A Geospatial Approach for New Perspectives on Satisfaction with Health Services in Malawi

Gideon Mazinga

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A Geospatial Approach for New Perspectives on Satisfaction with Health Services in Malawi

by

Gideon Mazinga

A Dissertation submitted in partial satisfaction of the requirements for the degree of Doctor of Philosophy in Social Policy and Social Research

June 2008
Each person whose signature appears below certifies that this dissertation, in his opinion, is adequate in the scope and quality as a dissertation for the degree of Doctor of Philosophy.

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<tr>
<td>AIDS</td>
<td>Acquired Immune Deficiency Syndrome</td>
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<td>ARV</td>
<td>Antiretroviral</td>
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<td>CHAM</td>
<td>Christian Health Association of Malawi</td>
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<td>CMMS</td>
<td>Center for Medicare and Medicaid Services</td>
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<td>CWISDS</td>
<td>Core Welfare Indicators Survey Data Set</td>
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<td>GOM</td>
<td>Government of Malawi</td>
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<td>GIS</td>
<td>Geographic Information Systems</td>
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<td>GSDI</td>
<td>Global Spatial Data Infrastructure</td>
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<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
</tr>
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<td>JICA</td>
<td>Japanese International Cooperation Agency</td>
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<tr>
<td>LM</td>
<td>Lagrange Multiplier</td>
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<tr>
<td>MASM</td>
<td>Medical Aid Society of Malawi</td>
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<td>MK</td>
<td>Malawi Kwacha</td>
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<tr>
<td>MOHP</td>
<td>Ministry of Health and Population</td>
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<td>MFEP</td>
<td>Ministry of Finance and Economic Planning</td>
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<tr>
<td>NCQA</td>
<td>National Committee on Qualitative Assurance</td>
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<tr>
<td>NSO</td>
<td>National Statistics Office</td>
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<tr>
<td>OLS</td>
<td>Ordinary Least Squares</td>
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<td>UNICEF</td>
<td>United Nation International Children Education Fund</td>
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ABSTRACT OF THE DISSERTATION

A Geospatial Approach for New Perspectives on Satisfaction with Health Services in Malawi

by

Gideon Mazinga

Doctor of Philosophy, Graduate Program in Social Policy and Social Research
Loma Linda University, June 2008
Dr. Robert E. Ford, Chairperson

This dissertation explored the spatial pattern of user satisfaction with health services and factors, including policies that potentially explain the variation in the district-level of user satisfaction with health services. Nationwide secondary data was extracted from the 2002 Core Social Welfare Indicators Survey and the National Health Services Statistics databases obtained from National Statistics of Malawi. The National Health Facilities inventory obtained from the Malawi diffusion project was also geocoded to display the distribution of health care facilities in the country. Spatial autocorrelation and regression modeling techniques were applied on the national representative data set.

The spatial autocorrelation test revealed that districts in the southern region indicated higher than the mean level of user satisfaction with health services than districts in the northern and part of the central region of Malawi (Moran’s I = 0.40 at p < .05). The mean percentage level of household satisfaction with health services was 11.56 percent.

Two models were specified to investigate factors contributing to spatial variation of user satisfaction with health services. One was Ordinary Least Squares (OLS)
regression and the second was Spatial Lag regression, which was a modified version of the conventional model. Spatial Regression model included a spatial lag term to take into account of spatial dependency in the data.

The OLS regression model explained 46% of variance and specified the district level determinants: proximity to health facilities, clinical officers’ availability and proportion of poor people who travel more than an hour to the nearest facility. The compared Spatial Lag regression model explained 55% of the variance highlighting an improvement in explanatory power by 9%. The improvement demonstrates the importance of the inclusion of spatial effect in regression analysis when using geographic based data in social research.

In addition, a qualitative study on policy implication on quality and equity of health services delivery system reveals that policies about allocation of health services are not efficiently applied, hence promoting spatial variations in the level of satisfaction with health care services. The study recommends that health care policies need to incorporate principles of social justice and distributive justice in order to provide a more equitable health care delivery system.
Introduction

Problem Statement

The health sector plays an important role in ensuring sustainable socioeconomic advancement in developing countries. Delivery of quality health services is crucial for the improvement of health outcomes, such as those targeted by the Millennium Development Goals (MDGs) adopted by the international community in 2000. For example, the reduction of maternal mortality by 75 percent in 2015 depends on access to skilled care at birth and during pregnancy (Koblinsky et al., 1999; Tinker et al. 1993). Unfortunately, public health services are poor in most districts of Malawi (Kemp et al., 2003). In some districts, health services are not available within a reasonable distance or they are not accessible for some organizational reason, such as lack of qualified staff (Dussault & Franceschini, 2006).

In Malawi, the government has begun to integrate the health sector strategically into its poverty alleviation programs. In this regard, the government recognizes that improving the health and longevity of the poor is a fundamental goal of economic development (Commission on Macroeconomics and Health, 2001).

While efforts by the government, nongovernmental organizations (NGO), and the private sector have yielded better immunization coverage, particularly in prevention services (WHO/UNICEF, 2004), the public health sector is plagued by uneven demand and perceptions of poor quality (Kemp et al., 2003). Countrywide, quality of health services is of significant concern. According to the World Bank (2003), there are concerns that the deteriorating quality of public health care services in developing
countries such as Malawi is being ignored. The Malawi government and its developing partners have also acknowledged their concerns about such services (Malawi Government, 2004). The unavailability of health care service staff, such as clinical officers and nurses, and lack of access are among the major hindrances to the utilization of public health facilities. Accessibility of health services is a multidimensional concept that refers to geographic, economic (affordability), and organizational factors that can facilitate or hinder delivery of quality services (Frenk, 1992). The situation is further compounded by factors such as lack of drugs, long travel, and waiting times. Such failures play a powerful role in shaping patients’ negative attitudes and dissatisfaction with the health service delivery system (Andaleeb, Siddiqui, & Khandakar, 2007). These instances reflect the problems that must be quickly and responsibly addressed in Malawi. All of these service failures are reported frequently in the print media, but not much has been formally investigated to understand the potential geographic variability in the level of users’ satisfaction with health services in Malawi.

The last 20 years have witnessed an accelerating increase in the attention given to user satisfaction with health services (Atkinson & Haran, 2004). Recognition of the user perspective is very important for several reasons. First, user satisfaction is an important outcome in its own right. Second, user satisfaction studies inform planning as part of a range of assessment indicators used to compare different alternatives of organizing or providing health care (Fitzpatrick, 1991). Sitza and Wood (1997) report that literature on user satisfaction, largely from the United States and the United Kingdom, had reached a thousand papers a year by 1994. Interest in the user perspective is now also entering a policy agenda in developing countries and was recently highlighted in the WHO World
Health Report as a vital component of health system management (Schneider & Palmer, 2002). However, in contrast to the burgeoning literature on user satisfaction documented by Sitza and Wood, published studies in developing countries remain very sparse (Bernhant, Wladnyana, Wihardjo, & Pohan, 1999).

A number of studies tend to be descriptive, with only limited ad hoc exploration of what influences variation in user satisfaction (Atkinson & Haran, 2005). For instance, Atkinson (1993) found that high-risk pregnant women in Northeast Brazil were more dissatisfied with their prenatal care than others. Gattinara et al. (1995) found users of the Bolivian public primary health services who came from the highland zones, indicating the indigenous Indian population, were more likely to be dissatisfied with their care. One study explicitly exploring determinants from Santiago, Chile found a good chair-side manner and the receipt of drugs or clinical tests the best predictors of user satisfaction, indicating provision of care to be one of the more influential factors (Sacpracci, 1988).

Understanding the different influences on variation in user satisfaction is important. In order to improve health care provision, managers and policy makers need to be able to differentiate between factors they have control over and those that are part of a wider social and political context (Atkinson & Haran, 2005). Atkinson and Haran are quick to point out that this does not imply that nothing can be done about the latter group. It is vital to identify particular subgroups that need different strategies and approaches in care provision in order to build a locally responsive health system (Thi, Briancon, Empereur & Guillemin, 2002).

Much literature explores the relationship of satisfaction to prior expectations, noting the commonsense view that satisfaction is better where the care provided is close...
to prior expectations. According to Atkinson and Haran (2005), observed sociodemographic differences are often interpreted as indicating different levels of expectation. However, studies have found that variance in expectations only accounts for a small amount of the variance in user satisfaction (Avis, Bond, & Arthur, 1997; Linder-Pelz, 1982).

Regarding the provision of health services, measures of accessibility such as travel time, proximity, and convenience are consistently associated with higher satisfaction (Atkinson & Haran, 2005). Policies to restructure health systems in low- and middle-income countries have almost always included a move to decentralized local health systems. One of the aims of decentralization is to increase the health system’s responsiveness to the population served through the improvement of local management structures. As evident above, most studies on determinants of user satisfaction have focused on those operating at the individual scale. However, many aspects of health care provision are defined at the scale of management and spatial unit (district) scale; thus, management scale variables and district scale variables need to be considered as determinants of user satisfaction (Atkinson & Haran). The present study is therefore based on variables measured on the spatial unit (district) scale.

Purpose of the Study

Two main purposes were defined in conducting this study. The first key aim was to provide evidence-based information to policy makers in Malawi on the geographic variation of user satisfaction with health services, and provide recommendations to ensure provision of equitable quality health services to Malawians nationwide, across all districts. In connection with this aim, the study investigated factors that could help
explain the spatial variation of patterns of user satisfaction with health services. The second key aim was to addresses policy implications on the quality and equity of the health care services delivery system based on a qualitative study of informant interviews with key service provider personnel. A better understanding of patterns of satisfaction with health services and key factors that may explain the variation of spatial patterns of user satisfaction with health services should help policy and decision makers in adopting and implementing effective measures to improve health services nationwide.

Research Questions and Hypotheses

This study illustrates how GIS-based techniques can be a useful addition to existing social research methodologies, bringing new perspectives on persistent challenges and providing spatial intelligence to enhance decision making. Hence, a key aim was to develop a multi-method approach for examining issues of user satisfaction and access to health services from a geospatial perspective. Such methodological protocol prescribes the use of GIS technology in tandem with spatial analysis and formal statistics. Four fundamental research questions were examined:

1) Is there a discernible pattern of patient satisfaction with health services across Malawi’s districts?

2) Can we find co-varying contextual factors that illuminate the milieu and forces that shape the pattern of patient satisfaction?

3) What factors contribute to poor and inequitable health care services delivery system in Malawi according to health services providers?

4) What can policy makers do to improve quality and equity of the health services delivery system in order to reach all citizens irrespective of place of
residence? It is hoped that the approach taken in this study, as well as the information derived from it, will prove helpful to policy makers and decision makers as they strive toward the improvement of the delivery of health services in Malawi.

The following hypotheses were formulated in relation to the first two research questions:

**Hypothesis 1:** The household-level satisfaction with health services across Malawi’s districts follows a nonrandom spatial pattern.

**Hypothesis 2:** The variability in household-level satisfaction with health services across Malawi’s districts can be efficiently explained in terms of a few contextual determinants, such as population size, availability of healthcare personnel, and simple measures of spatial access to facilities.

Stemming from the identified questions and underlying hypotheses, the following research objectives were defined:

1) To investigate and characterize the spatial pattern of household-level satisfaction with health services in Malawi using spatial analytical methods.

2) To identify contextual factors potentially associated with satisfaction with health services in Malawi through multivariate regression modeling.

3) To identify factors potentially associated with health care disparities in Malawi by conducting a series of qualitative key informant interviews with health service providers from across the various administrative districts.
4) To articulate recommendations, based on findings from objective 3, to assist health policy makers in addressing the issues of quality and equity of the health services in Malawi.

Results pertaining to research questions 1 and 2 are presented in chapter 4, while those corresponding to questions 3 and 4 are presented in chapter 5.
Literature Review

Malawi’s health sector is characterized by a plurality of health providers (Kemp et al., 2003). The Ministry of Health and Population (MOHP) accounts for 60 percent of the total number of formal health facilities, followed by the Christian Health Association of Malawi (CHAM) with 25 percent, and other nongovernment and private providers with 15 percent of all health facilities (MOHP, 2003b). In government health services, almost all services are provided free of charge at the point of delivery. This is supported by GOM policy, so that its available resources will be used to ensure that a package of basic health services, the Essential Health Plan (EHP), will be provided to all citizens. CHAM facilities charge a set fee for service at the point of delivery (MOHP, 1999).

Despite a free public health service with “reasonable” geographic coverage, there are inequities in availability and access to health care (Kemp et al., 2003). A recent publication revealed that quality of care at each level, but particularly the periphery of the system, presents barriers to care (GOM/MOHP, 2002). This analysis concluded that the poor wait longer, receive fewer drugs, and pay more in comparison with the wealthy. It is unfortunate that such inequities are exacerbated for people living in geographically remote areas (Kemp et al., 2003). According to a study conducted by MHEN (2002), most hospitals and clinics in remote districts have no drugs.

Health Services Inequity

The concept of inequity has been considered synonymous with the concept of inequality (WHO, 1999); however, it is fundamental to differentiate between the two. Whereas inequity refers to differences that are unnecessary and avoidable but are also
considered unfair and unjust, inequality implies differences between individuals or population groups (WHO).

Inequity in health care access for citizens in various countries has long been of interest to scholars, policy makers, and medical professionals. Some studies have found that some populations experience more problems accessing health services, often because of factors such as poorly designed health infrastructures, social economic hardships, and geographic barriers like distance and lack of public transportation (Schur & Franco, 1999). These factors ultimately contribute to user dissatisfaction with health services. Health inequities are the major public health and social justice concern in many countries, with individuals suffering from disproportionate levels of morbidity compared to those who are better off (Wilkinson & Marmot, 2003).

Inequalities in opportunity are reproduced over time and across generations through economic, sociocultural, and political mechanisms (Ferreira & Walton, 2005). The same processes that reproduce inequalities can also harm efficiency and overall development; therefore equity in public service must be central to development policy (Ferreira & Walton).

*Satisfaction as Quality Indicator*

Consumers of health care services play a variety of roles in health care quality assessment and monitoring. By expressing their preferences, they supply the valuations needed to choose among alternative strategies of care (Donabedian, 1988). They help define the meaning of quality in the technical sense. Consumers are valuable sources of information judging the quality of care (Blazevska et al., 2004). This study further argues that some nontechnical data regarding care is obtained mainly from consumers. Thus
consumers can and do, through expressing satisfaction or dissatisfaction, express judgment about many aspects of the process of care and its outcomes. Consumers, if properly informed, could help regulate the quality of care through their choices.

Health care is now entering an age of “accountable consumerism” in which patients demand service excellence (Blazevska et al., 2004). Patients’ expectations for care have been defined differently in the literature. Some studies view patient expectations as probabilities, judgments on the likelihood that a set of events will occur (McKinley 2002; Conway, T., & Wilcocks, S., 1997). Others view expectations as desires for care expressed as perceived needs, wants, importance, standards, or entitlements (Kravitz, 1996). Whether patient expectations are considered as probabilities or values, an understanding of patient expectations is important because meeting these expectations may lead to greater satisfaction with care. The measure of user satisfaction is viewed as important in outcomes research and quality improvement efforts (Mazwell, 2001; Kenagy et al., 1999; Pichert et al., 1998). In addition to increased user compliance and health outcomes, user satisfaction has been linked to greater service utilization. For instance, managed care organizations are placing greater emphasis on user-perceived outcomes measures, such as satisfaction and functional status. As the user is becoming widely recognized as a reliable and important source of information about quality of health care service (Lawthers, Rozanski, Nizankovski, & Rys, 1999), important steps are taken toward making performance transparent with the publication of concrete figures on the quality of outcomes relevant to users.

