….

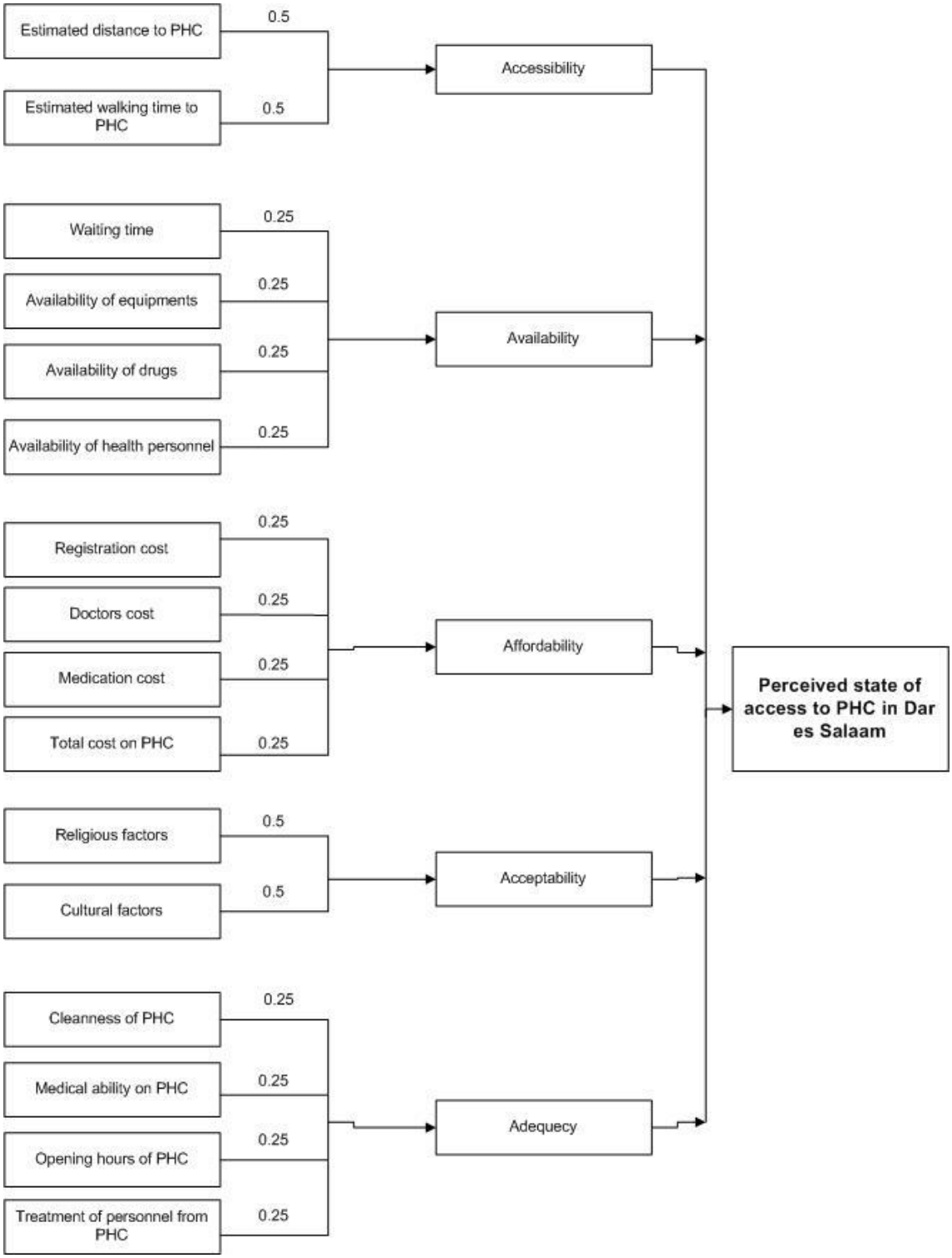
	choosing a particular facility?	
C.40	How is the cleanliness of the facility?	Very clean___ Clean ____ Normal ____ Dirty _____ Very dirty____
C.41	How is the personal treatment from all facility personnel?	Very good ____ Good ____ Normal ____ Bad _____ Very bad ____
C.42	What does your household think about medical ability (trust) on the facility?	Very good ____ Good ____ Normal ____ Bad _____ Very bad ____
C.43	Do health facilities have sufficient health personnel?	Yes: _____ No: ____ If no, what kind of personnel needed most? Doctor's_____, Nurses _____ Midwives_____ Dentist_____ Laboratory technicians_____ Others; specify _____
C.44	What does the household think about availability of equipments and laboratory facilities from a visited health care facility?	Very good ____ Good ____ Normal ____ Bad _____ Very bad ____
C.45	If equal number of male and female medical personnel is available, to whom will your household prefer to visit?	___ Male household members to male doctors ___ Female household members to female doctors Does not matter for Male _____ Female _____ Does not matter all How satisfied are you with existing situation in this regard? Very satisfied____ Satisfied _____ Normal _____ Unsatisfied ____ Very unsatisfied _____
C.46	Does the opening hour of a facility suits your household time?	Yes _____ No ____
C.47	If your household income doubled, will your household go to	Yes ____ No _____ If no, which one will you visit (name)? …….. Why? …….

