uOttawa

L'Université canadienne
Canada's university

FACULTÉ DES ÉTUDES SUPÉRIEURES ET POSTOCTORALES

uOttawa

L'Université canadienne
Canada's university

FACULTY OF GRADUATE AND POSDOCTORAL STUDIES

Julia Vedom

AUTEUR DE LA THÈSE / AUTHOR OF THESIS

M.A. (Geography)

GRADE / DEGREE

Department of Geography

FACULTÉ, ÉCOLE, DÉPARTEMENT / FACULTY, SCHOOL, DEPARTMENT

Health Care Access and Regional Disparities in China

TITRE DE LA THÈSE / TITLE OF THESIS

Huhua Cao

DIRECTEUR (DIRECTRICE) DE LA THÈSE / THESIS SUPERVISOR

CO-DIRECTEUR (CO-DIRECTRICE) DE LA THÈSE / THESIS CO-SUPERVISOR

EXAMINATEURS (EXAMINATRICES) DE LA THÈSE / THESIS EXAMINERS

Eric Crighton

Anne Gilbert

Gary W. Slater

Le Doyen de la Faculté des études supérieures et postdoctorales / Dean of the Faculty of Graduate and Postdoctoral Studies

HEALTH CARE ACCESS AND REGIONAL DISPARITIES IN CHINA

JULIA VEDOM

Thesis Submitted to the
Faculty of Graduate and Postdoctoral Studies
In Partial Fulfilment of the Requirements
For the Master of Arts in Geography

Department of Geography
Faculty of Arts
University of Ottawa

©Copyright by Julia Vedom, Ottawa, Canada, 2008

Library and Archives Canada

Published Heritage Branch

395 Wellington Street
Ottawa ON K1A 0N4
Canada

Bibliothèque et Archives Canada

Direction du Patrimoine de l'édition

395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file Votre référence
ISBN: 978-0-494-46502-8
Our file Notre référence
ISBN: 978-0-494-46502-8

NOTICE:
The author has granted a non-exclusive license allowing Library and Archives Canada to reproduce, publish, archive, preserve, conserve, communicate to the public by telecommunication or on the Internet, loan, distribute and sell theses worldwide, for commercial or non-commercial purposes, in microform, paper, electronic and/or any other formats.

The author retains copyright ownership and moral rights in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

AVIS:
L'auteur a accordé une licence non exclusive permettant à la Bibliothèque et Archives Canada de reproduire, publier, archiver, sauvegarder, conserver, transmettre au public par télécommunication ou par l'Internet, prêter, distribuer et vendre des thèses partout dans le monde, à des fins commerciales ou autres, sur support microforme, papier, électronique et/ou autres formats.

L'auteur conserve la propriété du droit d'auteur et des droits moraux qui protège cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

In compliance with the Canadian Privacy Act some supporting forms may have been removed from this thesis.

While these forms may be included in the document page count, their removal does not represent any loss of content from the thesis.

Conformément à la loi canadienne sur la protection de la vie privée, quelques formulaires secondaires ont été enlevés de cette thèse.

Bien que ces formulaires aient inclus dans la pagination, il n'y aura aucun contenu manquant.

Canada

ABSTRACT

This thesis examines the access of health care facilities in nine provinces of China between the years 1989 and 2004, evaluating the effect of demographic, financial and geographic factors. Equity in social welfare has long played a major role in shaping China's national policies. However, continued pursuit of the GDP-led development orientation in China since the late 1970s has resulted in increasing urban-rural and intra- and inter-regional socio-economic disparities, raising multiple causes for concern from an equity perspective and suggesting the trends that should be closely monitored. While there is a consensus about the need and importance of access equity, little geographic research has been conducted in this area.

In light of these issues, using China Health and Nutrition Survey this study addressed the following two objectives: (1) to describe the geographic and financial disparities in access to clinics and hospitals in nine provinces of China during the 1989-2004 period, and (2) to explore the demographic, socio-economic and geographic factors affecting access to health care.

Results of the analysis show that between 1989 and 2004 the accessibility gap between hospitals and clinics in terms of geographic indicators has decreased, while the gap in financial accessibility has increased, making urban hospitals the least accessible facilities. Access to both hospitals and clinics in urban and rural areas is mostly conditioned by geographic factors, namely the travel method, region of residence and the availability of health care facilities. Patients who were able to reach the facilities on foot were more likely

to enjoy better access than those who were not able to do so. Similarly, residents of western China (Guangxi and Guizhou) along with the provinces with higher availability of health care facilities also tended to have better potential access than their counterparts.

Several important contributions essential for informing public decision- and policy-making stem from this thesis, leading to a better understanding of issues related to the accessibility of health care in nine provinces of China. While, typically, the determinants of accessibility have been attributed to the financial or demographic characteristics of patients, this research has identified geographic factors as being of the foremost importance in the accessibility of health care. This important finding provides grounds for further geographic research on accessibility issues in China. While our conceptual framework was designed for studying the accessibility of health care in China, it can be potentially applied to any country with regional, provincial or neighborhood disparities in access.

RÉSUMÉ

Cette étude a examiné l'accès aux soins de santé dans neuf provinces de la Chine entre les années 1989 et 2004, évaluant l'effet des facteurs démographiques, financiers et géographiques. L'équité a joué depuis longtemps un rôle important dans l'élaboration des politiques nationales de la Chine. Cependant, la poursuite continue des réformes orientées vers le marché introduites en Chine pendant la fin des années 1970, a résulté en une augmentation des disparités urbaines et rurales, intra- et interrégionales, ainsi que socio-économiques. Ces circonstances ont soulevé des questions multiples concernant l'équité, suggérant les tendances qui devraient être attentivement suivies. Tandis qu'il y a un consensus au sujet du besoin et de l'importance d'équité d'accès, à ce jour peu de recherches géographiques ont été conduites dans ce secteur.

À la lumière de ces enjeux, utilisant l'Enquête sur la santé et la nutrition en Chine (CHNS), cette étude a visait les deux objectifs suivants: (1) décrire les disparités géographiques et financières dans l'accès aux cliniques et aux hôpitaux parmi neuf provinces de la Chine au cours de la période 1989-2004, et (2) explorer les facteurs démographiques, socio-économiques et géographiques affectant l'accès aux soins de santé.

Les résultats de l'analyse montrent qu'entre 1989 et 2004 l'inégalité d'accessibilité entre les hôpitaux et les cliniques a diminué en termes d'indicateurs géographiques, alors que l'inégalité dans leur accessibilité financière a augmenté, faisant des soins de santé dans les hôpitaux urbains les moins accessibles. Nous trouvons que l'accès aux hôpitaux et aux cliniques dans les secteurs urbains et ruraux est la plupart du temps conditionné par des

facteurs géographiques, c'est-à-dire, le transport, la région de résidence et la disponibilité des soins de santé. Les patients qui pouvaient atteindre les équipements à pied ont habituellement eu un meilleur accès que ceux qui ne le pouvaient pas. Également, les résidants de l'ouest de la Chine (Guangxi et Guizhou) et des provinces avec une disponibilité des soins de santé plus élevée ont aussi tendance à un meilleur accès potentiel que leurs contreparties.