The advantage of user or patient surveying is that it identifies what is valued by patients and the general public, and standardized surveys can be tailored to measure
specific levels of satisfaction (Sitzia, 1999). However, reaching valid and reliable results still remains a challenge for the health services providers (Sitzia). The process itself needs to be validated by rigorous scientific scrutiny for appropriate comparison within geographical regions. For instance, health care institutions using performance indicators to differentiate themselves and demonstrate client focus reap considerable advantages, especially if they have a quality management system to underpin the development of performance (Kolking 2003; Dolan, 1998).

GIS in Health Services Research

Many questions concerning health policy are related to geographic space (Loslier, 1995). The incorporation of geographic analysis into health services research and policy analysis has been slow. A major deterrent has been the lack of adequate tools for managing and analyzing spatially defined data in flexible ways. GIS technology has been heralded as one of the most exciting emergent information technologies (Yasnoff & Sondik, 1999). It has been used by now extensively in natural resource management, public works, transportation, and government but until recently has been largely ignored in policy and socio-behavioral research. GIS provides software tools that enable researchers to input, store, manipulate, analyze, and visualize spatial information (Higgs 2004). Intuitively, GIS can be defined as an information technology that uses digital maps to interpret complex data. It allows the user to examine new relationships between variables, as one can bring together many different types of data (e.g., health, administrative, etc.). This in turn provides the social and physical context necessary for enhancing analysis in health planning and policy to emerge.
A growing number of health service agencies are discovering GIS as a new way to help understand health and social problems, explain to policy makers and constituents the wide discrepancies between needs and resources, and effectively and equitably place those resources in communities (Mandayam, 2002).

According to Higgs (2004), the integration of geographically referenced data from a variety of agencies concerned with health issues is enabling researchers to visualize trends and relationships over space and time in order to monitor the influence of government policies, such as those aimed at reducing health services inequalities. Eliminating disparities requires more than political will and administrative resources; it is equally a matter of timely, accurate and geographically defined information (Stern, 1995). Health problems vary in geographic space, as do the needs of people.

The need of spatially referenced information—and improved analytical methods—is particularly acute in a climate of changing health needs, risks, and health care delivery. By capturing the spatial dimensions of this dynamic environment and linking them with important attributes aggregated at different geographic levels, GIS and spatial analysis can be powerful tools for better distinguishing and modeling the context within which disparities in access to health services occur.

According to Higgs’s argument on the importance of integration of geographically referenced data in revealing trends and relationships, the spatial data is appropriately examined and appropriate decisions can be made accordingly based on such information. Health is a major concern of people everywhere in the world, especially in a developing country like Malawi, where most people are poor (Benson, 2000). GIS can be a crucial tool in examining health problems that have a spatial
dimension. GIS is playing an increasingly important role in helping the world’s health leadership achieve the promise of a “healthy people everywhere” as a reality (ESRI, 2003).

A review of literature has revealed that there is significant interest in the use of spatial technologies in measuring geographic access to health care services. As Cromley & McLafferty (2002, 258) assert, “by documenting changes in service availability in their geographical and social contexts, and analyzing differential impacts on population groups and places, GIS can play an important role in understanding evolving patterns of accessibility and their consequences.”

For instance, Higgs (2004) further comments that a logical extension to such work is to explore the relationship between access factors and health outcomes to examine the impact of changes in service delivery (e.g., the centralization of some health services on such outcomes). Gulliford (2002), for example, explored the potential relationships between the supply of doctors at the health authority level and health measures such as infant mortality rates and hospital admissions. In addition, a study on variations in access to oncology centers has highlighted potential explanatory factors for inequalities in patient survival from lung cancer (Jack et al., 2003).

Geospatial methods combined with GIS are becoming a useful suite of tools in research. The application of GIS products and specifically geospatial statistics has received considerable attention in recent years and is increasingly the focus of a number of research activities in various fields. GIS provides a collection of tools for the management and visualization and analysis of spatial data, which are very powerful when they are integrated with statistical methods for spatial data analysis (Krivoruchko,
Gotway, & Zhigimont, 2003). However, there is a lack of use of these available spatial statistical tools in social and human services research fields (Steinberg, & Steinberg, 2006).

Many standard GIS programs have now integrated statistical methods with GIS tools for mapping and modeling spatial data (Anselin, 2003; Wong & Lee, 2005). As a research tool in the social sciences, GIS has not been explored and applied to nearly the same depth relative to applications in the natural sciences, where GIS has a longer history (Steinberg & Steinberg, 2006). GIS has an extremely valuable role to play in assisting social science researchers in their quest to study issues such as inequity in social and health services and other socioeconomic issues. Using household-level measures collected across Malawi’s districts, this paper illustrates the implementation of GIS-based methods for regional data analysis aimed at the investigation of patterns of user satisfaction with health services.

Another study (Soret et al. 2003, 36) explicitly states that “the full potential of GIS is being underutilized to the extent that there are situations in health services research and practice where some of the more advanced GIS functions can indeed improve our basic understanding and, in the end, outcomes.”

Social Policy Perspective

The public provision of goods and services to meet human needs is one major aspect of social policy. A useful definition of social policy is provided by Getubig and Schmidt (1992, 1), as follows:

...any kind of collective measures or activities to ensure that members of society meet their basic needs (such as adequate nutrition, shelter, health care and clean water supply) as well as being protected from contingencies (such as illness,
disability, death, unemployment and old age) to enable them to maintain a standard of living consistent with social norms.

Based on the above definition, two objectives and instruments of social policy are vital among others in the context of this research. First is the *social services* function of ensuring access to basic services such as health care, which achieve important private and social objectives but may be inaccessible to the poor. Second is the *social security* function of social policy, which includes social assistance (income transfers to chronically vulnerable groups such as the unemployed), as illustrated by the International Labor Organization (1984). That study focused on the social services function regarding health services. Inasmuch as effort is made to ensure that all citizens have access to health care through EHP in Malawi, there are several social policy concerns that need to be addressed to ensure quality health services to citizens in all districts of the country.

In order to establish a benchmark of standards against which equity in health can be assessed, the framers of the Universal Declaration of Human Rights (UDHR) provided a clear guidepost, both in terms of equity in health and well-being and access to health care, stating that:

*Article 25: Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowed, old age or other lack of livelihood in circumstances beyond his control.*

In recent decades, important authors have dedicated great efforts to studying, defining, and interpreting the concepts of equity and social justice, as well as health care quality. The most well known are the works of Rawls (1971), Sen (1992), and Whitehead (1991).

In reviewing the literature, one sees that the general theories of justice, as in John Rawls’s theory of justice as fairness (Rawls, 1971), are very applicable in this situation.
In bioethics, efforts have tended to concentrate on access to health care (Pereira, 2003). According to Peter (2000), besides just focusing on fairness in health, something can be changed about the situation that is considered unjust in health care services. Thus, in the context of health, if the allocation of health care is perceived to be an instrument best suited to correct health outcomes, then conceptions of equity will concentrate on health care, not only on health (Peter). Daniels (1985) asserts that we therefore may regard people’s access to health care as being important in and of itself, independently of its contribution to an equitable distribution of health outcomes.

In consideration of the fact that we are concerned with not just health care but also with health outcomes, and given the fact that there are serious social inequalities in health outcomes that cannot be traced back to differential access to health care, then conceptions of health equity have to go beyond health care. An approach to health equity based on Rawls’s theory of justice as fairness (Rawls, 1971) is ideal in this study. Although Rawls has not himself addressed the topic of health, the concept of justice as fairness provides a useful framework for evaluating social inequalities in health services (Poland et al., 1998).

In addition, the theory of justice as fairness (Rawls, 1971) can be applied to public health services equity both directly and indirectly. The direct approach is that it embeds the pursuit of health equity in the pursuit of social justice in general (Peter, 2000). The indirect approach is based on the premise that social inequalities in health outcomes are wrong, not simply because actual health outcomes deviate from what is considered ideal, but rather because and insofar as they are the expression and product of unjust economic, social, and political institutions (Peter).
Furthermore, Peter (2000) argues that an understanding of social inequalities in health care services, and the mechanisms by which they are produced, may reveal something important about how the institutions of society work and hence inform our assessment of the justice of these institutions located in various districts of the nation.

On the other hand, fairness is seen as an important criterion for many policy choices (Levy & Sidel, 2006). Views on health care are reflective of the society’s willingness to tolerate very large inequalities in income, wealth, and economic and political power. As many studies have shown, the more unequal a society is in economic terms, the more unequal it is likely to be in health terms (Watts, 1997). Many ethicists, following Rawls, have argued that health care is special and that, in this domain, inequity is injustice because poor health care and poor health so profoundly limit opportunities in life for the full realization of one’s potential for employment, relationships, and social and political participation. In this view, justice in health care is good for the public’s health, and the public’s good health, in turn, broadens opportunities and facilitates a more just society (Kiple, 1993).

According to the widely cited 1992 paper, “The Concepts and Principles of Equity in Health,” Whitehead defined health inequities as differences in health that are unnecessary, avoidable, unfair, and unjust. Whitehead (1992) further urges that in much of the health equity discussions, reasonable claims are made that there are disparities in health status and access to care for different categories of people in Malawi, whether identified by social class or spatial distribution. These types of inequities or disparities are a clear reflection of social injustice. As argued by Levy and Sidel (2006), social injustice is defined in several ways. First, they define it as the denial or violation of
economic, socio-cultural, political, and civil or human rights of specific populations or groups in society based on the perception of their inferiority by those with more power or influence. Second, social injustice refers to policies or actions that adversely affect the social conditions in which people can be healthy. This type of social injustice is common among the poor around the world, who often suffer more than others as a result of policies and actions taken or not taken for their benefit. An example of this form of social injustice includes “policies or practices that promote failure to provide essential public health and medical care services” (Levy & Sidel). Social injustice, therefore, can lead to a wide range of adverse health consequences, such as disparities in health status and access to health services within or between populations.

However, not much has been done to reveal the extent of the inequality of the quality of health care services spatially in Malawi, hence the need for the present study. In supporting this argument, Chilowa, Devereus, Kadzamira, and Mvula (2001) note that there is little evidence of a systematic bias in favor of one region of Malawi or discrimination against another in social services such as health care. In light of this scenario, the present study explored the spatial aspect of quality of health care services in districts of Malawi by studying users’ satisfaction level and investigated factors that explain the variations.

*Household Satisfaction with Health Services*

One of Malawi’s major challenges in the health services delivery system is to provide universal coverage of quality health services to its approximately 12 million people, especially to the poorest and most vulnerable. There has been increased attention to issues of equity and quality of health care with the renewed commitment of
governments and international organizations to improve health services (Gwatkin, 2000; Wagstaff, 2000). Recent studies on health services inequity reveal that the whole health care system in Malawi is inequitable and therefore needs to conduct more studies to improve the situation (Kemp 2003). There is a concern that achievement of the Millennium Development Goals (MDGs) is likely to be compromised if inequity in health care services is not properly addressed (Zere, Moeti, Kirigia, Mwase, & Kataika, 2006).

Malawi’s health care facilities are distributed among all districts in the country in order to provide health care to all citizens. There is at least one district hospital and a number of rural health centers, or dispensaries, in every district. Satisfaction with health services refers to households citing no problem with the health service system following a recent visit to the local health facility (NSO, 2002).

There are several factors contributing to variations in levels of satisfaction with health services in Malawi. First, the availability of health care professionals, particularly doctors, clinical officers, and nurses, varies from place to place. A second factor is proximity to health services; most people face transportation problems when traveling to the nearest facility. Since most people walk, it takes more time to reach the nearest health care facility. Third, policy implications vary on allocation of resources based on social factors such as poverty rates per district and population size.

According to the Malawi National Health Accounts (2001), the Ministry of Health and Population uses a systematic resource allocation mechanism policy to allocate drugs to public health facilities between districts, based on population (75%) and poverty rates (25%). The policy of allocating resources based on district population size and poverty
rates can contribute to variation in user satisfaction level. However, no study was conducted to determine whether factors such as population size used in the resource allocation policy influences the variation in satisfaction level with health services. Although some studies have attempted to explore other individual factors contributing to quality of health services in a particular district of Malawi, not much has been done to investigate such factors spatially.

A new EHP which began operating in 1999 recommended a thorough organization restructuring of the entire health sector, with the aim of establishing health care services that are more sustainable, equitable, cost effective, and responsive to client needs, which will obviously contribute to user satisfaction. In order to achieve this, a policy to allocate health resources based on the proportion of poverty rates and population, among other factors, was introduced in the strategic policy to reach the most poor and vulnerable living in those districts (Cripps, Kress, Olson, & Ross, 1998). Therefore, poverty rate and population size can determine how much health care resources are to be allocated in the district, thus explaining the variation.

Therefore, in order to provide better planning, there is a need to evaluate the delivery of health services in the country based on the client’s perspective of the health care system. Consequently, this study focuses on the percentage of households per district satisfied with health services as dependent variable, and models the potential variables that can explain the variation in patterns of level of satisfaction by district. All health service facilities have also been mapped to aid in the understanding of how these facilities are distributed across the nation. It is very important for policy makers to know geographic locations that need urgent intervention to improve and provide satisfactory
health services. Health facilities seem to have been well distributed in an effort to reach all citizens across the nation (Figure 3), but the services being offered at most of the facilities are of lower quality (Kemp, 2003).

Characterization of spatial variability may help to achieve a better understanding of the complex interactions between levels of satisfaction and the explanation of these social demographic factors.

Much effort has gone into spatial exploration and analysis of variations in spatial data (Anselin, 1999). In recent decades, a specific approach, the spatial autocorrelation and regression modeling analysis, are widely used in the process for appropriate analysis of spatial data (Anselin). To our knowledge, there is little study of the variation of user satisfaction with health services based on spatial analytical methods.

*The Role of User Satisfaction*

User satisfaction has become a critical measure in assessing health care delivery systems (Mirvis, 1998). According to Oliver (1997), patient satisfaction is the user’s fulfillment response. In other words, it is the overall level of contentment with a service experience.

Health care facilities are beginning to recognize the importance of delivering patient satisfaction as a strategic variable and a crucial determinant of long-term viability and success (Davies & Ware, 1988; Makoul et al., 1995; Royal Pharmaceutical Society 1997). Because patient satisfaction is considered one of the desired outcomes of health care, such information should be as indispensable to assessment of quality as to the design and management of the health services delivery system (Donabedian, 1988).
Recent surveys and their wide use in the health care industry in the USA reflect the importance accorded to consumers’ experience with a variety of services, such as Medicare and Medicaid (Lake, Kvam, & Gold, 2005). Other organizations such as the National Committee on Quality Assurance (NCQA) and The Center for Medicare and Medicaid Services CMMS) are also deeply involved in assessing the patient’s perspective (Andaleeb et al., 2007). The World Health Organization (WHO) has similarly created a performance system based on multiple measures in which health system “responsiveness” (patient satisfaction) and its distribution in populations of varying economic status are key components (Andaleeb et al.).

Though studying user satisfaction represents intense interest in giving voice to the users in the developed world, in developing countries such as Malawi, users have very little voice. Few studies have sought their views, and there is little effort to involve them in measuring satisfaction or defining health services standards. This has implications for how health care services are ultimately perceived and the extent to which they are used. Andaleeb et al. (2007) further argue that patients who endure the physical, psychological, social, and economic experience during the overall health service delivery process would in fact be able to make an evaluative judgment of how they were treated, as reflected in their overall satisfaction or dissatisfaction.

User satisfaction is such a vital competitive tool that hospitals that are consumer focused have been able to increase capacity utilization (Gregory, 1986; Boscarino, 1992). In addition, studies have revealed that service satisfaction significantly improves patients’ quality of life (Dagger & Sweeney, 2006) and enables service providers to determine specific problems of users, on which corrective action can then be taken (Oja,
Kouri, & Pakarinen, 2006). Patients' voices should serve to bring about similar changes in developing countries like Malawi.

Furthermore, it has been shown that dissatisfaction can have serious ramifications: patients are unlikely to follow treatment, may fail to show up for follow-up care, and, in extreme cases, may resort to negative word-of-mouth reactions that can dissuade others from seeking health care services from the system.