	the same facility?	……..…..
C.48	Which of these factors do you think is affecting your household access to primary health care?	***[Tick only the most important factor considered by a household]*** Distance and travel time to primary health care: _____ Availability of drugs, waiting time, equipments, health personnel and quality of service: _____ Cost of services: _____ Opening hours of a facility, cleanness and behaviour of health personnel's:_____ Religious and cultural factors: _____
C.49	Which of these factors is more important for you to get a better primary health care?	***[Rank the preferences from 1to 6]*** Reduced travel time: _____ Reduced waiting time: _____ Reduced cost: _____ Cultural and religious factors: _____ Improved quality of services: ____ Friendly health personnel: ____
C.50	What is the overall level of satisfaction on health care service that you are getting?	____ Very satisfied ____ Satisfied _____ Normal ____ Unsatisfied ____ Very unsatisfied
C.51	What do you think should be changed to have better primary health care?	Reduced travel distance to health care: ____ Reduced travel time: _____ Reduced waiting time: _____ Reduced cost: _____ Better option on cultural and religious factors: _____ Improved quality of services: ____ Improve personal treatment from health personnel: ____ Increase the number of health personnel: ____
	Predisposing	
D.52	Occupation of house head	☐ Temporary employed ☐ Self employed ☐ Permanently employed ☐ Unemployed
D.53	Mothers Education level	☐ No education ☐ Adult education ☐ Primary school ☐ High school ☐ Secondary school ☐ College/university
D.54	Women within reproductive age {}	☐ None ☐ 1 ☐ 2 ☐ 3-above

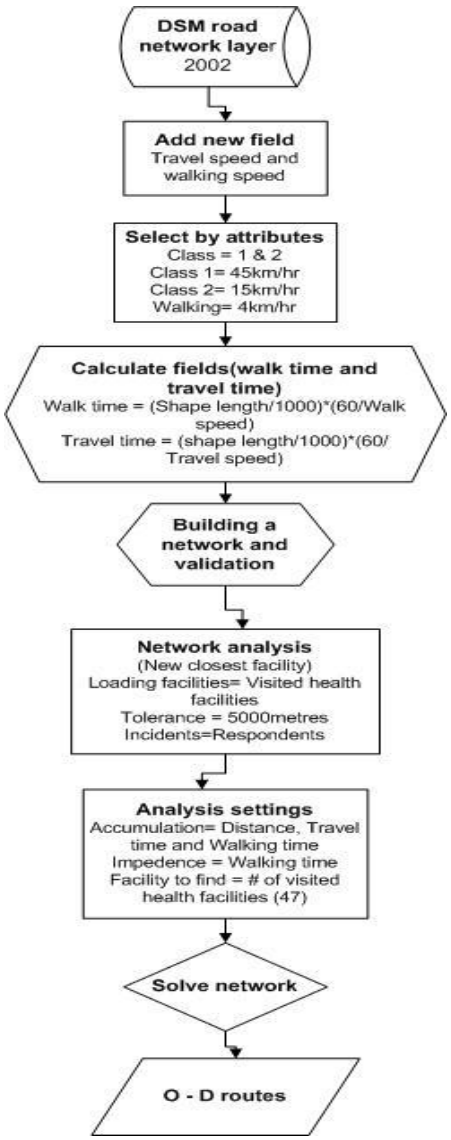
<table>
<tr><td></td><td>Enabling</td><td></td></tr>
<tr><td>E.55</td><td>Do you have health insurance?</td><td>☐ Yes ☐No</td></tr>
<tr><td></td><td>Health condition</td><td></td></tr>
<tr><td>F.56</td><td>What is the main health problem in your family?</td><td>☐ Malaria ☐Cholera ☐dyrea
☐ Mother/child ☐ Respiratorydiesease Skin ☐ diseases
Others</td></tr>
<tr><td>F.57</td><td>How do you treat yourself in case of the following sickness?</td><td>
<table>
<tr><td></td><td>malaria</td><td>dyrea</td><td>Skin disease</td><td>Mother/child</td><td>Respiratory disease</td></tr>
<tr><td>Self medication</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>pharmacist</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Health facilities</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>F.58</td><td>Which family member visit health facilities most</td><td>☐ Women ☐ kids Aged person ☐</td></tr>
<tr><td>F.59</td><td>How can you describe the health condition of your family?</td><td>☐ Very good ☐Good ☐Moderate
☐ Bad ☐ Very bad</td></tr>
<tr><td>F.60</td><td>How frequent do a member of your family visit health facility in the last 6 months?</td><td>☐ Every two weeks ☐ Monthly ☐ After every two months.
☐After every three months ☐ None</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

Thank you very much for your cooperation

Appendix 6: Synthesized indicators for access component scores



Appendix 7: Flow diagram for estimated walking time



Appendix 8: Flow diagram for analysing availability of health facilities