Cette thèse fut plusieurs contributions importantes en termes de politiques publiques. Elle nous amène à une meilleure compréhension des enjeux liés à l'accessibilité des soins de santé dans neuf provinces de la Chine. Alors que, les causes déterminantes de l'accessibilité sont généralement attribuées aux caractéristiques financières ou démographiques des patients, cette recherche a identifié la première importance des facteurs géographiques dans l'accessibilité des soins de santé. Cette conclusion importante suggère de continuer la recherche géographique sur les enjeux d'accessibilité en Chine. Quoique que notre cadre conceptuel était conçu pour l'étude particulière de l'accessibilité des soins de santé en Chine, il peut pourtant être appliqué potentiellement à n'importe quel pays avec des disparités régionales, provinciales ou de voisinage dans l'accès.

ACKNOWLEDGEMENTS

It is difficult to overstate my gratitude to my supervisor, Dr. Huhua Cao, for his explosive enthusiasm, his inspiration and sincere dedication to his work. Throughout the thesis and particularly during the writing period, he provided endless support, encouragement, advice, and lots of good ideas. I am extremely thankful to Professor Cao for the multiple research, networking, and work opportunities that he created under his projects.

I would like to thank my resourceful committee members, Dr. Eric Crighton and Dr. Anne Gilbert, for their valuable comments, suggestions, and guidance throughout the program. Numerous thanks go to Dr. Illimar Altossaar for that initial push towards graduate school. I also owe many thanks to the continuous support of the HEAL labbers, namely Jing Feng and Laura Prazeres, as well as others. I am lucky to have been part of such a friendly and productive space!

I must mention that this thesis would not have been possible without the financial support of the Faculty of Graduate and Postdoctoral Studies and the TA and RA positions kindly offered by the Department of Geography, at the University of Ottawa. Also, I am thankful for the Canada-China Scholars' Exchange Program 2007-2008 scholarship that allowed me to experience and develop a true passion for China, its people, language and culture.

I am most of all thankful to my family, my mom Rimma, and my husband Jaan, and friends for providing a supportive and loving environment, for helping me get through the difficult times, and for all the emotional support, and caring they provided. I really don't think I'd make it through without your constant encouragement, patience and love.

Только благодаря вам – СПАСИБО, AITÄH!

TABLE OF CONTENTS

ABSTRACT II

RÉSUMÉ IV

ACKNOWLEDGEMENTS VI

TABLE OF CONTENTS VIII

LIST OF FIGURES X

LIST OF TABLES XI

PREFACE XII

CHAPTER ONE 1

1.1 China Context 1
- 1.1.1 Introduction 1
- 1.1.2 China's economic and health reforms 3
- 1.1.3 China's current health care system 6
- 1.1.4 Health care provision and administration 8
- 1.1.5 Urban-rural and regional disparities 10
- 1.1.6 Challenges of access research 13

1.2 Concept of Accessibility 13
- 1.2.1 Theoretical frameworks 14
- 1.2.2 Accessibility measured and perceived 16

1.3 Conceptual Framework 17

1.4 Organization of thesis 20

CHAPTER 2 21

2.1 Abstract 22

2.2 Introduction 23

2.3 Accessibility of Health Care in China 24

2.4 Data & Methods 32
- 2.4.1 Data 32
- 2.4.2 Defining access and related terms 34
- 2.4.3 Outcome variable - Accessibility index 35

2.4.4 Statistical analysis and explanatory variables 36

2.5 Results 37
2.5.1 Evolution of Health Care Access from 1989-2004 37
2.5.1.1 Geographic access 37
2.5.1.2 Financial access 38
2.5.2 Accessibility index 39
2.5.3 Determinants of access to health care 41
2.5.4 Access to hospitals 42
2.5.5 Access to clinics 43
2.5.6 Hospitals vs. clinics 44

2.6 Discussion 46
2.6.1 Spatial inequalities and access to health care 46
2.6.2 Income and access to health care 48

2.7 Conclusion 51

2.8 Acknowledgements 54

CHAPTER 3 55

3.1 Summary and conclusions 55
3.1.1 Review of the research results 55
3.1.2 Summary of findings 56
3.1.2.1 Objective 1: to describe the geographic and financial disparities in access to clinics and hospitals in nine provinces of China during the 1989-2004 period. 56
3.1.2.2 Objective 2: to explore the demographic, socio-economic and geographic factors affecting the access to health care 57

3.2 Contributions of the study 58
3.2.1 Theoretical contributions 58
3.2.2 Methodological contributions 59
3.2.3 Empirical contributions 60

3.3 Limitations & Directions for Future Research 61

REFERENCES 63

APPENDIX 1 Survey questions 70

APPENDIX 2 Profile of the sample 71

APPENDIX 3 Framewok for the analysis of access 76

APPENDIX 4 Regression results 77

LIST OF FIGURES

Fugure 1.1 The Chinese health care system. 7

Fugure 1.2 Health care administration in China. 8

Fugure 1.3 Urban-rural ratios in hospital beds and health care personnel per 10,000 people. 11

Fugure 1.4 Framework for the study of access. 15

Fugure 1.5 Access as fit. 16

Fugure 1.6 Conceptual framework for the study of accessibility of health care. 18

Fugure 2.1 Conceptual framework for the study of access to health care. 31

Figure 2.2 CHNS sample distribution. 33

Figure 2.3 Changes in geographic and financial indicators of accessibility to health care in China between 1989 and 2004 37

Figure 2.4 Access index in clinics and hospitals in China from 1989 to 2004 40

Figure A.3 Framework for the analysis of access. 76

LIST OF TABLES

Table 2. 1 Regression results. 41

Table 2. 2 Regression model summary. 42

Table A.2 Profile of the sample. 72

PREFACE

This thesis follows the article format and consists of an article in preparation for submission to the *Social Science and Medicine Journal.* The candidate is the first author of the article, while the second author, Dr. Huhua Cao, provided guidance on conceptualization and direction of the research. In order to satisfy the stylistic criteria for manuscript submission of the journal, some figures and tables were omitted from the text of the article, but are referred to in the footnotes and are provided in the appendices of the thesis for consultation. The objectives, context of the research and literature review are described in detail in the introductory chapter of the thesis.