Satisfaction and Quality of Health Care

According to Lohr, Donaldson, and Harris-Wehling (1992), “quality” in health care exists “to the degree to which health services for individuals and populations increase the likelihood of the desired health outcomes and are consistent with current professional knowledge.” Quality defined in this way may be measured along several dimensions of health care delivery, such as structures, processes, and outcomes of care including user satisfaction (Marvis, 1998; Lohr et al., 1992). Users' evaluations are important for quality monitoring and improvement in publicly provided systems of health care delivery (Crow, Gage, Hampson, Hart, Kimber, Storey, et al., 2006). According to Crow et al., user feedback alerts policy makers to users' needs, perceptions, and concerns, identifies areas of service failure, and enables the evaluation of improvements as they are implemented. A number of attributes combine to influence the quality of care that is provided. Assessments of the overall performance of health care delivery arrangements may incorporate input details such as staff numbers and qualifications (Donabedian, 1966; Donabedian, 1980). Although there is much debate about how quality of care should be measured, levels of user satisfaction are highly relevant signals because they reflect consumers' perceptions of the standards achieved (Walsh, 1994),
their judgments of the “goodness” of care, and the success of providers at meeting client values and expectations (Donabedian, 1980).

An empirical investigation of this issue, however, suggested that consumers do provide valid assessments (Davies & Ware, 1988). Other evidence shows the relationship between professionally determined quality standards and patient satisfaction and highlights the importance of incorporating user opinions (Phillips, Carson, & Roe, 1998; Eriksen, 1987). In addition, satisfaction data do provide important insights into the function of health care systems and assessments of quality (Mirvis, 1998). A pioneer in quantitative assessment of quality, Donabedian (1966) affirms that achieving health and satisfaction as defined for its individual members by a particular society, region, or subculture is the ultimate validator of the quality of care.

_Framework of Factors for User Satisfaction_

Studies in the developing world have shown a clear link between patient satisfaction and a variety of explanatory factors (Rao, Peters, & Bandeen-Roche, 2006). Andeleeb et al. (2006) argue that the link is important in the health care sector in developing countries such as Malawi. Furthermore, earlier studies (Andeleeb et al.; Parasuraman, Berry, & Zeithaml, 1991) suggest several structure and process factors that influence patient satisfaction.

The framework in Figure 1 developed by Neuhauser and Andersen (1972) to review studies with hospitals as the unit of analysis was used in this study. Although the relevant variables change slightly, this framework is equally applicable to the present study on a broader perspective based on the argument by Fleming (1981) that “for either health facility or patient-based studies, outcomes are measures of quality of care,
efficiency and satisfaction” (p. 45). In accordance with this argument, the following research framework of factors that drive satisfaction appropriately fit this study.

Research Framework

![Diagram of Research Framework]

Source: Duncan Neuhauser and Ronald Andersen (1972)

*Figure 1.* The Research Framework of factors that drive patient satisfaction.

*Environmental factors* include measures that describe the locations of health facilities or the characteristics of the served populations. These factors can be broadly measured in terms of region or administrative jurisdiction, or in terms of rurality/urbanicity. According to Fleming (1981), the health facility environment is mainly measured through demographic and socio-structural characteristics of patients, such as poverty. Levy and Sidel (2006) argue that “poor populations usually bear a triple burden: they live, on average, in the most dangerous biological and physical environments and are exposed to the worst social determinants of health status; they have
the least access to health care; and, when care is provided, it tends to be of poorer quality” (p. 209).

*Process factors* include four measures: reliability, assurance, availability, and cost. *Reliability* refers to the providers' ability to perform the promised service dependably and accurately (Fleming, 1981). In principle, a favorable healthcare workforce to population ratio should have a positive effect on patient satisfaction. It would be expected that the greater the number of health professionals (clinical officers, doctors, nurses, etc.), the better care the patient receives (Fleming). *Assurance* is predicated on the availability of adequate qualified health workers such as clinical officers, doctors, and nurses. The skill and courtesy of qualified staff provide a sense of assurance that they have the patient’s best interest at heart and that they will deliver services with integrity, fairness, and beneficence. *Availability* is based on the premise that “the greater the patients’ spatial access to health care facilities, the greater will be their satisfaction” (Andeleeb et al., 2006: 4). Finally, Sclossberg (1990) and Wong (1990) have suggested that health care consumers have become much more sensitive to cost, despite the potential availability of health insurance coverage, and they will search for the best value. In the developing world, cost is a perennial concern among those seeking health care, given their low earnings. Such costs include consultation fees, laboratory test charges, travel, drugs, and accommodations. While basic health care service is supposed to be free in public hospitals and health centers, patients end up bearing additional unseen costs. Costs at private hospitals vary markedly across facilities. The lower the perceived overall cost of health care services, the higher will be the level of patient satisfaction.
Thus the perceived overall cost of health care services contributes to patient satisfaction regarding affordability.

*Structural measures* shape the process within which care is administered. These measures include the size of the hospital, the population the health facilities serve, distance, travel time to the nearest facility, and other measures of geographic access.

For the most part, the environment sets a certain constraint within which the health facility operates. Structural characteristics shape the processes within the hospital (Heydebrand, 1973). Tangible factors in the form of physical evidence such as hospitals, health centers, and beds are also very important to patient satisfaction judgments (Fleming, 1981).

*Quality and Inequity of Health Care*

Accessibility of health services is a multidimensional concept (Frenk, 1992) that refers to geographic, economic (affordability), and organizational factors that can facilitate or hinder use of services.

Malawi is among the countries in the southern region of Africa that are experiencing an increase in the number of patients seeking health services as a result of prevailing diseases, including, but not limited to, HIV/AIDS. In addition, 65 percent of the population of 12 million are defined as poor and unable to meet their daily consumption needs, including health care (NSO, 2000). Poverty levels are higher in rural areas than in urban areas (Kemp et al., 2003). The depth of the severity of poverty in Malawi is reflected in its health indicators: life expectancy at birth dropped from 46 years to 39 years in 2000 (Kemp et al. 2003; World Mortality Report, 2005). Despite the high degree of generalized poverty, there are considerable socioeconomic inequities in
Malawi: the richest 20 percent of the population consumes 46.3 percent of goods and services, compared with only 6.3 percent consumed by the poorest 20 percent, one of the most skewed distributions in Sub-Saharan Africa (UNICEF/GOM, 2000). As a less developed country with most of its people in rural areas, Malawi has a need to strengthen health services in all districts to ensure equitable quality of health care for its population.

It is important that government and other constituents have enough information to guide them in making effective policies that will improve the quality of health services for all Malawians and will address these health problems in all geographic areas. In an effort to address the need to improve the quality of health services, it is helpful to know which geographic areas require immediate attention; hence the need for this study to assess the user level of satisfaction with health services in all districts.

Efforts have been made by policy makers, researchers, and health care providers to identify, reduce, and ultimately eliminate health inequities (Kemp et al., 2003). However, Kemp et al. advise that the whole health system in Malawi is inequitable. Therefore, adequate studies are needed to understand the magnitude of the inequity in health services geographically to ensure appropriate targeting of deprived districts. To the best of my knowledge, no study has been done in which a geospatial approach has been explicitly adopted to analyze patient satisfaction with health services in order to assess the presence of disparities in access to health care in Malawi.

One of the key priorities in meeting the Malawi government’s social inclusion and social justice policy is the requirement for equal access to a range of both primary and secondary health care services for disadvantaged groups, particularly those in remote districts (MOHP, 2002). In response to this policy, the government of Malawi introduced
a plan called the “Essential Health Package,” which attempts to ensure that health services reach the needy in all districts (Kemp et al., 2003). A geographic analysis of satisfaction with health services is ideal in order to strengthen the implementation of the Essential Health Package in vulnerable districts.

Malawi is experiencing an increase in demand for quality health services in all areas. HIV prevalence rate is 15 percent (NSO, 2001), and the number of patients requiring quality services is increasing against the few available health care workers. According to Kemp and others (2003: 29), “the poor and the vulnerable in Malawi have a higher burden of illness and disease, have less access to health services, and suffer the greatest impact from ill health.” There is a need to promote equity in health services. Equity is promoted through the availability of quality services integrated at the periphery in terms of service level, such as at a health center, or geography, such as remote districts (GOM/MOHP, 2002). In view of the fact that the country is facing an HIV/AIDS pandemic, and that the anti-retroviral treatment drugs are available in the country through funding from the Global Fund, there is a concern as to whether the distribution of these drugs will reach the needy citizens in rural districts (Kemp et al. 2003).

Equity in quality health services can be effectively addressed for better planning and targeting if policy makers understand both the sub-optimal spatial distribution of services, as well as user perception of the services across administrative districts in Malawi.

**Significance to Social Policy**

Social policy may be defined in a number of ways that complement each other. Broadly speaking, it refers to “collective interventions directly affecting transformation in
social welfare, social institutions and social relations” (Mkandawire, 2001:1). Social policy is often defined as social services such as education, health, employment, social security, and regulation of institutions and social structures to alter the unequal distributive outcomes of service activity such as satisfaction (Deacon, 2007; Ortiz, 2007). Policies can frame the activities of service delivery systems and other private participants so that they better account for social aims and keep services viable and accessible to everyone. It is also important to articulate social rights, which can lead to effective legislative and institutional mechanisms to enable citizens to make claims about social entitlements such as health care from their governments (Deacon, Ortiz, & Zelenev, 2007). Social policy within a country is made up of the combination of those elements mentioned above that include health services.

Much of the debate on the challenges to social policy has focused on identifying appropriate national-level social policy responses and strategies in the context of increasing and improving delivery of goods and services to all citizens regardless of their geographical location or social status (Deacon et al., 2007). The debate has particularly focused on the social impacts of reforms being made to national health and strategies or policies that ought to be made regarding delivery of health care services. The major concern is the negative consequences of policies on the provision of public social services such as health, and determinant factors on health care services (Yeates, 2001).

The World Health Organization declaration of Alma Ata (WHO, 1978) stated that primary health care (PHC) was the key to achieving “Health for all by the year 2000” and that it should be an integral part of a country's health care scheme. In recent years increasing emphasis has been placed upon issues concerning the evaluation of health care
(Williams et al., 1991). Thus, it has been argued that evaluation of health care should not only focus upon measures of clinical effectiveness and economics, but also upon measures of social acceptability to the consumers of health care (Calnan et al., 1994). Increasingly, attention is turning to the kinds of policies necessary to achieve socially equitable development, that is, how to provide essential social services such as health services to all citizens (Deacon et al., 2007).

In accordance with the policy framework for the Poverty Alleviation Program (Government of Malawi [GOM], 1995), the overall objective of the health sector in Malawi is to raise the health status of all Malawians, especially affected groups, through improving access to health facilities and related services. Recently, there has been an increasing recognition of the importance of the health care user voice in determining the quality of health care services (Bartlett & Boldly, 2001; Boldly & Bartlett, 1998; Boldly & Grenade, 2001; Ryden et al., 2000; Schmitt, 2000). It has been stressed that users provide a valuable source of information about the appropriateness and quality of service, and that such information should be used for quality improvement (Boldy and Barlett; Phillips-Doyle, 1992). Understanding user views and the factors influencing their satisfaction can assist facilities to provide user-focused services and enhance users’ quality of life (Chou, Boldly, & Lee, 2003). There is a lack of studies that focus on users’ perception of the quality of health care services in the country. Furthermore, not much has been done to investigate the quality of health care services spatially in Malawi to identify districts with poor quality of health care services. There is therefore a great need for spatial analytical-based research to provide a clear picture of how users of public health services are satisfied with health services across Malawi’s administrative units.
Government and other policy makers can use the results to identify and implement appropriate policies that address the poor quality and inequitable health service delivery system in the country, hence improving the quality of life.

Conclusion

In summary, further research is needed that more clearly defines neighborhood contexts and links to the determinants of variation in user satisfaction level with health care services, thereby allowing an understanding of the inequity in health care services in the country (Kemp, 2002). This is very critical for policy making and for planning health services to reach all districts in the country, since some districts will need specific intervention based on the prevalence of the determinant factors that affect user level of satisfaction. There were no research studies in the literature in Malawi that included GIS technology that spatially evaluated user satisfaction with health care services. The current study addresses this lack of research by examining the variation in patterns of user satisfaction level with health services, along with the determinant factors that explain the variation.

Furthermore, a qualitative study based on the service provider point of view was conducted to enhance the understanding of factors contributing to poor quality of health services in Malawi. On the basis of the findings of the qualitative study, recommendations to improve the deteriorating and dissatisfactory health care service delivery system are discussed in this study.
Methods

The study was organized in three parts: First, GIS-based spatial analysis was used to investigate the patterns of level of satisfaction with health services in the country. Second, formal statistical modeling was carried out to explore factors that contribute to the variation in users’ level of satisfaction. Third, a qualitative study in the form of key informant interviews with health services workers was also conducted following the GIS analysis.

Study Area and Analytical Tools

Geographical setting. Malawi is a landlocked country in Southern Africa bordering Tanzania, Zambia, and Mozambique and has a population of over 10.4 million of people, of which 85% live in rural areas. The country’s area is 118,484 square kilometers. Figure 2 below indicates the location of Malawi in Africa. Its twenty-six administrative districts, plus the four major urban centers, constituted the thirty administrative area units used in this study. For convenience, these area units are referred to as districts.

Malawi’s health sector is characterized by a plurality of health providers (Kemp et al., 2003). The Ministry of Health and Population (MOHP) accounts for 60 percent of the total number of formal health facilities, followed by the Christian Health Association of Malawi (CHAM) with 25 percent, and other nongovernment and private providers with 15 percent of all health facilities (MOHP 2003). In the government health care system, almost all services are provided free of charge at the point of delivery. This is supported by GOM policy that its available resources will be used to ensure that a package of basic
health services, the Essential Health Package (EHP), will be provided to all citizens. CHAM facilities charge a set fee for services at the point of delivery (MOHP, 1999).

Despite a free public health service with “reasonable” geographic coverage, there are inequities in availability and access to health care (Kemp et al, 2003). A recent publication revealed that quality of care at each level, but particularly the periphery of the system, presents barriers to care (GOM/MOHP, 2002). The analysis concluded that the poor wait longer, receive fewer drugs, and pay more in comparison with the wealthy (GOM/MOHP). Such inequities are exacerbated for people living in geographically remote areas (Kemp et al., 2003). According to a study conducted by WHEN (2002), most hospitals and clinics in remote districts have no drugs.

Data. The CWISDS from NSO (2002) was used to carry out the research with permission from NSOM as indicated in Appendix A, particularly to answer research questions 1 and 2. The Core Welfare Indicators Survey (N = 9,898) was a nationwide comprehensive survey of the living standards of households in all districts of Malawi. The core welfare indicators survey of the 2002 data set was well suited for this analysis because the data observations were collected at the district level.
Figure 2. Location of Malawi in Africa.
The study variables used in this study are presented in Table 1 below.

Table 1.

*Description of variables used in this study for spatial and statistical analyses.*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td><strong>Dependent variables</strong></td>
<td></td>
</tr>
<tr>
<td>Satisf</td>
<td>Percentage of households satisfied with health services</td>
</tr>
<tr>
<td>W_satisf</td>
<td>Spatially lagged dependent variable</td>
</tr>
<tr>
<td><strong>Potential explanatory variables</strong></td>
<td></td>
</tr>
<tr>
<td>Coratio</td>
<td>Population-to-clinical officer ratio</td>
</tr>
<tr>
<td>Proximity</td>
<td>Proportion of households within sixty minutes of nearest health facility</td>
</tr>
<tr>
<td>Population</td>
<td>Population size (number of persons)</td>
</tr>
<tr>
<td>Accs2_pove</td>
<td>Proportion of poor who need to travel one hour or longer to reach the nearest health care facility.</td>
</tr>
<tr>
<td>Dr_ratio</td>
<td>Population-to-doctor ratio</td>
</tr>
<tr>
<td>Bedsratio</td>
<td>Population-to-bed ratio</td>
</tr>
</tbody>
</table>

The dependent variable satisfaction (*satisf*) refers to the percentage of households satisfied with health services. From the data set we obtained the percentage of participants who responded positively to the question of whether they were satisfied with health services in their district. The second dependent variable is the spatial lag variable (*w_satisf*). The spatial lag is the weighted mean of a variable for neighboring spatial units of a given district (Wong & Lee, 2005).

The independent variables selected for regression analysis are briefly described as follows: First, the *population* variable is very important in this study because it is used to
adjust or control for differences in population size. According to the Ministry of Health and Population (MOHP, 2001), health resources such as drugs are distributed in districts based on the population size of the district. This policy may contribute to a situation in which the larger the district’s population, the more resources for the health sector it receives. Furthermore Chilowa et al. (2001) also observed that service programs appear to be concentrated in areas with high population, with the south generally receiving more benefits than the north, which benefited the least from the services, thus greater population entails greater need.

The proximity variable refers to the proportion of households that live within sixty minutes to the nearest health care facility in the district. Jain et al. (1985) found that proximity of user’s home to the health facility is one important determinant factor of satisfaction with health care service. Coratio, the number of residents per clinical officer, is a process-type variable. Since it is expected that the quality of healthcare is inversely related to the population-to-clinical officer ratio, coratio is a reasonable predictor variable of satisfaction level in those districts. Accs2_pove refers to the proportion of poor people who travel more than one hour to the nearest health care facility in the district. This variable helps to identify the magnitude of poor people who struggle to get health care at their nearest facility. According to Fitzpatrick (1991), a broad definition of “accessibility” includes issues such as physical access to health care facilities. Thus, travel time to the facility and waiting time have been found to be related to patient dissatisfaction (Abromowitz et al., 1987).

The other candidate variables include proportion of people per doctor (dr_ratio) and number of people per bed (Bedratio). The number of people per doctor is another
type of process variable, which helps to identify population size served by one doctor. This variable can indicate whether a larger number of people served by one doctor lowers the satisfaction level in the district. With regard to Bedratio, it is important to assess the adequacy of beds compared to the number of people in a district. This variable can indicate whether a larger number of people per district would affect user satisfaction.

Many barriers stand in the way of poor people seeking medical care: transportation costs, social stigma, lack of information, discrimination by medical personnel, and shortage of time. Even when treatment is available free of charge, these and other barriers too often prevent people from accessing the health care that they need and to which they are entitled.

GIS-based spatial analyses. GIS is an appropriate information technology to investigate patterns of user satisfaction with health services. In this study, GIS technology was used to integrate and organize spatially referenced information and produce maps indicating districts with levels of satisfaction with health services. GIS was further utilized to carry out data exploration and spatial statistical analysis to analyze the significance of the spatial relationship of user satisfaction with health services and determinants of user satisfaction.

This section describes the GIS analytical procedures used in the study. GIS served as the database infrastructure and analytical platform to implement the geospatial approach to the evaluation of health care customer satisfaction in Malawi. All data were integrated and organized in a GIS-based central data repository. GIS tools were also used for data display and production of maps, as well as for exploratory data analysis and to carry out spatial statistical tests to determine the spatial association of the variables.
The Malawi GIS layer was obtained from Malawi Diffusion and Ideational Change Project (2004-2006). In order to ensure that the data were usable by GIS software, several steps were taken. First, the attribute table was converted from Microsoft excel file format to a dbase file and was joined to the GIS file on which the analysis was based. The joining procedure was performed on the district identifying number.

The health facilities inventory was used to map all health care facilities in the country, and was obtained from University of Pennsylvania’s Malawi Diffusion and Ideational Change Project (2004-2006). The geo-coding of facilities was conducted using ArcGIS version 9.1 (Ormsby et al., 2001).

Software. Mapping and GIS analysis were done using both ArcGIS version 9.1 (Ormsby et al., 2001) and GeoDa version 0.9.5.i (Anselin, 2005). Spatial autocorrelation tests and spatial regression modeling were implemented by using the GeoDa software (Anselin). A geo-database was created using ArcGIS that contained all the dataset, including the shape files for Malawi.

Analytical Protocol

In this research, the following key components of spatial data analysis were used: descriptive mapping/visualization, ESDA, and spatial statistics.

Descriptive mapping and visualization. A critical component of a GIS is its ability to produce graphics on the screen or on paper that convey the results of analysis to the people who make decisions about resources. Wall maps and other graphics can be generated, allowing the viewer to visualize and thereby understand the results of analyses or simulations of potential events. It is very important to realize that a frequent problem for socioeconomic GIS users is the requirement to transfer data between incompatible
sets of areas, especially between the incompatible spatial referencing systems; hence the need for appropriate manipulation (Anselin, 1996). The spatial objects linked to the study phenomena were represented on a map in order to display their spatial relationships. The data for both locations and attributes were processed using the GeoDa version 0.9.5.i (Anselin, 2003) and ArcGIS software version 9.1 (Wong & Lee, 2005). In terms of digital representation, polygon features were employed to represent Malawi’s administrative districts as spatial objects (Heywood, Cornelius, & Carver, 2006).

GIS tools were used to visualize the results of the spatial analyses. Standard classification method of natural breaks were used to group similar values on the map (Mitchell, 1999).

*Exploratory Spatial Data Analysis (ESDA).* ESDA is defined as “a collection of techniques to describe and visualize spatial distributions, identify spatial outliers, discover patterns of spatial association, clusters or hot spots, and suggest spatial regimes or other forms of spatial heterogeneity” (Anselin, 1999: 258). Methods of ESDA take into account the spatial aspects of data, are accepted as standard tools, and are considered a vital part in the integration of spatial analysis and GIS (Anselin & Getis, 1992; Bailey 1992; Goodchild, 1992; Fotheringham & Rogerson, 1993). ESDA is utilized to measure the spatial association between observations for one or several variables (Anselin, 1996). Exploration was the first step in inductively investigating the spatial pattern of satisfaction to ascertain general trends or gradients in the mapped distribution of values. ESDA incorporated quantitative spatial analyses and were conducted to complement descriptive mapping, the map-oriented nature of GIS (Fischer, Schoten, & Unwin, 1996).
These techniques included box plots, scatter plot matrices, methods for detecting spatial outliers, and spatial classification procedures for data simplification (Fisher et al.).

A histogram was used to check for unnecessary characteristics of the spatial data, referred to as “islands”. Island refer to the area unit that is disconnected to the main area of study. The histogram was derived from the data before proceeding to the other analytical steps and revealed a normal connectivity of the area units of study.

A graphical tool called a box plot was used to explore the data distribution. Box plots were dynamically linked to the underlying data variable map to help identify cases and outliers.

Spatial statistical methods. In this section, an overview is provided of the statistical method used to formally characterize spatial patterns and how it was used in the interactive visual GIS environment. According to Mitchell (1999: 36), “Patterns can be seen by looking at the map. However, to find out if there are hidden or meaningful patterns in the data, there is a need to use spatial statistics to measure and quantify the relationships between features.” A choropleth map was created to display the spatial distribution of percentage of households satisfied with health services categorized by class of interval to explore whether satisfaction in a particular region was higher than in neighboring districts.

The relevant question is this: Are satisfaction rates around a particular district noticeably higher than those in other areas? This question cannot be reliably answered simply by inspecting the designed map. The next section describes the specific statistical methods for spatial analysis that can be used to provide an objective answer to such a question.
In order to carry out any analysis of spatial autocorrelation, a spatially lagged variable (a sum of observations at neighboring locations) was computed using GeoDa version 0.9.5.i. The spatially lagged variable also became a very important component that was instrumental in a regression analysis.

The spatial scatter plot is another convenient tool. According to Anselin (2003), Moran’s I spatial autocorrelation statistic is visualized as the slope in the scatter plot with the spatially lagged variable, the weighted mean value of neighboring observations on the vertical axis, and the original dependent variable on the horizontal axis. The original dependent variable and the spatial lagged variables were standardized to facilitate interpretation and categorization of the type of spatial autocorrelation (cluster or outlier).

A scatter plot produced using the GeoDa software indicated the slope of the regression line as Moran’s I statistic. The four quadrants in the scatter plot correspond to different types of spatial correlation. Spatial clusters in the upper right (high-high) and lower left (low-low) quadrants, and spatial outliers in the lower right (high-low) and upper left (low-high), were identified using the quadrants (Anselin, 2003). The scatter plot provided an indication of possible sub-regions where the spatial correlation was different from the rest.

*Spatial autocorrelation.* Spatial autocorrelation indicates the extent to which the occurrence of one feature is influenced by similar features in the adjacent area. As such, statistics of spatial autocorrelation provide a useful indicator of spatial patterns. The spatial pattern of a distribution is defined by the arrangement of individual entities in space and the geographic relationships among them (Hansen, 1997). Spatial autocorrelation is based on the first law of geography which states that “everything is
related to everything else, but near things are more related than distant things" (Tobler, 1970: 236). Thus spatial autocorrelation measures the similarity of objects within an area or the degree to which a spatial phenomenon is correlated to itself in space (Cliff & Ord, 1973, 1981). In other words, spatial autocorrelation tools test whether the observed value of a variable at one locality is independent of values of the variable at neighboring localities (Hansen).

A positive spatial autocorrelation refers to a map pattern where geographic features of similar value tend to cluster on a map, whereas a negative spatial autocorrelation indicates a map pattern in which geographic units of similar values scatter throughout the map. When no statistically significant spatial autocorrelation exists, the pattern of spatial distribution is considered random (Anselin & Getis, 1992; Bailey, 1992; Goodchild, 1992; Fotheringham & Rogerson, 1993).

There are several indicators of spatial autocorrelation (Cliff & Ord, 1973, 1981; Goodchild, 1986; Haining, 1990; Chou, 1997). Global indicators of spatial association include Moran’s I (Moran, 1948), Geary’s c (Geary, 1954), and the General G statistics (Wong & Lee, 2005). Global statistics measure the degree of spatial association as reflected in the data set as a whole. Moran’s I is commonly used for global measures of spatial autocorrelation (Cliff & Ord; Goodchild; Haining). Local Indicators of Spatial Association (LISA) detect spatial autocorrelation at a local scale, meaning that the measure provides spatial autocorrelation value for each areal unit (Wong & Lee). In this study, the global indicator was Moran’s I, while local clustering was assessed via the Local Indicators Spatial Association (LISA). Both methods are described next.
The spatial pattern of a distribution is defined by the arrangement of individual entities in space and the geographic relationships among them (Hansen, 1997). Moran's I is defined as a measure of the correlation among neighboring observations in a pattern (Boots & Getis, 1988) and is based on the interpretation of the statistic as a regression coefficient in a bivariate regression of the spatially lagged variable Wy (i.e., w_satisf) on the dependent variable satisf. This type of interpretation allows the use of the scatter plot for easy visualization (Figure 9). This scatter plot may be used in isolation or integrated as an additional view on the data interactively (Monmonier, 1989; Unwin, 1993). The Moran's I statistic can be calculated according to the following equation (Odland, 1988):

\[ I = \frac{n \sum \sum W_{ij} (x_i - \bar{x})(x_j - \bar{x})}{W \sum (x_i - \bar{x})^2}, \]

where \( x \) is the observed value at location \( I \), and \( n \) is the number of locations. The weighting function \( W \) is used to assign weights to every pair of locations in the study area, and the spatial autocorrelation depends on these weights as well as the data for the locations. The simplest weighting function for area data is a set of binary weights that have a value of one (1) for areas that share a common boundary and a value of zero (0) otherwise. These adjacency weights do neglect important spatial elements such as distance between the centers of the polygons. The mean of Moran's I under either normality or randomization is given by

\[ E_I = \frac{-1}{n - 1} \]
which approaches zero for large samples (Odland). Computation of Moran’s I is achieved
by division of the spatial co-variation by the total variation. Resulting values range from -
1 to 1. Positive signage represents positive spatial autocorrelation, while the converse is
true for negative signage. A zero result represents no spatial autocorrelation, indicative of
spatial randomness. The statistical coefficient in Moran’s I provides an indication of the
type and degree of spatial autocorrelation present in a data set. To obtain the spatial
autocorrelation coefficient of a variable we have to correlate the values of that variable
for pairs of localities. However, not all pairs of localities will be correlated, only those
that are considered neighbors.

Furthermore, Anselin (in Fischer et al., 1996) expresses Moran’s I in matrix
notation as,

\[ I = (N/So)y'Wy/y'y \]

where \( N \) stands for the number of observations, \( So \) is the sum of all elements in the spatial
weights matrix \( (So=\sum i\sum j wij) \), \( y \) is the observations in standard deviations from the mean,
and \( Wy \) is the associated spatial lag. The \( y \) are the deviations from their mean, \( I \) is
formally equivalent to a regression coefficient in a regression of \( Wy \) on \( y \). The
interpretation of Moran I as a regression coefficient provides a way to visualize the linear
association between \( y \) and \( Wy \) in the form of a bivariate scatter plot of \( Wy \) against \( y \)
(Figure 9).

**Local Indicators of Spatial Association (LISA).** According to Wong and Lee
(2006), it is reasonable to suspect that the magnitude of spatial autocorrelation is not
necessarily uniform over the region, but rather varies from one part of it to another. This
implies that the spatial autocorrelation magnitude may be high in some subregions but
low in others. LISA helps to capture the spatial variability of spatial autocorrelation at the local scale (Anselin, 1995). In order to indicate the level of spatial autocorrelation at the local scale, a spatial autocorrelation value is derived for each areal unit, as indicated in Figure 10. Wong and Lee define the local Moran statistic for area unit $i$ as

$$I_i = z_i \sum_j W_{ij}z_j,$$

where $z_i$ and $z_j$ are deviations from the mean for the corresponding $x$ values, or

$$z_i = \frac{x_i - \bar{x}}{\delta},$$

where $\delta$ is the standard deviation of the variable $x$. Therefore, $Zi$ is basically the z score of $xi$. Similar to the interpretation of Moran’s I, a high value of the local Moran statistic means a clustering of similar values (which can be all high or all low).

**Spatial weight matrices.** In order to quantify the neighborhood relationship among districts, spatial weight matrices, referred to as spatial lag, were computed by using the binary connectivity method (Wong & Lee, 2005). The binary connectivity method denotes neighbors with a value of 1, while non-neighbors are denoted with a 0. Spatial weights matrices are needed to quantify the neighborhood structure among the data units in order to calculate spatial autocorrelation statistics.

**Multivariate regression analysis.** The enter linear regression method in SPSS version 15 was used to select the four independent variables from the eight potential variables. The selected independent variables were included in the Ordinary Least Square (OLS) model and Spatial Lag modeling analysis in GeoDa software. The selected variables for spatial modeling entails population per clinical officer ($coratio$), proportion
of poor people who travel more than an hour to the nearest health care facility (accs2_pove), and proximity (percentage of households within sixty minutes to the nearest health care facility). Multivariate linear regression models were used to assess the relationship between user satisfaction with health services and predicting factors. To investigate the explanatory influence of variables on the satisfaction level of households, we conducted an Ordinary Least Squared (OLS) regression analysis using SPSS version 15 and GeoDa version 9.5.1 (Anselin, 2005). Applied to this context, the OLS regression equation is specified in matrix notation as follows:

\[ y = X \beta + \epsilon \]

where \( y \) is a vector of observations on the dependent variable, \( X \) is a matrix of independent variables, \( \beta \) is a vector of coefficients, and \( \epsilon \) is a vector of random errors (Draper & Smith, 1981). The explanatory variables, \( X \), are specific variables influencing satisfaction rates.

**Spatial regression modeling.** In order to control for spatial autocorrelation, a spatial lag variable was inserted into the model as a supplementary explanatory variable (Anselin, 2003). The spatial lag is the weighted mean of a variable for neighboring spatial units of a given district (Wong & Lee, 2005). For the dependent variable, the spatial lag variable is generally written \( W_y \), where \( W \) is the spatial weight matrix that identifies neighboring spatial units.