CHAPTER ONE

1.1 CHINA CONTEXT

1.1.1 Introduction

The understanding of health care accessibility issues is essential for informing public decision- and policy-making aimed at improving living conditions. Equity in social welfare has long played a major role in shaping China's national policies (Liu et al., 2002); however, continued pursuit of the market-oriented reforms introduced in China in 1970s has resulted in increasing urban-rural and intra- and inter-regional socio-economic disparities (Zhao, 2006). This has raised multiple concerns about differences in availability of health services in urban and rural areas and particularly about the equity of access to health care, which has been widely considered a key objective of health care policies (Liu et al., 2003). Empirical evidence suggests that urban-rural and regional health status disparities continue to grow, which can be attributed to increasing income disparities, changes in health care financing and organization, as well as dramatic reduction of insurance coverage (Liu, Hsiao, & Eggleston, 1999). From early 2000, the Chinese government has recognized the growing inequality and has shifted its development orientation from GDP-led to people-centered (Meng, 2007). This implies that major changes in accessibility of health care should have followed such a radical change in the policy. Using the household survey data from the China Health and Nutrition Survey (CHNS), changes in the accessibility of health care are examined at the household level across socio-economic groups in nine provinces of China over the 1989-2004 period. Applying quantitative approaches, this research seeks to

contribute to the understanding of health care access in China, summarizing and critically assessing existing English-language literature on the subject, as well as analyzing the CHNS data.

Although the literature on access to public health care has primarily focused on developed countries, such as the United States, the United Kingdom, Canada and Australia, the analysis of health care related issues in developing countries, including China, has also received substantial attention from researchers, particularly during the last few decades. However, previous research on access to health care in China was mostly focused on post-reform health insurance changes (Akin et al., 2004; Henderson et al., 1994; Liu et al., 2002; Lui et al., 2004; Wang & Luo, 2005; Zhang & Kanbur, 2006), with an exception of only a few studies. Generally, health care studies lacked geographic focus and did not emphasize urban-rural socio-economic disparities which are potentially important predictors of access. This research will attempt to extend the rather sparse literature assessing changes in access to health care as a result of economic reforms in China. It considers more dimensions of access than earlier work (Akin et al., 2005; Gao et al., 2001; Liu et al., 2002), focusing specifically on geospatial analysis. In order to better understand possible issues related to health care accessibility, this research aims at tracking the changes in health care access in China using the data of nine provinces and specifically has two objectives: 1) to describe the geographic and financial disparities in access to clinics and hospitals in nine provinces of China during the 1989-2004 period, and 2) to explore the demographic, socio-economic and geographic factors affecting the access to health care.

1.1.2 China's economic and health reforms

Over the past five decades, the People's Republic of China (PRC) has introduced extensive reforms not only in the structure of its economy, but also concerning family planning and financial accountability within enterprises and service sector organizations. Particularly during the last three decades, China has been experiencing considerable economic growth, as well as a widening disparity between urban and rural living conditions (Cao, 2008; Chang, 2002; Colin, 2005; Lin, 2002). Following the central reforms, China has clearly emphasized development of coastal areas, believing that these regions would stimulate the prosperity of the whole county (Chaolin, Jianfa, & Taofang, 2004). In addition, the fiscal reforms of 1994, introduced a new revenue-sharing arrangement between central and provincial governments that widened the gap of regional inequality with central and particularly western rural areas falling farther behind, destabilizing the unity of the nation (Wei & Fang, 2006). The Gini index, a widely used indicator of inequality in income distribution, increased from 0.32 in 1995 to 0.45 in 2002 (Meng, 2007). Although the index values vary from one study to the other, there is a general consensus that income disparities have reached alarmingly high levels (Zhao, 2006).

Since the foundation of the People's Republic of China in 1949, the country has gone through two very distinct development phases: 1) period of egalitarian society (1950s-1970s), characterized by outstanding achievements in the improvement of population health; and 2) the time of economic liberalization (1980s-1990s) oriented towards unmatched economic growth (Liu, 2004). Prior to the mid-1980s, the health policies of China accentuated preventative care, wide accessibility and public health founded on a broad

publicly financed system (Wong, Tang, & Lo, 2007). The Government Insurance Scheme (GIS) and the Labor Insurance Scheme were launched in urban areas and the Cooperative Medical Scheme (CMS) was established for the rural population (Meng, 2007). Essentially universal coverage was achieved by means of a "three-tier" public provision system, with street clinics, district hospitals and city hospitals operating in urban areas, and village clinics, township health centers and county hospitals creating the network in rural strata (Eggleston et al., 2008). Dramatic improvements in public health, measured in an increase in life expectancy, and a decline in maternal, infant and under-5 mortality rates was recognized internationally as a "successful health revolution" (WHO, 2005, p. 6).

As a result of health care reforms that were fully implemented nationwide only in 1998 (Wong, Tang, & Lo, 2007), the current health care system is significantly different from what it was during the leadership of Chairman Mao[1]. The fiscal reforms of the mid-1980s, and particularly the 1990s, which reduced the redistributive power of the central government, directly affected the provision of public services. The government reduced the subsidies for public hospitals, forcing health institutions to rely upon service charges and the sale of medicine (Wong, Tang, & Lo, 2007). The over-prescription of drugs and medical operations, as well as the unnecessary use of costly high-tech medical equipment is common because the hospitals are authorized to receive 15% commission for Western medicine and 25% for Chinese medicine (Eggleston et al., 2008). A study conducted by Zhang, Feng and Zhang (2003) has concluded that less than 2% of drugs prescribed in health clinics and only 0.06% of drugs prescribed in village clinics were deemed necessary (Eggleston et al., 2006). Due to the prescription of unnecessary care and rapid health care inflation, the share of out-

[1] Mao Zedong was the leader of the People's Republic of China (PRC) from its establishment in 1949 until his death in 1976.

of-pocket expenses paid by the patients has been increasing steadily from 16% in 1980, to 38% in 1988 and to 61% in 2001 (Xiaobo Zhang & Ravi Kanbur, 2005).

Available empirical studies suggest that the current health care delivery system leaves much room for improvement (Eggleston et al., 2008). The WHO report (2005) has ranked the overall performance of China's reformed health care at 144 among 191, and the fairness of its system even lower at 188 among 191 evaluated countries. The health care reform has produced significant, and often unaffordable increases in the cost to patients, and reductions in health insurance coverage, causing greater gaps in access to health services particularly among urban-rural residents (Liu, 2004; Liu et al., 2002). Zhao (2006) argues that two especially negative developments that accompanied the socio-economic transformation are: the collapse of the Cooperative Medical System in rural areas, and the erosion of the Labor Insurance Scheme in urban areas.

In early 2000, the Chinese government recognized that despite economic benefits the market-oriented reforms also had negative effects on regional disparities, accepting that wider reforms were needed (Watts, 2006). As a result the "five-balance strategy" was proposed in an attempt to reduce inequalities. The strategy is based on promoting balance among: 1) urban and rural areas, 2) eastern and western regions, 3) economic and social development, 4) economic development and environment protection, and 5) domestic and international market development (Meng, 2007). The Effective Health Care Research Programme Consortium China RPC programme was also established in February 2006 in order to gradually improve the quality and efficiency of health care services in China[2].