The spatial lag model is computed using the formula:

\[ y = \rho W y + X \beta + \epsilon \]

similar to the OLS equation but with the addition of the \( W_y \) spatial lag of the dependent variable, which takes the coefficient \( \rho \). Spatial lag model was helpful in determining if
the level of the dependent variable in neighboring districts was related to the level of the
dependent variable in the area in question (Fisher & Nijkamp, 1993).

Alternatively, the spatial dependence can be attributed to the error term of the
model and modeled as a spatial error model:

\[ y = X\beta + \varepsilon, \text{ where } \varepsilon = \lambda W\varepsilon + \varepsilon \]

Here the error term is disaggregated into spatial lag of the error term of neighboring
aggregated spatial units, with coefficient \(\lambda\), and the residual error term for the spatial
variable for the model affect the aggregated districts and its neighbors in a similar manner
(Anselin, 1992).

Spatial dependency diagnostic and model selection. In order to choose which
model to use, Lagrange Multiplier tests (LM-Error and LM-Lag test statistics) were
computed using GeoDa to identify the right model for the analysis (Anselin & Rey,
1991). The decision rule discussed by Anselin (2005) in Figure 3 was followed to
determine the appropriateness of running the spatial lag model.
Figure 3. Decision rule for spatial regression analysis (Anselin, 2003).
Qualitative Study and Questionnaire Design

In order to address policy issues adequately, following the results of the spatial analysis of user satisfaction secondary data, qualitative key informant interviews were conducted to answer research questions 3 and 4, as recommended by Steinberg and Steinberg (2006). The researcher initially conducted in-depth discussions with 20 health services providers (officials) about factors that contribute to poor quality, inequitable health care services in Malawi. Policy issues and implications were also discussed. The interview was conducted on the phone following the approved phone script. (See Appendix D.)

The key informant interviews were conducted with the participants identified through snow bowling technique (Cherry, 2000; Steinberg & Steinberg, 2006) from diverse geographic locations. The discussions revealed a variety of factors from the service provider point of view and enhanced the process of making recommendations that address the quality and inequity of health services.

A preliminary questionnaire was developed in English and was designed in a user-friendly manner to better capture desired constructs. The questionnaire was pre-tested several times to arrive at appropriate wording, format, length, and sequencing of the questions. Pre-test feedback was used to refine the questionnaire until it was ready for data collection. A copy of the questionnaire guide is in Appendix B.

Resources

The researcher established links with the NSOM where the secondary data were provided for GIS analysis. Spatial and statistical analyses were conducted at the Loma Linda University School of Public Health Geo-informatics Laboratory. ArcGIS, GeoDa,
and SPSS software were run on an HP desktop computer. Financial resources were provided by Loma Linda University Department of Social Work and Social Ecology.

Research ethics

In consideration of the fact that the research was primarily based on secondary data from NSOM, there were no ethical implications with human subjects in the study. However, for qualitative data collection through key informant interviews, a consent form was administered to the interviewees (See Appendix E). The qualitative study component of the study was approved by the Institutional Review Board under an expedited review (See Appendix C).
Results

Validity and Assumptions

In order to ensure validity, data screening was conducted to identify missing data and outliers, and statistical assumption checking was performed to ensure correct functional form and constant variance. There was neither missing data nor outliers that were considered detrimental to the analysis.

For multiple regression analysis, we examined the crucial assumptions that needed to be met, as recommended by Mertler and Vannatta (2002): first, the assumptions that the dependent variable and the combination of independent variables is linear (linearity); second, the variance of the residuals across all values of the independent variables is constant (homoscedasticity of the variance of residuals); and third, the normal distribution of errors (normality). The assumption for normal distribution of residuals was determined by the histogram in Figure 4:
The residual scatter plot was also produced using SPSS version 15 to determine if these three assumptions were met. This examination was conducted because it provides a test of all three of these crucial assumptions (Tabachnick & Fidell, 1996). The assumptions of linearity, normality, and constant variance (homoscedasticity) were met, hence revealing the points clustering along the horizontal line defined by \( \Lambda_1 = 0 \), in a somewhat rectangular pattern (see Figure 5). Tabachnick and Fidell (1996) support the use of residuals because they are a good alternative in place of routine pre-analysis data screening.
The fourth assumption was that there should be no multicollinearity of independent variables (Mertler & Vannatta, 2002). We tested for multicollinearity by computing tolerance for all the independent variables included in the regression model and found none. As recommended by Mertler and Vannatta that tolerance of more than 0.1 is an indicator of the appropriateness of independent variables utilized in the
regression, we verified that all the independent variables attained a tolerance of more than 0.1, hence the assumption of multicollinearity was not violated, as indicated.

*Exploratory Spatial Data Analysis (ESDA)*

This section illustrates the results of GIS-based investigation of spatial patterns of user satisfaction with health services and factors that may explain the variation in spatial patterns. We first present the results according to the analytical protocol entailing visualization, ESDA, spatial statistics, and the multivariate regression model analysis.

*Visualization.* In order to aid the understanding of spatial distribution of levels of user satisfaction with health services, the map below (Figure 6) indicates the distribution of health care facilities in the country, matched with the user satisfaction level, and Figure 7 indicates the percentage distribution of household satisfaction with health services. In addition, this map shows all the facilities in the country matched with satisfaction level per district. The map also shows two dispensaries on the island of Malawi.
Figure 6. Percentage of households satisfied with health services.
Figure 7. Health facilities and percentage of households satisfied with health services.
**Exploratory devices.** The three other exploratory devices of box map and box plot, scatter plot, and brushing are illustrated in Figures 8 and 9 respectively.

The box plot and box map clearly indicate that there are higher values and lower values of percentage of satisfaction with health services, as displayed in Figure 8:

*Figure 8. Box map (left) and box plot (right) for satisfaction level per district*
The Moran scatter plot (Figure 9) presents the relationship between the variable $satisf$ in location $i$ and the values of that variable in the neighboring locations ($w_{satisf}$).

![Moran scatter plot](image)

*Figure 9.* Scatter Plot (left) and Brushing illustration, with satisfaction map with health services (right).

The scatter plot in Figure 9 indicates districts with higher values (upper right section of the scatter plot), which were selected on the map (at right), depicted with cross-hatching.
The slope of the line in the scatter plot is equivalent to the Moran’s I coefficient. The slope is positive, indicating positive spatial autocorrelation: high values of the variable in location i tend to be clustered with high values of the same variable in locations that are neighbors of i, and vice versa. If the slope in the scatter plot is negative, that means that we have a sort of checkerboard pattern, or spatial competition, in which high values of a variable in location i tend to be with lower values in the neighboring locations.

In Figure 9, the slope of the curve is calculated and displayed at right, on top of the graph. The four quadrants in the scatter plot correspond to different types of spatial correlation. Spatial clusters in the upper right (high-high) and lower left (low-low) quadrants, and spatial outliers in the lower right (high-low) and upper left (low-high) are easily identified using the quadrants (Anselin, 2003).

The scatter plot provides an indication of possible sub-regions where the spatial correlation may be different from the rest. Districts with high rates of satisfaction tend to have neighbors with high rates as well, particularly in the southern region of the country.

Spatial autocorrelation. Global Moran’s I test results for spatial autocorrelation of the percentage of households satisfied with health services are shown in Table 2.

Table 2.

Summary of Global Spatial Statistical Analysis

<table>
<thead>
<tr>
<th>Statistic</th>
<th>z-score</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moran’s I</td>
<td>0.40</td>
<td>3.5</td>
</tr>
</tbody>
</table>

* Statistically significant at 95 % Confidence interval (p < .05)
Based on the results in Table 2, the spatial randomness test was statistically significant: Moran's I = 0.40 (p < 0.05). The null hypothesis of spatial randomness is rejected; therefore it was concluded that the distribution of values of satisfaction with health services over Malawi's 30 districts exhibited a tendency toward clustering.

*Local Statistics for Spatial Autocorrelation (LISA).* The descriptive map in Figure 6 suggested a pattern of low and high values of satisfaction in different portions of the map. Therefore, local spatial autocorrelation tests were also applied, particularly LISA techniques using GeoDa (Anselin, 1995). The results of LISA analysis were mapped in Figure 10. The cluster map on the left indicates local clusters of high and low values of satisfaction. The significance map on the right displays districts that are significant.

The LISA maps clearly depict two spatial patterns: high values of satisfaction in the southern region, and low values of satisfaction in the central and northern regions. Using Moran's I, we tested the null hypothesis of spatial randomness against the alternative hypothesis of positive significant spatial autocorrelation. A positive and significant statistic indicated that districts with scores of higher satisfaction have neighboring districts that also have higher scores of satisfaction (high-high), and districts with low satisfaction scores also have neighbors with low satisfaction scores.

The spatial autocorrelation test results revealed that households in the southern region were more satisfied than those in the northern and central regions (Moran' I = 0.40, p < 0.05). However, the mean satisfaction level nationwide is very low (11.57%). The geographic variation of user satisfaction with health services suggests the existence of spatial patterns of lower and higher than the mean level of user satisfaction per district.
While this exploratory view of the data may suggest hypotheses to test in further analysis, the principal message is that, taken together, the maps in Figures 6 and 9 indicate that user satisfaction level is a clustered regional phenomenon. A combination of structures and processes somehow conspire to partition the country into regions of higher and lower user satisfaction.
Multivariate Regression Analysis

The following are the results of the regression analysis in determining factors that contribute to explaining the variance in level of satisfaction with health services. Furthermore, this section will determine which model was a better fit in explaining the variation in satisfaction level.

The OLS enter method in SPSS version 15 was utilized to select the four independent variables that were included in the final model. We selected four independent variables that were significant out of the six potential variables listed in Table 2. The traditional OLS method was again first tentatively applied to analyze the relationship between user level of satisfaction and the four explanatory variables. The results for the OLS model of the four independent variables are presented in Tables 3, 4, and 5.

The four independent variables were included in the regression model using the enter method. The regression results, including some independent parameters and regression diagnostics, are gathered together in Table 5.

Table 3.

Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Sq.</th>
<th>Std. Error of Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.676</td>
<td>.457</td>
<td>.370</td>
<td>2.1320</td>
</tr>
</tbody>
</table>

Predictors: Constant, coratío, accs2_pove, population, proximity
Dependent variable: Satisf
Table 4.

ANOVA Summary Table

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>95.727</td>
<td>4</td>
<td>23.932</td>
<td>5.265</td>
<td>.003**</td>
</tr>
<tr>
<td>Residuals</td>
<td>113.639</td>
<td>25</td>
<td>4.546</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>209.367</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Predictors: Constant, coratio, accs2_pove, population, proximity
Dependent variable: Satisf
** Significant at p < 0.01

Table 3 indicates that 46% of variance in user satisfaction with health services was explained by the OLS model and that the model was significant (F = 5.265, p < 0.05) as indicated in table 4.

The GeoDa software was used to obtain the diagnostic statistics. The OLS model yielded similar results with those of SPSS, but the significant spatial dependence diagnostics test of Lagrange M (lag) suggested the presence of spatial effects (p < 0.05). A spatial lag model was then conducted to correct for the spatial dependence, and results are indicated in column II of Table 5. OLS Model and Spatial Lag Model results are indicated in Table 5 below.
Table 5.

**OLS and Spatial Lag models of user satisfaction with health services**

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>p value</th>
<th>Coefficient</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>14.0727</td>
<td>0.0000***</td>
<td>10.0630</td>
<td>0.0000***</td>
</tr>
<tr>
<td>Population</td>
<td>7.2599</td>
<td>0.0048**</td>
<td>6.1483</td>
<td>0.0017**</td>
</tr>
<tr>
<td>Accs2_pove</td>
<td>-7.9549</td>
<td>0.0052**</td>
<td>-6.5323</td>
<td>0.0002***</td>
</tr>
<tr>
<td>CO_ratio</td>
<td>-0.1570</td>
<td>0.0385*</td>
<td>-2.1839</td>
<td>0.0017**</td>
</tr>
<tr>
<td>Proximity</td>
<td>0.0787</td>
<td>0.0202*</td>
<td>0.0554</td>
<td>0.0427*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lag Coefficient (ρ)</td>
<td>NA</td>
<td></td>
<td>0.3547</td>
<td>0.0251**</td>
</tr>
<tr>
<td>Moran’s I (residual)</td>
<td>0.2408</td>
<td>0.0137*</td>
<td>0.0276</td>
<td>0.8870</td>
</tr>
<tr>
<td>R-square</td>
<td>0.4572</td>
<td></td>
<td>0.5454</td>
<td></td>
</tr>
<tr>
<td>S.E. of regression</td>
<td>2.1320</td>
<td></td>
<td>1.7810</td>
<td></td>
</tr>
<tr>
<td>Log Likelihood</td>
<td>-62.54</td>
<td></td>
<td>-60.39</td>
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</tr>
<tr>
<td>Akaike Info Criterion</td>
<td>135.09</td>
<td></td>
<td>132.78</td>
<td></td>
</tr>
<tr>
<td>Schwarz Criterion</td>
<td>136.64</td>
<td></td>
<td>133.30</td>
<td></td>
</tr>
<tr>
<td>Lagrange M (lag)</td>
<td>4.4053</td>
<td>0.0358*</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Lagrange M (Error)</td>
<td>3.1394</td>
<td>0.0764</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

NA indicates not applicable  
* means significant at p < 0.05; **p < .01, ***p < 0.001

ρ for spatial lag Model

Column 1 in Table 5 shows the results of a standard OLS regression, and column 2 shows the results of spatial lag model. Quite significant independent variable estimates and an acceptable R-square indicated that the OLS model was satisfactory. However, Spatial Lag model was a better fit, explaining about 55% of the variance in the model.

In addition, Figure 11 below presents the two residual scatter plots for both OLS model and Spatial Lag model. The spatial lag model residuals reflect insignificant spatial autocorrelation (Moran’s I = 0.027, p > .05), as indicated in Figure 11 (B). Lack of autocorrelation of residuals in spatial lag model clearly indicates that spatial lag variable...
improved the explanation of the unexplained variance that was reflected by positive spatial autocorrelation (Moran’s I = 0.2408, p<.05), as seen in Figure 11 (A).

(A) OLS model  
(B) Spatial Lag model

_Figure 11._ Moran’s I scatter plots of residuals A (OLS model); B (Spatial Lag model).

The explanatory power of the spatial lag model considerably improved over the OLS regression model (with R-square of 0.55), as compared to the OLS model (R-square = 0.46). The proper measures of fit of Log-Likelihood, Akaike info Criterion (AIC), and Schwarz Criterion (SC) were compared to those of the OLS regression model. There is a change in the log-likelihood from -62.54 (for OLS model) to -60.39 (for the Spatial Lag model). Compensating the improved fit for the added variable (the spatial lagged dependent variable), the AIC (from 135.09 to 132.78) and SC (from 136.64 to 133.30) both decreased relative to OLS, again suggesting an improvement of fit for the
spatial lag specification. The spatial autoregressive coefficient is estimated at 0.35 and is significant (p < 0.05).

There are some differences in the significance of the other regression coefficients between the spatial lag model and the classic traditional OLS model. The control variable population is even more significant (p = 0.001, < 0.01) than before (p = 0.004), and the significance of availability of clinical officers has improved from p < 0.03 to p< 0.01. Proximity is constantly significant at p < 0.05). The magnitude of all the estimated coefficients is also affected, with all showing a decrease in absolute value. To some extent, the explanatory power of these variables was attributed to district values associated with the neighboring locations. This was indeed picked up by the coefficient of the spatially lagged variable that is significant at p < .05.