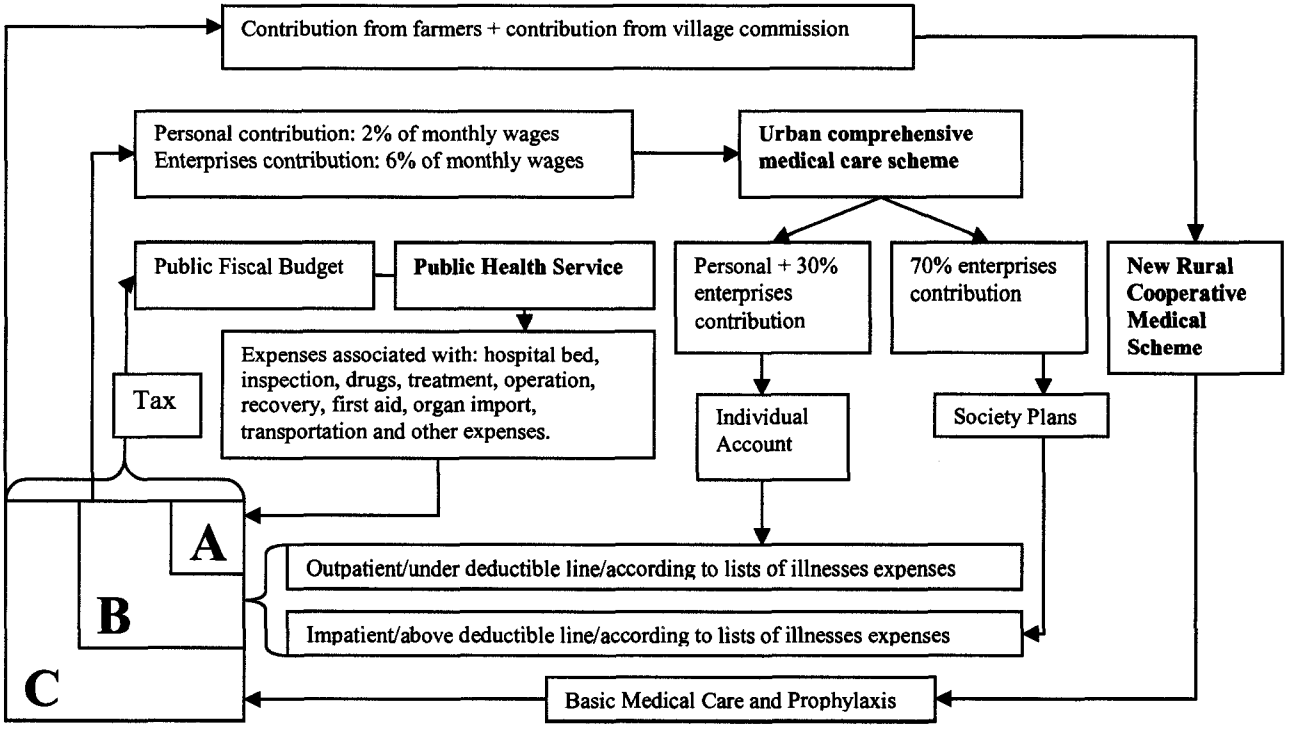
[2] Effective Health Care Research Programme Consortium China RPC programme (China network) downloaded on May 1, 2008 < http://www.chinaehcrpc.cn/english.asp>

Moreover, in October 2006 the government committed to increase health care funding by as much as 1-1.5% of its GDP (approximately $25-$38 billion) over the next several years (Yip & Hsiao, 2008). Health care is gradually becoming more prominent on the political agenda in China and with such a politically firm vision in place there is a hope for equity-promoting health policy changes in the future.

1.1.3 China's current health care system

Along with the economic reforms during the last three decades, the health care system in China has undergone considerable changes (Zhang & Kanbur, 2005). The health care reform in the late 1970s, introducing major changes in health care financing mechanisms, has led to major changes in health care, dramatically increasing the out-of-pocket medical expenses (Zhao, 2006). Although the health care models implemented nationwide had a certain degree of variation, Cai (1999) argues that all of them share the following intended characteristics: ensuring access to basic care; wide coverage; joint premium employer-employee contributions; and, integration of the individual medical savings and social pooling (Liu et al., 2002). Figure 1.1 presents an overall structure of the current health care system in China that divides population into three groups (A, B and C) based on their occupation (Hougaard, Osterdal, & Yu, 2008). For group A (government employees, public sector organizations, army, research and education institutions) essentially all health care expenses are covered as envisaged by the "Public Health Service Administration Act" passed in 1988. Group B (urban employees) is regulated by the "Decision of the State Council of Comprehensive medical care scheme among urban

workers" introduced in 1998. Health care financing for this group combines the socially pooled fund and payments of insurance premiums made by enterprises and employees.



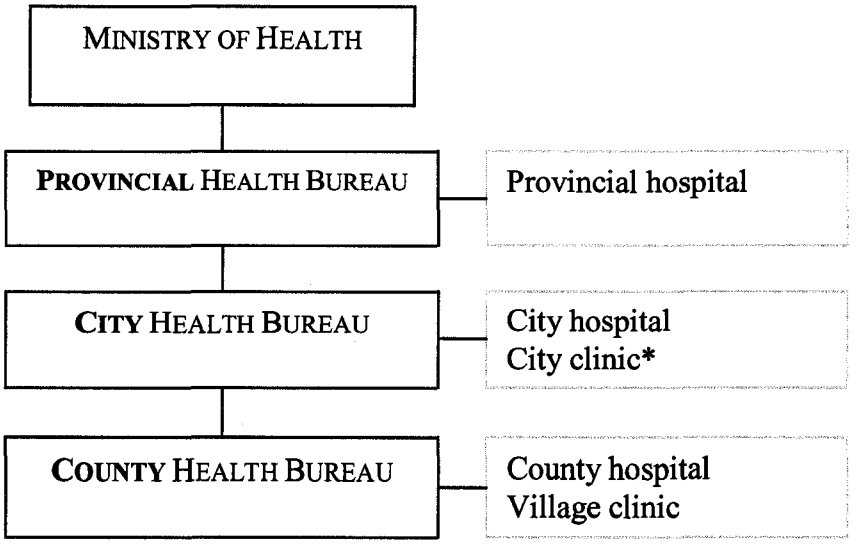
Fugure 1. 1 The Chinese health care system.
Source: Hougaard, Østerdal and Yu, 2008, p.4.

Generally, personal contributions are 2% of every employee's salary, while enterprise's contribution is 6% of total monthly wages. This financing mechanism not only facilitates the access to medical care by providing health insurance coverage for employees, but also implies the health care reform objective in modernizing people's mindsets concerning health care responsibility. It gradually shifts the responsibility for financing health care away from the central government and towards a shared enterprise-employee responsibility (Wong, Tang, & Lo, 2007). Group C is proportionally the largest (approximately 64% of the total population) and is composed exclusively of the rural population (Hougaard, Osterdal, & Yu, 2008). Health care financing and provision for this group is not covered by any specific

regulation, except for a small proportion that is regulated under the "Rural Cooperative Medical Scheme."

1.1.4 Health care provision and administration

In China, in addition to the Ministry of Health, many other institutions have an indirect impact on health, such as the Central Family Planning Committee, Ministry of Finance, National Development Reform Council and the Food and Drug Administration (Li, Zhang, & Tian, 2006; Mao, 2006). China's public health system comprises delivery facilities at different administrative levels: provincial, city, and county level (See Figure 1.2).