**Conclusion**

The significant spatial autocorrelation tests of user satisfaction with health services demonstrate effectiveness of such tests in exploring patterns of the phenomenon of interest. These tools help show patterns of districts that are lower than the mean and those that are higher than the mean. Both OLS regression model and Spatial Lag model were significant in explaining the variation of user satisfaction level, but Spatial Lag model was the best fit because it accounted for more of the spatial effect.
Policy Implications on Quality and Equity of
Health Care Services in Malawi

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This article will be submitted to the Journal of Global Health Policy and Practice. The article addresses the third and fourth research questions: “What factors contribute to poor quality and inequity of health care services systems in districts of Malawi based on service providers’ point of view?” and “What can policy makers do to improve quality and equitable health care delivery services to reach all citizens in all districts irrespective of place of residence?”
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Abstract

There is widespread recognition of the poor quality of health services in Malawi, but far less is known about the source of dissatisfaction among users in various districts. Although Malawi still embraces the policy of free public health services at the point of delivery, the health sector faces inefficient and inequitable health services. Although the number of health care facilities increased over the years through funding from donor agencies such as Malawi Social Action Fund (MASAF), studies have revealed that the population is not satisfied with the quality of health services. Some households, particularly in the northern region and part of the central region, are far less satisfied than households in districts of the southern region, indicating inequity in health care services in the country.

The purpose of this paper is to discuss possible factors for inefficient and inequitable health care services in Malawi, address the policy implications, and offer recommendations for this situation. Key informant interviews with health workers such as district hospital administrators, matrons, medical assistants, planners, and technocrats were conducted. A review of the publications on health services policy in Malawi was also conducted to assess the information regarding policy and the condition of health care services.
This paper discusses some findings believed to contribute to poor and inequitable distribution of health services in districts of Malawi and recommends policies that address those findings. The paper also discusses the challenges and some implications in the proposed policies. The study found that poor quality and health services inequity is influenced by mal-distribution of resources, shortage of health personnel such as doctors and nurses, poor management, and lack of priorities in the health care service delivery system. In addition, the health care delivery system and potential policy recommendations for improving the quality and equitable delivery of health care services are also discussed.

Introduction

It has been recognized that the quality of health care services in Malawi is deteriorating and, furthermore, is inequitable among districts in the country (Kemp et al. 2003). A National Core Social Welfare Survey (NSO, 2002), which was spatially analyzed by Mazinga (2006) using Geographic Information Systems Technology, revealed that there is substantial spatial variation in patterns of user satisfaction level with the health services delivery system. Remote districts in the northern and those in the central region indicate a lower user satisfaction, compared to districts in the southern region (Mazinga). The National Core Social Welfare Survey further indicates that remote districts’ mean satisfaction level is much lower than the urban districts of Blantyre, Zomba, Lilongwe, and Mzuzu (NSO, 2002). According to the National Core Social Welfare Survey (NSOM), the national mean percentage of households satisfied with health services per district was only 11.57 percent.
Malawi's living conditions are among the poorest in the world (Wold et al., 2005). Based on the poverty mapping analysis, 65 percent of Malawi's population lives in poor households (Benson et al. 2002).

Although the number of health facilities has increased over the years, access to functional health services continues to be limited and poor (Wold et al., 2005). The Malawi Poverty Reduction Strategic Plan (MEPD, 2002) has noted that physical access to health centers remains poor, with only 3 percent of the population living in a village with a health center. In addition to the poor condition of existing health centers, there is inadequate supply of drugs and medical supplies (Wold et al.). Furthermore, most people live far from the health center (Malawi Economic Justice Network, 2003). About 85 percent of the population in Malawi lives in rural areas (NSOM, 2002). However, a study conducted by Fozzard and Simwaka (2002) noted that health spending skewed toward the provision of tertiary care in urban areas, thus marginalizing the rural districts. Most of the poor in rural districts have limited financial resources and rely mostly on free public health care services.

The goal of Malawi's government is to raise the level of health status of all Malawians by reducing the incidence of illness and occurrence of premature deaths (Ministry of Economic Planning and Development, MEPD, 2002). The Ministry of Health and Population (MOHP, 1999) policy is to raise the level of health status of all Malawians through the development of a health delivery system capable of promoting health, preventing, reducing and curing disease, protecting life and fostering the general well-being and reducing the occurrence of premature deaths. The vision of MOHP is to improve the health status of all Malawians through the provision of effective, efficient
and safe health care service (Vision 2020, 1999). Finally, its mission is to stabilize and improve the health status of all Malawians by improving access, quantity, cost-effectiveness and delivery of a quality Essential Health Plan (EHP) and related services to alleviate the suffering caused by illness, and promoting good health, thus contributing to poverty reduction (MOHP, 2004).

The statements above entail economic objectives for health care, which are also the centerpiece for health sector reforms recognized by the government (MOHP, 2004), which embrace the following:

- Equity in delivery and financing of health services
- Efficiency in resource allocation and utilization
- Quality of health care goods and services
- Effectiveness of health care services and goods provided

Some of these economic objectives, in particular equity and efficiency, will be evaluated in the later sections of this paper.

Because the policies, vision, and goals clearly consider all Malawians, everyone must benefit from the health care system. That means all residing in each and every district of the country are to receive the quality of health care they deserve. These policies are consistent with John Rawls's theory (1993) of social justice that promotes a fair service delivery system whose basic arrangements must respect the fundamental equality of all members of society and should not exclude anyone. The Malawian government policy of free public health services at the point of consumption supports the theory of social justice whereby everyone has access to available quality health care. Although there is a policy of free public health services at the point of delivery, the health sector faces the
problems of inefficient and inequitable service delivery (Makoka, Kaluwa, & Kambewa, 2007).

Malawi, one of the world’s poorest countries, is faced with the compound crisis of persistent sickness, impoverishment, and economic backwardness. Human survival in this country is in free fall as life expectancy plunges to below 40 years—half the longevity of privileged populations such as in the USA and Japan. Another crisis is the incapacity of health care services to respond effectively to the deteriorating health conditions. A hard-hit nation such as Malawi lacks the social and physical infrastructure to be able to mount an effective response. According to the study conducted by the Physicians for Human Rights (2004), the human infrastructure and operating system in developing countries like Malawi are simply too feeble to grapple with the challenges. Furthermore, it appears that the country lacks the political imagination, collective will, and solidarity necessary to produce an inequitable health care system (Kemp et al, 2003).

This paper seeks to make three main contributions. First, identify and discuss the factors leading to poor and inequitable health care delivery system in Malawi. Second, discuss proposed policies to address this situation. Third, make recommendations for implementation.

*The Health Care Delivery System and Structures in Malawi*

Nearly all formal health care services in Malawi are provided by three agencies. The MOHP runs approximately 60 percent of health facilities, the Christian Health Association of Malawi (CHAM) provides 37 percent, and other private institutions provide 3 percent of the services (MOHP, 2003). Malawi’s health care facilities belong to different ministries and agencies. These facilities are geographically scattered across the
entire nation and range from small dispensaries on estates to large hospitals in cities. Among the overseeing agencies, there were 843 health facilities in the country in 2002, with more than 50 percent of them being health centers.

CHAM is made up of independent church-related health facilities. The government assists CHAM by providing it with an annual grant that covers local staff salaries. CHAM facilities charge user fees for treatment, with the exception of growth monitoring, immunization, and community-based preventive health care services, which include treatment of specific communicable diseases such as tuberculosis, sexually transmitted infections (STIs), and leprosy. Although CHAM provides services at a fee, it is generally perceived that the quality of care in these facilities is relatively better than that of public facilities.

Health services are provided at three levels: primary, secondary, and tertiary. Primary-level services are delivered by rural hospitals, health centers, health posts, and outreach clinics. The secondary level, consisting of district hospitals and CHAM hospitals, supports the primary level by providing surgical backup services, mainly for obstetric emergencies and general medical and pediatric inpatient care for common acute conditions. Some of these hospitals also provide some specialized health care. Tertiary hospitals provide services similar to those at the secondary level, along with a small range of specialized surgical and medical interventions.

The MOHP adopted the concept of the EHP in the mid-1990s and defined the package in 2001. The package covers cost-effective interventions that address the major causes of morbidity and mortality in the general population, and focuses on medical conditions and service gaps that disproportionately affect the rural poor. Serious issues
with respect to equity and quality of care have emerged in the wake of health-sector privatization and liberalization. The Government of Malawi (GOM) needs periodically to evaluate the impact of opening the medical sector to private practice.

Malawi faces the problem of organizing health service delivery in a manner that provides adequate quality and coverage of health care to an entire population, against a background of economic challenges and limited resources. In response to these challenges, MOHP has been implementing varying degrees of reform in the health sector to ensure quality health care in all districts of the country (MOHP, 2001a).

Status of Health Care Services Delivery System

Although Malawi’s health care facilities are distributed in most parts of the country, the Japanese International Corporation Agency (JICA/MOHP) facility inventory in 2002 found that only about 9 percent of government and mission health facilities were capable of providing the EHP onsite (Calcon, 2003). In each district, only one or two facilities had adequate EHP capacity. These service deficits arise from lack of health workers, supply stock-outs, and lack of basic utilities that include water, electricity, and phone or radio communication.

According to Kemp et al. (2003), the health care system in Malawi is poor and inequitable. There is variation in quality of health care services in the country. People in the southern region tend to be more satisfied than people in districts of the northern region. However, the average of households satisfied with health services per district is only about 12%. Given this scenario, it is important to understand the various factors that are contributing to the poor quality of health services, along with the inequity in health services distribution. Appropriate and effective policies in the health care delivery system
could improve the health status of the majority of Malawians, because health care is one of the determinants of health. Nevertheless, health indicators will not improve if the health system remains in its current state of disrepair.

Methods

To understand the factors that contribute to a variation in the level of quality health care in different districts in Malawi, key informant interviews with 20 participants involved in the health services delivery system were conducted in December 2007. The interviews were done by phone. The participants were identified through snow bowling technique (Steinberg & Steinberg, 2006). The consent forms were administered to the participants by the researcher in such a way that they were assured their identities would not be recorded and there was minimal risk of violating their privacy by participating in the study. The interviews were conducted in English since most participants were fluent in that language.

In order to understand the policy situation with health services adequately, various government and other publications on policies regarding health care services in Malawi were also reviewed (Malawi Government, 2001a; Malawi Government, 2001b; Malawi Government, 2004; Ministry of Health and Population, 2004).

A total of 20 health service professionals were interviewed. The interviewees included hospital administrators, district health officers, district hospital matrons, legislators, medical assistants, and clinical officers at rural health centers. Respondents were geographically dispersed throughout the country. The average amount of time spent on each interview was one hour.
Results

This section describes major factors identified by interviewees as contributing to poor quality and inequitable health care services.

Shortage of health workers. According to the interviewees, a shortage of health care workers has severely affected the Malawi public health services. The shortage has also affected the denominational facilities run mainly by CHAM. This is evidenced by the fact that, of the 13,629 posts established in the health sector, only 10,697, or 78 percent, are filled (Muula, 2006). The situation is critical, as the matron for one of the hospitals situated in the rural district said: “We used to have two nurses in a ward per shift. Today we cannot have two nurses any more, and this situation makes it difficult for one nurse to adequately care for all patients in the ward.”

There are several causes for the shortage of health care workers. They are complex and interrelated. First, the interviewees cited worker deaths due to HIV/AIDS. Second, workers leave for “greener pastures” in neighboring countries such as South Africa and even overseas. Third, some staff prefer working in private nongovernmental agencies, situated mainly in urban centers, which offer better salary packages.

According to the interviewees, the situation is so critical that some other health facilities simply do not have staff, forcing facilities to close, thereby robbing people of any meaningful access to quality health care. This concern is greatest in rural areas, given the severity of the shortage and the difficulty of replacing health personnel who leave their rural posts (Regional Network for Equity in Health in Southern Africa, 2003). In Malawi, “the construction and refurbishment of health facilities has outpaced the health system’s ability to staff and maintain them on a sustainable basis” (USAID, 2003). Some
new health facilities in rural communities constructed with support from the Malawi Social Action Fund (MASAF) are not operational simply because of the lack of qualified staff (Muula, 2006).

The loss of health personnel often leaves a health facility understaffed, possibly with unqualified individuals. Furthermore, the interviewees indicated that professionals may have to work in a field for which they have received little or no training because of the dearth of personnel educated in these disciplines. The severe shortage of doctors and nurses in rural areas often leads to health facilities being staffed by personnel who are trained to treat only uncomplicated conditions. Patients with more complicated conditions are unlikely to receive proper care (Stilwell, 2003). For instance, in some rural health centers, undertrained staff have been called on to deliver babies, and ward attendants have had to perform the work of nurses (Aitken & Kemp, 2003).

Because health facilities that are understaffed are unlikely to be able to deliver timely health services, there are long wait times. More than a mere inconvenience, long waits deter people from seeking medical care at all. People might also delay seeking care because of doubts about the quality of care they will receive.

In addition, the increased workload and decreased morale for those who remain may lead to burnout, impeding the efficiency of health care delivery. These factors provide contribute to staff’s leaving the profession and sometimes migrating to other countries.

Unequal distribution of health workers within the country. The interviewees emphasized that the overwhelmed health care system is further challenged by the mal-distribution of the limited qualified health workers. The country, with a population of 12
million, has approximately 252 doctors, 338 clinical officers, and 601 medical assistants registered with the medical council (Malawi Medical Council, 2004). This is insufficient to man all facilities, which include CHAM, public and health facilities, and research organizations. Most of the clinical responsibilities, including operative duties, are performed by clinical officers (Fenton, Whitty, & Reynolds, 2004). Medical assistants (a cadre lower than clinical officers) are posted to mostly rural health centers (Muula, 2006). However, most of these professionals prefer working in the urban districts, thus leaving remote districts without qualified medical professionals. One administrator for a hospital situated in the northern region remarked, “We do not have adequate medical professionals at our hospital simply because they do not want to work in the bush.”

With the prevalence of HIV/AIDS and increasing use of antiretroviral therapy, the shortage of healthy personnel in rural health centers is identified as one of the major impediments to making ARVs (antiretroviral drugs) widely accessible to the majority of the affected people situated in rural districts.

*Shortage and unequal distribution of drugs and medical supplies.* The interviewees identified the shortage of drugs and medical supplies as a contributing factor impeding quality health care in districts of Malawi. Most health facilities in the rural areas lack drugs and supplies. For instance, one medical assistant in a remote district complained, “A patient suffering from malaria at a rural health center is not able to get malaria treatment simply due to stock-outs of the malaria drug.” In some cases, after visiting the health center, patients are told to look for malaria treatment on their own at grocery stores. The problem is that most people in the rural areas, in contrast to urban
dwellers, do not have adequate income to purchase prescribed medications such as Fansidar.

Shortage and poor distribution of drugs is engendered largely by the failure at medical stores to maintain the stocks of important drugs at all times. Most service providers believe that central medical stores used to coordinate the supply of drugs to most public health facilities is overwhelmed, hence unable to keep pace with the demand for drugs in all health centers. According to interviewees, the shortage of drugs in public health facilities is critical because of inefficient drug supply management. A study conducted by the Ministry of Finance and Economic Planning (MFEP, 2001) supports the interviewees’ view. The study results also revealed corruption and fraud as serious problems, reporting that about 60 percent of the drugs were diverted from the public health system.

**Occupational stress.** Most health care workers suffer from occupational stress, according to the interviewees. This is an expected reaction to the death and disease they face, fear of occupational infection, new tasks such as HIV counseling for which they might not be trained, and immense work loads. The occupational stress adversely affects their performance in the delivery of health services, particularly in the rural areas where there is a critical shortage of staff compared to the urban districts.

**Physical health infrastructure and poor management.** In order to adequately delivery quality health care, health facilities need to have the basic utilities such as electricity, communication systems, and running water. According to the interviewees, these utilities are not generally available in the rural areas, thus hindering the delivery of quality services to the community.
According to the interviewees, health professionals are trained to heal people, but often the lack of the basic utilities, support, and other necessities impedes their ability to effectively care for patients, a terribly demoralizing situation. In addition, in rural health facilities, lack of transportation, such as ambulances to transport critically ill patients to a referral hospital or central hospital, is common. Most health centers do not have ambulances.

Furthermore, lack of priorities in hospitals was identified as a contributing factor to poor quality of health services. One medical assistant noted: “Management has to identify the priorities of a health care institution. We need to buy medicines first for the patients, then other items later if funds permit.” This statement reveals that management style affects the quality of health care.

Access to health care facilities. Most people travel long distances on foot to get health care services in the rural areas. Because back-country areas have poor roads, they are not accessible during rainy seasons. This not only discourages people from making the difficult journey but also impedes the delivery of drugs and medical supplies to the health care facilities and virtually cripples the referral system.

Inadequate medical equipment and supplies at health facilities. The few health facilities that exist in the country have inadequate medical equipment and supplies in both urban and rural areas, the latter being the worst. This prevents the people from getting the quality health care services they need regardless of where they live. The inadequate medical equipment and supplies is equally critical in some private paying hospitals and clinics.
The role of politics. Politics is one of the factors influencing variation in the quality of health care in Malawi. For instance, one interviewee said: “One health center in the southern region of Malawi has two ambulances, simply because there is a political figure in the constituency who plays a role in acquiring the ambulance. In contrast, there is no ambulance at health centers in my district in the northern region.”

Politics therefore plays a role in influencing how households are more satisfied in some districts than in others.

Policies and Recommendations

In this section we discuss the policies, challenges, and recommendations to improve health care services in all districts.

Health care financing. The policy of providing free health services at the point of delivery at public health facilities is good because everyone is entitled to receive quality health care. However, the health sector faces the problems of inefficient and inequitable service delivery (Kemp, 2003). The challenge facing the government is that if services are to be provided for all, then not all services can be provided. In Malawi it was noted that public finance has attempted to provide too broad a range of health services, resulting in their being spread too thinly over many services (Malawi Government, 2000a). This suggests that there is need for other sources of financing for health care in order to reach all users adequately in all districts. Malawi has enjoyed donor funding for health services, but there is still the need for more funding to provide quality health care adequately and equitably.

It’s about time for the Malawi government to consider seriously private health insurance in order to finance the overwhelming deterioration and inequitable quality of
the health care system (Makoka, Kaluwa, & Kambewa, 2007). The Malawi government desires to provide free medical care, but it can barely finance the entire public health care system. It is difficult to plan for sustainable health care service delivery for all Malawians, as the following source of health care financing reveals:

Table 6.

*Source of Finance in Health Sector, 1998-1999 financial year.*

<table>
<thead>
<tr>
<th>Source of Finance</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private</td>
<td>45</td>
</tr>
<tr>
<td>Government</td>
<td>25</td>
</tr>
<tr>
<td>Donor</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
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</table>

Source: Malawi National Health Accounts (Malawi government, 2001 b)

In view of the state-service delivery failure, the burden of access to effective health care has been shifting to the private pocket (Makoka et al., 2007). More users are opting to pay for health care in the search for better quality in the country. Estimated out-of-pocket expenditures by households on health services have been on the rise and involve a growing number and diverse range of private-for-profit players (Makoka et al.). Private expenses for health care have increased from US $9.1 million in 1995 to US $37.1 million in 2000, when the share of private expenditure on health in GDP was 4% compared to the government’s contribution of 3.6% toward the health sector (Malawi Government, 2001c; World Bank, 2003). The increase in private expenditure on health
indicates that people with financial capability are realizing the importance of health care and are willing to pay for it as long as it meets their satisfaction.

In view of this, introduction of health insurance could provide an additional source of health care financing. Health insurance can offer a number of economy-wide or public benefits, including private sector cost-sharing that can relieve government of the burden of providing all services to those willing and able to pay, thus allowing more effective targeting of public health care resources toward the needy in the remote and rural districts. This would improve equity effects and increase efficiency through competition in health service provision, as argued by Makoka et al. (2007).

The health insurance industry in Malawi is underdeveloped (Makoka et al., 2007). In addition to the insurance company, OASIZ Medical Aid, the Medical Aid Society of Malawi (MASM), and a few schemes for firms and parastate organizations, Malawi needs more health insurance providers, as there is a need to target the working class, including the civil servants. Although health insurance coverage is small nationwide, it represents a significant pool of those with the ability to pay and thus provides a potential major payment system for hospitals in Malawi. Therefore, government hospitals with sections that receive user fees, such as private wards in central hospitals, need to review their fee schedules to align them with actual costs and remove unnecessary government subsidies for those patients with the ability to pay.

Decentralization. Several policies have been suggested to improve the quality of health care services in Malawi. Most interviewees believe that decentralization of the health care system would enable remote and rural districts to manage health services better, since they would have the power to make decisions at the local level. The Malawi
government has already taken a broad move on the decentralization policy as recommended. The Policy on National Decentralization was already outlined in Act No. 42 of December 1998, which aimed at devolving administrative authority to the district level (Picazo, 2002). The act transfers all managerial authority over health service delivery at the district level, from MOHP to local district assemblies. Although the restructuring is slow-paced, decentralization is believed to be a solution to most management issues faced at district levels. The interviewees believe that the process of decentralization is too slow to be effective, simply due to the lack of qualified staff at the local district level. Decentralization itself requires more qualified staff to execute the system in all districts, and this will require a steady, sound budget.

*Formal cost-sharing programs in government hospitals.* We recommend a national user-fee policy that will permit central and district hospitals to impose fees and have private wards based on fees. First, permit one hundred percent retention of fee revenues at the hospital level, and second, permit hospital use of fee revenues subject to specific guidelines from the Ministry of Health and Population and spending authorities designated by the government.

In consideration of the cost-sharing policy, it is highly recommended that the Central Medical Stores be restructured so that drugs are made available on a sustainable basis. Fee programs depend crucially on the availability of drugs, which is a major indicator of quality of health services in Sub-Saharan Africa (Picazo, 2002). The user fee policy, along with decentralization whereby district authorities have power in decision-making, will improve services at the district level by generating funds to subsidize the other hospitals in rural areas that cannot afford user fees.
**Geographic distribution of donor projects for health services.** According to the interviewees, some district hospitals in the southern region have an adequate supply of drugs through donor-funded projects. Such health projects are not available in every district. For instance, Chiradzulu District Hospital benefits from donor-supplied drugs compared to other districts without such assistance. The donors make a significant contribution to the quality of health care in districts they are serving.

A survey on distribution of donor-funded projects in health care services revealed that of the 34 donor-funded health projects, 23 have nationwide application (Picazo, 2002). Twelve districts host two or more donor-funded projects, while six districts have at least one project each. Six districts, however, do not host a single donor-funded project (their access to donor-funded activities is limited to those donor projects that are nationwide in application, which are usually inadequate). The study indicated that donors are prone to locate in relatively pleasant districts. These districts had multiple donor health projects: Mangochi (south) - five; Salima (central) - four; Blantyre (south) - two; Lilongwe (central) - two; Zomba (south) - two.

Donors have much less tendency to locate in the northern and/or remote districts (such as Nkhotakota, Ntchisi, Nkhotakaya, and Chitipa). This location pattern of donor health projects needs to be examined further. The government must specify policy and geographic criteria to donors in order to provide access to health services for populations in the most vulnerable areas, hence avoiding duplication of donor activities in districts so that health resources are distributed more equitably.
Collaboration of public and private health agencies. To come up with solutions on a national level, the introduction of a collaborative body to address and monitor health care delivery progress will be beneficial to the health sector. In the recent past, government has extended its support to CHAM through the introduction of service level agreements. This arrangement aims to improve poor people’s access to health services by removing financial barriers and to strengthen government’s partnership with nongovernmental agencies.

Under this arrangement, district health officers contract CHAM health facilities to provide an agreed range of EHP services to the needy population at no fee. The costs of providing the services are met by the District Health Office. This type of arrangement is appropriate and needs to be encouraged.

Training. In consideration of the staff shortage, current output from training institutions needs to be expanded to meet current and future demands.

Conclusion

The purpose of the study was to explore and discuss factors for poor quality and inequitable delivery of health care services in districts of Malawi. The paper sought to address policy issues and recommend policies to improve and ensure equity in health care systems in all districts. This study has illustrated several challenging issues facing health care services delivery systems and how the users are affected. The paper has further discussed policies that could improve quality and equity in delivery of health care services among districts of Malawi. The challenge to policy makers is to take these documented pathways and make something of them. Can something be done?
Indeed, all the policy recommendations come with challenges. For instance, the long outstanding policy of decentralization takes time to be implemented effectively. The question of whether the cost of decentralizing the system will outweigh the benefits is yet to be investigated, considering the magnitude of the already severe shortage of health workers. There is a great need to restructure the network, and new staff will have to be hired to take up some responsibilities in order to execute the proposed decentralization policy adequately and effectively.

A positive step has already been taken by the government of Malawi whereby Local Government Act No. 42 will empower District Assemblies to run health services in their respective jurisdiction (Picazo, 2002). Once basic systems are in place and core capacities developed, managerial authority for finances, human resources, and physical resources will be transferred through a two-year, phased process.

Malawi’s health sector is facing a problem of inadequate and inefficient allocation of resources, in addition to longstanding weaknesses in the coordination of donor funding to ensure equitable geographic coverage of resources. In view of this development, enhancement of partnerships in the delivery of health services between government and donors needs to be a top priority.

According to the Malawi government (2004), rationalization of health service financing, management, and delivery mechanisms will be addressed through a Sector-Wide Approach (SWAp) to better support the health services system. SWAp is a sustained partnership led by national authorities involving different arms of government, groups in civil society, and one or more donor agencies with a goal of achieving improvements in people’s health through a collaborative program of work (Malawi
Government, 2004). SWAp will involve strengthening the leadership and managerial capacity of both the central Ministry of Health and Population and the District Assemblies.

According to the National Health Plan prepared in 2004, the government of Malawi has indicated the importance of monitoring the achievement of targeted sector-wide approaches through quarterly meetings between MOHP, districts, and the donor community. The ministry will ensure that progress toward achievement of indicators and completion of performance improvements will be documented in an annual "Report on the Health of the Nation," prepared by the Ministry of Health and Population.

Concerning the cost recovery and user fees recommendations, it is very important that the government propose a strategy that will not impact the quality of services for users who cannot afford to pay, just as CHAM hospitals accommodate those who cannot afford to pay. As part of the strategy, it is appropriate for the Ministry of Health to establish a health care financing and management coordination committee to look into the possibility of developing mechanisms for monitoring the implementation of fee paying wards and clinics to ensure adequacy in fees that are collected, without imposing a burden on those who cannot afford to pay.

The implementation of decentralization by the Ministry of Health and Population appears to be favored and supported by Act 24 of Parliament (Malawi Government, 2004). The reality is that decentralization of the health sector, to ensure improvement of health services, is not without challenges. There are critical issues that will need to be addressed in order to effectively implement decentralization. First, decentralization requires effective coordination. With the delegation of many health functions from the
Ministry of Health and Population to the districts, there is the potential for more efficient use of available human and material resources. However, this will require close collaboration between all partners in planning and prioritization to meet valid needs for equitable quality health care.

Second, duplication of health services and training efforts will need to be avoided. The application of social capital in the form of joint planning and monitoring of services will be necessary to ensure efficiency in all health sectors at the district level.

The study has shed some light on important policy proposals that are crucial to the improvement of health care services equity. The district health facilities will indeed improve their health services delivery system through decentralization policy. The author’s argument in this paper supports the structural-wide approach programs designed to address the health care needs of all people, particularly in the rural areas, hence promoting equity in the health care delivery system.

The introduction of a policy of user fees and health insurance to those with financial capability can provide an additional source of health care financing that can subsidize rural health care to patients with no income. Health insurance will reduce the burden of higher expenditures on health care for patients who can afford paying for it, as some studies have also revealed that most people with income are already willing to pay for health care (Makoka et al., 2007). Introduction of national identity cards will be necessary for effective monitoring of the eligibility of user fees at public health facilities.

In Malawi, patients walk for hours to reach a clinic, often to discover that no staff or medications are available. In a cruel irony, these dismal conditions are used to justify further neglect by those who argue that this "infrastructure gap" makes it impossible to
deliver life-saving treatment to the poor. We would like to see a radical change in the whole system while the circumstances are propitious in peaceful Malawi.
References


Conclusion

The primary goal of the study was to explore the geographic variation of user satisfaction with health services in districts of Malawi. In particular, the study was concerned with the differential spatial patterns of user satisfaction level, and how the determinant factors explain the variation in patterns of the level of satisfaction with health services. Equally important was the explicit qualitative analysis of factors and policies that contribute to the poor quality of health services, as well as variation in patterns of the level of satisfaction in districts of Malawi.

Overall, the results indicate that there is spatial autocorrelation of user satisfaction with health services in districts of Malawi, suggesting the coincidence of value similarity with locational similarity (Anselin, 1998; Cressie, 1993).

The significant spatial autocorrelation tests of user satisfaction demonstrate the effectiveness of these tests in exploring patterns in the phenomenon of interest. These tools help show patterns of districts that are both higher and lower than the mean. The significant positive spatial autocorrelation test results are consistent with Tobler's law of geography which states that everything is related to everything else, but near things are more related to each other (Tobler, 1979).

The higher percentage of households satisfied with health services tend to be located in the southern and partly in the central regions. The northern region districts reflect a pattern of lower level of user satisfaction. The map (Figure 6) also clearly indicates a higher percentage of satisfaction in urban locations such as Blantyre, Lilongwe, and Mzuzu. The remote districts reflect lower levels of satisfaction. However, it is noteworthy to recognize that the mean satisfaction level per district is very low, at
about 12 percent. This is a clear indication that Malawi’s health care service generally is very poor, hence the need for further spatial study to ensure better intervention in the entire country. The positive spatial autocorrelation of user satisfaction level with health services reveals the existence of social injustice prevailing in the health care delivery system.

Both OLS regression model and spatial lag model were significant in explaining the variation of user satisfaction level, but spatial lag model was the best fit because it accounted for more of the spatial effects. The results of the spatial regression model analysis determined the unique contribution of attributes; lack of clinical officers, proximity, proportion of poor people’s access, as important factors in explaining spatial variations in patterns of user satisfaction with the health services delivery system with population size as a control variable.

The four explanatory variables, population, proximity, clinical officer availability, and proportion of poor people who travel long distances to the nearest facility, are significant and are reviewed in detail below.

First, the proportion of poor households who travel more than an hour to the nearest health care facility is significant and is inversely associated with lower levels of satisfaction. The higher proportion of these poor households appears to correlate with the lower the level of satisfaction in those districts. This may be a result of the inadequate number of health facilities in some areas, where people are obliged to consume much time traveling long distances. Most households in rural areas use bicycles or walk to get to those locations, because they are too poor to afford public transportation. It should be noted that they walk long distances to seek health care while they are sick.
Second, the number of households per clinical officer per district significantly (p<.05) contributes to the explanation of part of the variation. The higher the number of households per clinical officer in a district, the lower the satisfaction level with health services in those districts. This suggests that policy makers can improve health services and improve user satisfaction by increasing the number of clinical officers in such areas. This would be the best alternative to doctors who are hardly available, because it is cheaper to train clinical officers than doctors.

Third, population size of the district confirmed our expectations based on the policy of resource allocation targeting highly populated districts, which resulted in a positive coefficient. This implies that districts with big population sizes have a higher than the mean level of satisfaction with health services since they receive a larger share of health care resources. These results suggest a key insight to policy makers: more resources in health services indeed seem to be channeled to districts in the southern region, where there are more people than in the other two regions. This is probably a result of the ongoing poverty alleviation program that encompasses the policy of improving health care in the country by targeting the poor and most vulnerable (Zere et al., 2007). The results are consistent with resource allocation criteria, which depend on population size (Cripps et al., 1998).

However, it should be noted that the overall satisfaction level in districts of Malawi is below standard. Furthermore, the spatial modeling analysis reveals that there is some variation in the level of district satisfaction with health services, which is partly explained by the variables discussed above.
Fourth, proximity measured as percentage of households who live within sixty minutes of the nearest facility yielded a positive correlation with user satisfaction with health services. This is an indication that people prefer to spend less time traveling to the facility for health care. However, it is a challenge to most users in rural districts to reach the health facility in an hour as most users walk or use bicycles. Some people with a bit more income can afford public transportation if the roads are passable.