Fugure 1. 2 Health care administration in China.
Source: adapted from Liu, 2004, p.534. *run by the district governments

The top quality facilities with qualified personnel are scarce and are restricted to the provincial level. While the number of medical institutions at the county level is quite high, they are generally very small and perform a very limited range of treatments (Hougaard, Osterdal, & Yu, 2008). In 2003, a study of 46 less developed counties by Wang et al., found

that 70% of village doctors did not have any formal medical education and had received on average only 20 hours of training (Eggleston et al., 2008). During the egalitarian era, there was a well-functioning referral system between the different levels of institutions, so village doctors would refer their patients to county, city or provincial facilities depending on the severity of the case. However, this was lost as a result of decentralization and currently patients can choose whichever level of provider they can afford, so if finances permit they prefer to turn directly to higher-level facilities. Consequently, higher-class facilities (provincial) are overutilized and mostly attended by higher-income customers and lower-class facilities (county and township level) are underutilized and mostly attended by poor patients (Eggleston et al., 2005). In such a fragmented system preventative, primary, and tertiary services are all provided by different levels of facilities. Consequently, there is considerable overlap of services and resources among the different levels of facilities. In addition, there is little coordination among different levels of health care providers, and tests are often repeated when patients are referred to another facility (Yip & Hsiao, 2008). "Waste and inefficiency characterize many of China's multiple systems of health services delivery" (World Bank, 2005, pp. 2-3). The regulations regarding the communication among these facilities and responsibilities of these providers are inadequate and there is a lack of enforcement mechanisms of existing regulations. Findings of Tang and Bloom (2000) suggest that the decentralization resulting from health reforms has had a negative impact not only on overall quality of services but also on equity of access since better quality higher-level facilities are accessible only if the patients can afford them.

Moreover, the health service delivery system is also run by a variety of public-private providers ranging from state-owned enterprises, military establishments, private

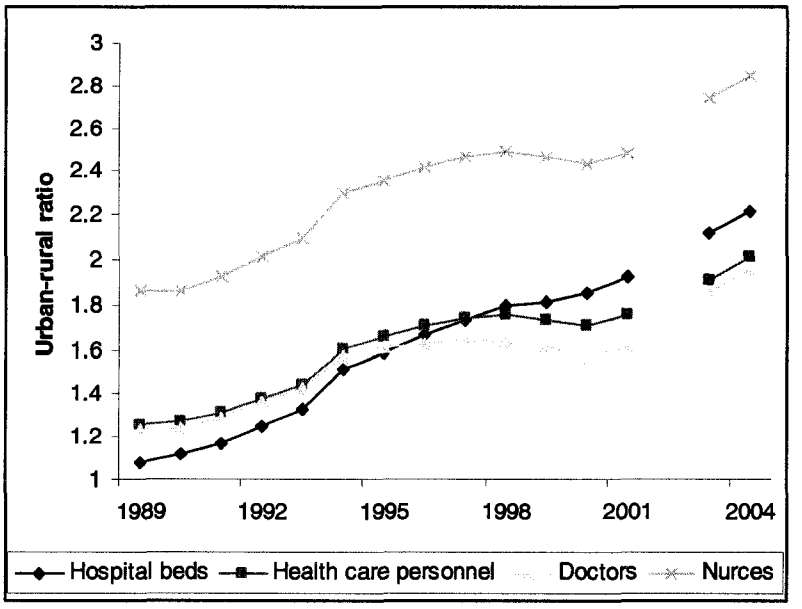
investors, and local cooperatives (Liu, 2004). Currently hospitals are classified as either for-profit or not-for-profit, with a further distinction between state or privately owned (Eggleston et al., 2008). In urban cities, for instance, only 2% of the hospitals are privately owned. In rural areas, however, most of village clinics (73.6%) belong to this category (Meng, 2007). Also, since the 1980s there has been a tendency of class conversions and by 2005, 15.9% of hospitals were registered as for-profit. However, the evidence from the limited Chinese empirical studies on the effect of ownership and profit status suggests that for-profit providers are just as likely to over-prescribe medicines as public ones, but also are just as likely to provide preventative services if paid to do so (Eggleston et al., 2005).

While health care provision is still dominated by state ownership, the main revenue of the health delivery system comes from out-of-pocket fees based on a regulated fee schedule (60%). The other two main sources are insurers (20%) and government subsidies (20%), although the latter accounts for a progressively decreasing share of providers' revenues (Eggleston et al., 2008; Liu et al., 2006).

1.1.5 Urban-rural and regional disparities

A critical challenge in post-reform China relates to urban-rural and regional inequalities (WHO, 2005). Income disparities have increased dramatically as coastal areas have become wealthier, while the poorest counties across China suffer from economic stagnation (Zhao, 2006). The PRC was unsuccessful in finding and maintaining the balance between the need for health care protection and economic growth (Wong, Tang & Lo, 2007). Contrasts in quality, availability and accessibility between medical services in China are also striking and, what is worse, the urban-rural inequalities continue to grow (Liu,

Hsiao, & Eggleston, 1999). It is becoming more and more evident that "economic growth alone does not guarantee equal distribution of the resource gains" (Gao et al., 2002, p. 20). The health care resources are ill-balanced between urban and rural areas, with the latter being considerably under-financed, affecting the availability of resources in rural areas (Mao, 2006). The root of these disparities is found in differences in socio-economic development that were influenced by separate development policies in urban and rural areas, resulting not only in income disparities but also leading to enlarged inequalities in resource distribution (Meng, 2007).



Fugure 1. 3 Urban-rural ratios in hospital beds and health care personnel per 10,000 people. Data for 2002 are missing. Source: Statistical Yearbook of China 2005.

Figure 1.3 presents the changes that have taken place in hospital bed and medical personnel availability across the urban-rural sectors between the years 1989 and 2004. In 1989 the number of beds in health institutions in urban and rural areas was somewhat comparable, 133.5 and 123.3 units per 10,000 population respectively. By 2004, however the number of beds in urban areas has almost doubled while it continued to decrease in rural

areas (Statistical Yearbook of China, 2005). Similar tendencies are observed with numbers of medical personnel employed. Clearly, the health service delivery system in urban areas has developed much faster than in rural areas, which is reflected in a growing gap not only in quantity of facilities available, but also in quality of care between urban and rural areas (Eggleston et al., 2005).

In addition, due to different income levels in urban and rural areas, the inpatient (hospitalization) visit cost places a comparatively heavier burden on rural residents than on their urban counterparts and this situation continues to worsen over time. In 1995, the hospital admission fee was equivalent to 30.3% of the average per capita urban and 105.7% of the average rural wage. While in 2003, in urban areas this proportion has decreased, accounting for only 27.9% of the average per capita urban wage, it continued to increase in rural areas, reaching 149.1% of the average rural wage (Mao, 2006). Unsurprisingly, this rapid health care cost inflation has rendered health care access and utilization increasingly inequitable between urban and rural areas as well as across various income groups (Zhang & Kanbur, 2005).

Since the introduction of economic reforms, health has been treated as a normal market commodity (Watts, 2006). Since it is not, researchers argue that government investment in health care should be increased, particularly in socio-economically disadvantaged areas (Mao, 2006). In 2006, development of health services in rural areas was made a top priority, however due to the poor quality of health personnel and equipment it will take a long time before these areas will have a comprehensive primary health care system (Meng, 2007).

1.1.6 Challenges of access research

As in the case of many developing countries the data and methodological limitations of empirical studies on China's health care suggest caution in drawing conclusions. Eggleston et al. (2008) summarized the limitations of empirical literature related to health care in China: 1) often based on aggregate data over time or before and after policy change without relevant control groups. Although the literature on health care is growing, the number of studies systematically assessing impact of economic reforms on inequality of health care access and use in China is still very limited; 2) small sample of providers or geographic areas (findings are not generalizable); 3) inadequate control of differences in cases or severity mix; 4) focus on only one aspect of provider performance (limited quality measures are usually used, e.g. availability of doctors trained in Western medicine); 5) inability to address endogeneity of reforms.

In addition to these above-mentioned points there exist other important deficiencies in China's health care sector studies. Most importantly, there is the general lack of geographic focus. Although a number of studies have included the urban-rural aspect, the disparities within urban or rural areas, as well as provincial and regional disparities are rarely analyzed. Finally, the majority of studies is descriptive in nature, and thus fails to establish a statistical importance of independent variables.

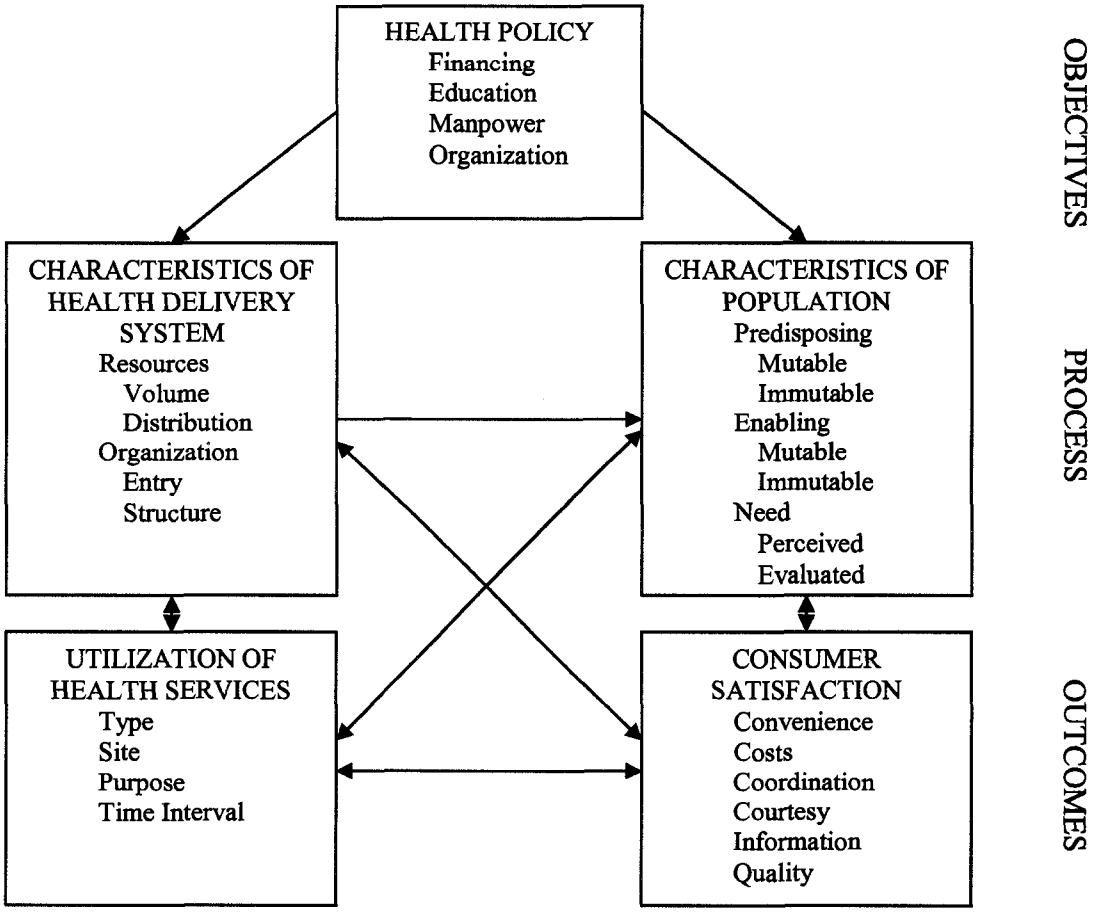
1.2 Concept of Accessibility

There is a general assumption that medical care is an important determinant of health status, however it does not guarantee health (Gulliford et al., 2003). Accessibility of health

care determines whether a population can benefit from medical infrastructure and resources that may exist. Nonetheless, there is no one standard definition or a common interpretation of accessibility. In fact, as Gould (1969) affirms "accessibility... is a slippery notion... one of those common terms that everyone uses until faced with the problem of defining and measuring it"(Gould, 1969, p.64 as cited in Cameron, 1995, p. 37). Some authors (Pechansky & Thomas, 1981) draw a distinction between the concepts of access (general domain) and accessibility (very narrow domain of client transportation, travel time and distance). A more widespread trend is to use "access" and "accessibility" interchangeably to refer to the ability of an individual to gain entry into the health care facility and to receive appropriate services when needed (Aday & Andersen, 1974).

1.2.1 Theoretical frameworks

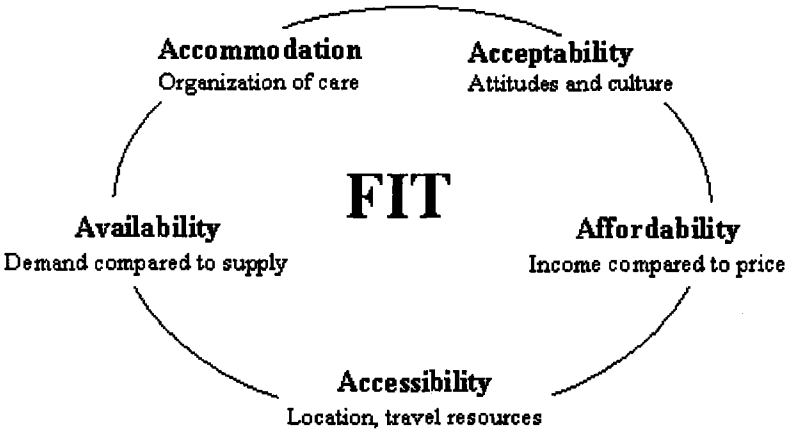
Most well-known frameworks treat access either in terms of *use*, or in terms of *fit*. The Behavioral Model of Health Services Use developed by Aday and Andersen (1974) is the dominant and the most applied theory of health care access that has been used widely as a framework for health care use studies of general populations as well as of minorities, low income, and other vulnerable groups (Andersen, 1995). A major contribution of the behavioral model is that it provides a framework for the study of access (Figure 1.4). The model is based on the assumption that "the proof of access is use of service" (Ricketts & Goldsmith, 2006, p. 275). It analyzes access through the *use* of health care services that is a result of: heath care objectives (health policy), process (characteristics of health care system and the population at risk), and outcomes (utilization and satisfaction).