Thus, we argue that the spatial variation in patterns of number of people per clinical officer per district affects the quality of health care in a district, which ultimately affects the user satisfaction level. Districts with few or no clinical officers reported much lower levels of satisfaction with health care services than those with a higher ratios, particularly in southern regions like the Blantyre and Mangochi districts. This is to be expected, given that users in the lower than the mean satisfaction-level do not have as many clinical officers as do those districts above the mean satisfaction-level.

Further, we argue that the inequity in access to health care services in the country (more than an hour away) is evidenced by the spatial autocorrelation being higher in rural districts than in urban areas. This is a noteworthy finding in the study in light of the fact that the inequities in socioeconomic status is directly linked to access to health care. People in rural areas tend to be poor and therefore face difficulties in accessing fast and reliable transport to the nearest facility. In addition, the impassable roads during rainy season also contribute to the issue of access as a major contributing factor to the variation in patterns of level of satisfaction with health services.

Furthermore, population size influences the distribution policy; thus the greater the population size, the greater the need for health services. This is logical and is to
expected. It therefore makes sense to deploy more resources where the most people live. In this study, we controlled or adjusted for differences in population size by having the population variable in our model. This implies that the association we found for other variables are independent of population size. The policy of health care resource allocation thus indirectly contributes to the patterns of satisfaction level. The districts in the southern region, and part of the central region where population size is high, receive more health care resources based on the percentage of population size level. This interpretation correlates with the fact that many people tend to live in cities, where we also see a higher satisfaction level.

An inspection of explanatory variables on a number of maps revealed a pattern of values higher in the southern districts, hence supporting the observation that health services are more available in the southern region. This inspection established the validity of the covariates, coratio, proximity, accs2_pove, showing a pattern of care more favorable to the south than the north. All these variables are essentially ratios: they are already adjusted for population and therefore show that the south has a geographic advantage over the north.

As suggested by Mitchell (2005), the results of Moran’s I may have different reasons for their influence. For instance, the results near the edge of the study area may be suspect, in that they may have fewer neighbors than units in the interior; therefore differences or similarities among surrounding features may be exaggerated and require other tests for confirmation. In this study, we further conducted other local statistical tests of Anselin’s LISA. The Anselin’s LISA test results consistently revealed local clusters of low and high values of satisfaction with health services (Figure 10). As argued by Ord
and Getis (1996), the values for global statistics are moderated when there is a strong
global pattern, thus making the clusters less obvious. Therefore the local statistics work
best for identifying clusters when there is no measurable pattern of clustering or
dispersion across the study area, as demonstrated by Anselin's (2003) LISA tests analysis
in Figure 10. Local statistics are useful if you need to identify the locations of clusters of
features. Local statistics can help find hot spots when a global statistic indicates that there
is a clustered pattern.

This paper demonstrates that geospatial methods are vital for studying spatial
patterns of any phenomenon in human services, public health, and social science studies.
This study is consistent with the argument of Mandayam (2002) that GIS is a planning
tool for Human Services Agencies. The revelation of patterns from the study is critical
for policy creation, planning, and decision-making in order to improve and provide
satisfactory health services in all districts.

The spatial regression model (spatial lag) increased the explanatory power of the
model in comparison with the OLS model. This spatial alternative model yielded an
improvement over the original OLS model. Therefore, we concluded that controlling
spatial dependence improved model performance. Using the model performance
parameters of the R-squared and Log likelihood, the spatial lag model has greater R-
squared and lower Log likelihood values, indicating a valid reason to adopt this model.
This paper has described the use of spatial analytical techniques in connection with user
satisfaction with health services in Malawi. These results demonstrate part of a major
effort in understanding location dynamics of client satisfaction level with health services
in Malawi. The results show that the use of spatial analysis can provide social scientists with tools that provide significant insights for understanding district location dynamics.

There are several important issues that these results can address in the social policy arena. First, the results provide a basis for strengthening the incorporation of health services improvement policy in poverty alleviation programs. Second, proximity is a very important factor in ensuring that people have access to health care facilities. Proximity is a marker or metric of geographic access. However, spatial access is often neglected in health services research (Meade & Erckson, 2005). Policy makers need to consider providing health facilities at strategic places where most people can have easy access. This problem can also be addressed using mobile clinic services. Although there are such services in Malawi, most of them are affected by inadequate budgets and impassable roads to the rural villages.

As can be seen, accounting for spatial dependence produces some noticeable differences in the size of the effects of the covariates in the model. Most strikingly, independent variables were more significant in the spatial regression model than in the OLS regression model. Thus, had we ignored the spatial dependence in the data and estimated a standard OLS model only, as we typically do, we would have an inadequate fit of the model to explain the variation in the pattern levels of satisfaction. By modeling the spatial dependence, we can capture some of the variables in a good-fit model, thus increasing its power in explaining variations in level of satisfaction with health services.

As in any evaluation study, there are a number of hot button issues that policy makers cite as determining or influencing the outcome of health services delivery systems, in this case client level of satisfaction. Researchers can implement policy
measures into standard political econometrical models to assess their significance (Lacombe & Shaughnessy, 2007). What is frequently omitted, however, is the importance that geographic space and location dependency may or may not have on user satisfaction level. For instance, unobserved effects that influence two adjacent or nearby districts where services are provided may not be captured in standard econometric specifications, leading to incorrect inferences (Lacombe & Shaughnessy). The problem is that unobserved effects are usually difficult to quantify, though they are no less important in influencing the general political and/or administrative leanings of a neighborhood, city, or district.

To the extent possible, most satisfaction studies capture demographic and possibly socioeconomic factors (variables) believed to be important as a measure of quality health care. Unobservable location specific factors generally reflect a common set of characteristics in the community, which may be a result of shared background. The benefit of a spatial econometric analysis is that it allows us to quantify the aggregate effect of these location-specific factors and thus to recognize and disentangle formerly unobservable effects that may corrupt standard ordinary least squares (OLS) results.

The present health care system, which leaves Malawi far behind other nations in population health status, is drifting toward social chaos. In contrast, universal health access through public-sector social insurance must become part of the Malawi social contract, restoring the primacy of the interests of patients and providers in a just and equitable system.

At the root of the inequality and social injustices discussed in this study are ideological and political factors, as noted by Levy and Sidel (2006). There is a need to
address the mechanisms of the system that are ill-suited to providing for such a basic human need as health care. This research reveals the quality situation with health care services in Malawi primarily on users’ perspective and sets a pace for further research for better policies to improve the quality and equitable distribution of health services to reach the marginalized districts, particularly in the northern region.

These results bring us to very important policy implications. Variations in levels of user satisfaction across geographic space imply different policy prescriptions for different areas. Policies that promote equity and diversification would be a positive action to address lower levels of satisfaction in districts, particularly those situated in the northern region and partly in the central region of the country.

Limitations of the Study

There were several limitations we encountered when conducting the study. The spatial analytical process did not consider other possible variables that may contribute to the explanation of variation in patterns of user level of satisfaction with health services, since the analysis was based on available secondary data. We were unable to collect other potential spatial data that could be helpful in explaining the variation in user satisfaction level based on financial constraints.

In addition, Malawi is a small country with few districts. We were limited to a few number of independent variables to be included in the model. It is obvious that there are other factors that explain the variation of levels of satisfaction with health services. To explore all of them was beyond the capability of this study because of financial and time constraints.
Direction for Future Research

This study sets a pace for further research on how such determinant factors for satisfaction with health services can be addressed in each district in order to improve the quality of health services.
References


26th January, 2007

Dear Mr Gedion Mazinga,

RE: USE OF STATISTICAL DATA FROM THE NATIONAL STATISTICS OFFICE-MALAWI

I refer to your request to use data from the Malawi National Statistics Office for your studies.

We are pleased to inform you that your request has been accepted but on the following conditions:

- Neither the basic data nor any reprocessed version or application thereof may be copied or transmitted to other persons or organizations, directly or indirectly without prior written consent from the Commissioner of Statistics.

- All publications produced using the database should explicitly acknowledge the National Statistical Office (Malawi) as the original source of the data.

- It should be specified that the application and/or analysis is the result of the user’s independent processing of the data.

- A copy of all publications/research projects should be sent to NSO for information purposes.

Finally, let me thank you for your interest in using data from the National Statistics Office.

Yours truly,

C. Machinjili
COMMISSIONER OF STATISTICS.
Key Informant Interview Questionnaire Guide

T.oma Linda
University

Geographical Variations of User Satisfaction with Health Services in Malawi: Analysis Using Geographic Information Systems

Key Informant Interview Questions Guide

Question 1
What prevents people in this area from getting the health care they need? Is that true for the urban and rural areas?

Question 2
What are the health care challenges facing this district? Are they the same for the urban and rural areas?

Question 3
Among the issues you raised in the first two questions, what do you think is the biggest issue preventing all residents in this area from getting the quality health care they need? Is that issue the same for the urban and rural areas?

Question 4
What are the strengths of the local health care services? Is there anything that’s great that shouldn’t be changed? Are the strengths different in urban versus rural areas?

Question 5
What do you think could be done to improve healthcare services in this area? Would that be the same thing in all areas of this district?

Question 6
Are there health care concerns/issues? Or other things you would like to add?

Thank you for your time
Approval Letter from Institutional Review Board

INSTITUTIONAL REVIEW BOARD
Initial Approval Notice - Expedited Review
OFFICE OF SPONSORED RESEARCH • 1118B Anderson Street • Loma Linda, CA 92350
(909) 558-4531 (voice) • (909) 558-9131 (fax)

To: Ford, Robert E
Department: Social Work
Protocol: Geographic variations of user satisfaction with health services in Malawi: analysis using geographic information systems technology

This study was reviewed and approved administratively on behalf of the IRB. This decision includes the following determinations:

1. Risk to research subjects: Minimal
3. Stipulations of approval are: <None Specified>

Consent Form
If a written consent form is required, approval will be indicated by the affixed IRB approval stamp. This now becomes your official consent form for the dates specified and should be used as a master for making the necessary copies.

Adverse Events / Protocol Changes
The IRB should be notified in writing of any modifications to the approved research protocol. All adverse effects, anticipated or not, should be reported to the IRB: serious events should be reported within seven days; all others within 15 days.

Protocol Review
To assure uninterrupted approval of this project, you are required to complete and return a status report at least two weeks prior to the approval end-date indicated above. (See http://research.llu.edu - select “IRB Tools for Investigators”, then “Research Report Form.”) In addition to requesting a renewal, you may also use the Research Report Form to close the study.

Records
All records relating to this project, including signed consent forms, must be kept on file for three years following completion of the study.

Please note the PI's name and the OSR number assigned your IRB application (as indicated above) on any future communications with the IRB about this project. Direct all communications to the IRB c/o the Office of Sponsored Research.

Thank you for your cooperation in LLU's shared responsibility for the ethical use of human subjects in research.

Signature of IRB Chair/Designee: [Signature]

Loma Linda University Advantist Health Sciences Center holds Federalwide Assurance (FWA) No. 6447 with the U.S. Office for Human Research Protections, and the IRB registration no. IRB00000383. This Assurance applies to the following institutions: Loma Linda University, Loma Linda University Medical Center (including Loma Linda University Children's Hospital, LLU Community Medical Center), Loma Linda University Behavioral Medicine, and affiliated medical practices groups.

IRB Chair: Rhodes L. Rigby, M.D., MBA
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Telephone Script Used to Contact Participants for Interview

Loma Linda University

Geographical Variations of User Satisfaction with Health Services in Malawi:
Analysis Using Geographic Information Systems

Phone Script

- Hello, my name is Gideon Mazinga with Loma Linda University’s Department of Social Work and Social Ecology. May I speak to _______?
- I would like to tell you about a research study that is being done by Loma Linda University, Department of Social Work and Social Ecology.
- Would it be convenient for me to talk to you about this study on (day) ________________ at (time) _____________?
- The purpose of this study is to explore geographic variations of user satisfaction with health services in Malawi.
- You are invited to participate because of your involvement in health care services in Malawi.
- If you agree to participate, you will be asked to answer some questions about delivery of health services, health care challenges, policies, and what can be done to improve health services to reach all citizens in all districts.
- This will take about one hour of your time.
- You will not be paid for your participation in this study.
- The risk of invading your privacy is minimal. Your name or any other identifying information will not be recorded, in order to protect your anonymity.
Although you will not benefit directly from this study, we hope the results will help us learn how user satisfaction with health services vary by district so that we can enhance fair and equitable delivery of quality health services to all citizens.

- Do you have any questions?
- You can contact Mr. Shelton Kanyanda of the National Statistics Office of Malawi at (01) 524 377 if you have questions about this study.
- Participation is voluntary. Your decision whether or not to participate or to terminate at any time will not be a problem.
- Would you like to participate in this study?
Informed Consent Form

School of Science and Technology  
Department of Social Work & Social Ecology  
11065 Campus St. Loma Linda, CA 92350

Loma Linda University

Informed Consent

Geographical Variations of User Satisfaction with Health Services in Malawi:  
Analysis Using Geographic Information Systems

1. Purpose and Procedure
You are invited to participate in a research study because of your involvement in health care services in Malawi. The study is part of student’s endeavor under the advisory of Professor Robert Ford. The purpose of the study is to explore geographic variations of user satisfaction with health services across districts of Malawi and investigate spatial patterns of factors for user dissatisfaction with health services. The study will also evaluate policies regarding delivery of health services and explore possible recommendations to enhance equitable and quality health services in all districts. As part of the in-person interview, you will be asked about delivery of health services, health care challenges, policies, and what can be done to improve quality of health services. The interview will require quite some time as I hope to gain a thorough understanding of health care delivery system.

I ask that you set aside at least one hour for the interview. The interview will be conducted in casual and conversational style. You will have control of the content, though I will have prepared questions to prompt you.

2. Risks
The committee at Loma Linda University that reviews human studies (Institutional Review Board) has determined that your participation in this study exposes you to minimal risk of invading your privacy.

3. Benefits
There is likely no direct benefit to you for participating in this study. However, by sharing your experience and knowledge of health services this may benefit the health sector in general in enhancing fair and equitable delivery of quality health services to all citizens.

4. Participant Rights
Under any circumstance, you are at liberty to withdraw, stop at any time during the interview or refuse to answer any question should you decide to do so.

Initial______ Date______  
Loma Linda University  
Adventist Health Sciences Center  
Institutional Review Board  
Approved  

Initial______ Date______  
Loma Linda University  
Adventist Health Sciences Center  
Institutional Review Board  
Approved
5. Confidentiality
We will not record your name or other identifying information in the database in order to
protect your anonymity.

6. Cost and Reimbursement
There is no cost to you for participation in this study. There is no reimbursement for
participation in this study.

7. Third Party Contact
If you wish to contact an impartial third party not associated with this study regarding
any question or complain you may have about the study, you may contact Mr. Shelton
Kanyanda in the Office of Commissioner of Statistics, National Statistics Office, P.O.
Box 333, Zomba, phone (01) 524 377 for information and assistance.

8. Informed Consent Statement
I have read the contents of the consent form and have listened to the verbal explanation
given by the investigator. My questions concerning this study have been answered to my
satisfaction. I hereby give voluntary consent to participate in this study. Signing this
consent document does not waive my rights nor does it relieve the investigators,
institution or sponsors from their responsibilities.

I may call Gideon Mazinga, MSA, during routine office hours at (08) 898 083 or email
gmazinga@llu.edu. I can also contact Professor Robert Ford, PhD during office hours
at (909) 558-7507 or email rford@llu.edu, if I have additional questions or concerns.

Consent of Respondent

I give my consent to participate in this study, and have received a copy of this consent
form.

Signature of Respondent ______________________ Date ________________

I have reviewed this consent form with the person signing above. I have explained the
potential risks and benefits and format of the study.

Signature of Investigator ______________________ Date ________________