Fugure 1. 4 Framework for the study of access.
Source: adapted from Aday and Andersen, 1974, p.212.

In 1981 Pechansky and Thomas proposed an alternative approach to studying and understanding access. They analyzed the use of health care facilities on a local scale and proposed the concept of 'fit' between the customer needs and the ability of the system to accommodate these needs (Figure 1.5). Pechansky's 'five As' model of health service accessibility focuses on the interaction of five key elements that determine the use of health care: availability (volume of doctors, hospital beds, etc.), accessibility (geographic proximity of health care), acceptability (attitudes of patient and of health provider towards each other), accommodation (clinic hours, waiting times, etc.) and affordability (financial means). Essentially, Pechansky's concept suggests that "there are recursive

interrelationships between resources, needs, and demands that can be measured" (Ricketts & Goldsmith, 2006, p. 276).



Fugure 1. 5 Access as fit.
Source: adapted from Ricketts & Goldsmith (2006), p. 275.

1.2.2 Accessibility measured and perceived

The degree of perceived or observed accessibility is closely related to the measurement criteria chosen (Curtis, 2006). It is generally agreed in the literature on access that there are two aspects to the dimension of accessibility: geographical (availability) and non-geographical (perceived social and economic barriers as well as outcomes of service utilization) (Cameron, 1995). Since physical elements of health care infrastructure, such as hospitals and health clinics, are relatively fixed in space, "most measures of geographical accessibility concentrate on the physical separation that impedes the contact" (Gulliford, Figueroa-Munos & Morgan, 2003, p. 19). The gravity model suggested that there is an inverse relationship between distance and frequency of utilization of service, or that there is a "friction of distance". The utilization of facilities tends to decline as the distance between the user and the facility increases (Morrill, 1974). In addition to physical distance,

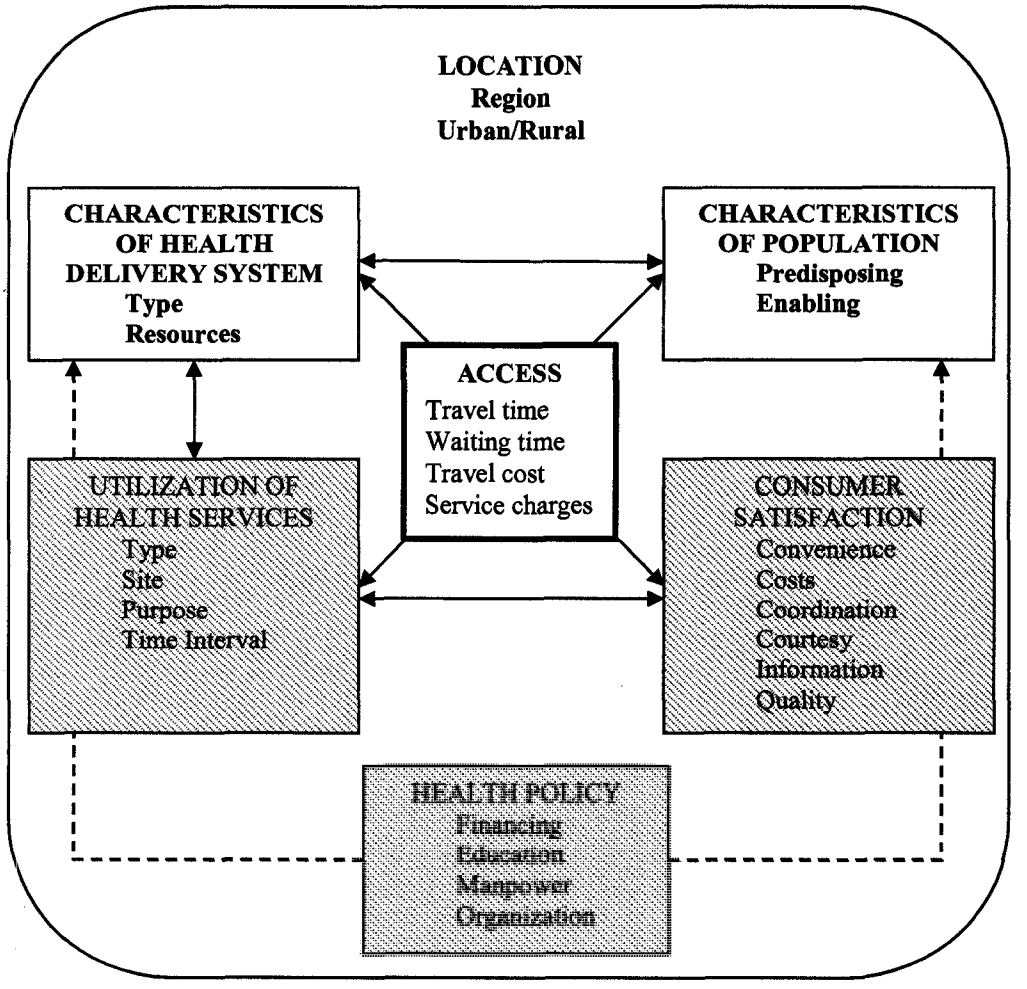
accessibility is also conditioned by non-geographic aspects such as: *perceived distance* (patient's perception of how far geographically the facility is), *social distance* (the way individuals perceive the distance separating them from other individuals, e.g. cultural differences), as well as *economic distance* (the ability to pay for services) (Meade & Earickson, 2000). Both perceived and social distances are based on racial, cultural, ethnic, class, income, as well as demographic differences among people.

Access is a complex multi-dimensional concept and, as seen, there are various ways of defining and measuring it. According to Watts (2006), "the government of China now accepts that accessibility is the premier concern in health" (p.1565). Such priority given to health care access raises questions about the meaning of the term and the measures that can be used to evaluate its existence as well as its equity. Analyzing the literature on the subject, Guilliford and colleagues (2003) have concluded that access is generally assessed in four ways by researchers in terms of: availability of health care resources, health care use, health outcomes, or in terms of equity, which according to him is the most important measure of access but also the most difficult one to operationalize. It is important to evaluate the contributions and limitations of existing empirical studies of health care access in China to understand the meaning and measurement of this term in the Chinese context.

1.3 Conceptual Framework

Based on the literature review of themes and concepts related to health care access, a conceptual framework for the study of access to public health services can be proposed. Figure 1.6 presents a diagram of the six broad factors determining accessibility (characteristics of the population, characteristics of health care delivery system, location of

both health care facility and the population at risk, consumer satisfaction, use of services and the policy governing the health care provision) and their indicators. This framework is essentially based on the model for the study of access proposed by Aday and Andersen in 1974 (Figure 1.4), with an important modification. In our analysis we concentrate on 3 components of the framework, the characteristics of population and on the characteristics of the health delivery system (non-shaded objects in the figure). It is generally accepted that understanding of the characteristics of both the population and the health care system is important for evaluation of the accessibility of health care (Henderson et al., 1998).



Fugure 1. 6 Conceptual framework for the study of accessibility of health care.
Modified from the study of access proposed by Aday and Andersen, 1974 (Figure 1.4)

However, in the context of China, empirical evidence has demonstrated growing urban-rural, as well as regional disparities, suggesting that characteristics of both the health care facilities (availability and quality of resources, e.g. doctors, hospital beds, medicines needed) on one hand, and households' socio-economic status on the other hand are location dependent (Zhao, 2006). It was thus essential to allocate a central role to the location in the analysis. In this study, the location is evaluated based on two variables: the region, and the sector (urban or rural) of residence of the survey respondents.

Access to health care is often equated with the availability (sufficient supply of facilities, e.g. hospitals, clinics) of services in a given geographic area (Ottenbacher & Graham, 2007). It is important to understand that although availability provides an increased opportunity, it does not guarantee a person in need of health care will be able to obtain needed services (Pechansky & Thomas, 1981). It is generally accepted that enabling factors (availability of health insurance or sufficient income), predisposing factors (age, gender, ethnicity, marital status, number of members in the household and education), and need and satisfaction with services should be considered when evaluating the accessibility of services (Aday & Andersen, 1974). Since the focus of the study is at the household level, only ethnicity, size of the family, marital status and education of the head of the household are evaluated as predisposing factors; and per capita household income, household heads' health insurance, and whether the facility is a referral facility from a work unit are evaluated as enabling factors. Although need, satisfaction with the services, and the government policy undoubtedly are very important (darker shaded areas in the diagram), due to restrictions of the data available and the focus on the household level, currently such factors can not be included in the analysis. In terms of measurement of access, the outcome

variable (accessibility index) is calculated based on four indicators of access to health care, which are: travel time one-way, travel cost one-way, waiting time to see a health practitioner, and cost of cold or flu treatment (as a proxy of a typical health care service charge).

Although some of the outcome variables, such as the service charges, might not be precise indicators of health expenditures, since the cost of flu treatment might depend on the quality of treatment, it nonetheless enables us to order or rank the facilities with respect to the overall cost levels for patients (Akin et al., 2005).

1.4 Organization of Thesis

The thesis is organized into three chapters including this introductory chapter. The second chapter comprises a paper in preparation for submission to the journal of *Social Science and Medicine*. This chapter addresses the objectives of the research tracing the changes in the access to health care in China from 1989 to 2004 outlining the demographic, socio-economic and geographic factors affecting the access to health care facilities. The article also describes the data and methods used for the analysis, synthesizing the results and contributions of the research. Some figures and tables were omitted from the text of the article, in order to satisfy the stylistic criteria for manuscript submission of the journal. These are, however, referred to in the footnotes and are provided in the appendices of the thesis for consultation.

The concluding chapter summarizes the major findings and conclusions drawn from this research. It discusses the major empirical, theoretical and methodological contributions of this study, outlining the limitations and highlighting the directions for future research.

CHAPTER 2

HEALTH CARE ACCESS AND REGIONAL DISPARITIES IN CHINA

Vedom J[1*]; Cao H[1]

Abstract word count: 248
Full word count: 8,234 and references 1,059

Address:

[1] Department of Geography, University of Ottawa, 60 University pvt, Ottawa, ON, Canada K1N 6N5

[*] Corresponding Author and Requests for Reprints

Email:

Julia Vedom jvedo056@uottawa.ca
Huhua Cao caohuhua@uottawa.ca

Under preparation for submission to: *Social Science and Medicine Journal*

2.1 ABSTRACT

Continued pursuit of the market-oriented reforms introduced in China in the late 1970s has resulted in increasing urban-rural socio-economic disparities, jeopardizing the equity in social welfare and particularly the equity of access to health care, which has been widely considered a key objective of health care policies. Using the household survey data from the China Health and Nutrition Survey (CHNS), changes in the accessibility of health care are herein examined at the household level across socioeconomic groups in nine provinces of China over the 1989-2004 period. First, we describe the access to health care over the 15 years of survey, and then using a multivariate regression we analyze the determinants of access in 2004. We find that the geographic accessibility gap between hospitals and clinics has decreased from 1989 to 2004, while the gap in financial accessibility has increased, making urban hospitals the least accessible facilities. This study concludes a strong correlation between the geographic factors (method of travel, region, and availability of infrastructure in the province of residence) and the quality of access received. Overall, patients who are able to reach the facilities on foot enjoy better access than those who can not. Similarly, residents of the West along with the provinces with higher availability of health care facilities also tend to have a better potential access than their counterparts. Understanding of health care utilization patterns and access issues is essential for informing public decision- and policy-making aimed at improving living conditions and building a harmonious society.

2.2 INTRODUCTION

Equity in social welfare has long played a major role in shaping China's national policies (Liu et al., 2002). However, continued pursuit of the market-oriented reforms introduced in China in the late 1970s has resulted in increasing urban-rural and intra- and inter-regional socioeconomic disparities (Zhao, 2006). This raised multiple causes for concern from an equity perspective, suggesting the trends that should be closely monitored. As a result, during the last decades the analysis of health care-related issues in China has received substantial attention. However, previous research on access to health care in China has mostly focused on post-reform health insurance changes (e.g. Akin et al., 2004; Ding & Zhu, 2007; Henderson et al., 1995; Gao et al., 2002; Liu et al., 2002; Lui et al., 2004; Wagstaff & Lidelow, 2008; Wagstaff & Yu, 2007; Wong, Tang & Lo, 2007), with the exception of only a few studies. Further, health care studies have lacked any geographic focus and have not emphasized urban-rural socioeconomic disparities, which are of vital importance in China. Research suggesting that the geographic location may influence patients' chance of receiving care continues to grow (Liu et al., 2007), and coupled with China's polarized development during the last three decades this demonstrates the need for a geographic focus. Our research will attempt to extend the rather sparse literature assessing changes in access to health care stemming from economic reforms in China by pursuing two specific questions herein: 1) how have geographic and financial disparities in access to clinics and hospitals changed during the 1989-2004 period?; and 2) to what extent did demographic, socio-economic and geographic factors affect access to health facilities in 2004? Focusing specifically on geospatial analysis, using the China Health and Nutrition Survey (CHNS), this study tracks the changes in accessibility of health care at the household

level across socioeconomic groups in nine provinces of China over the 1989-2004 period. By means of a multivariate analysis this research seeks to contribute to the understanding of causes in health care access disparities in China summarizing and critically assessing existing English-language literature on the subject.

2.3 Accessibility of Health Care in China

While the importance of accessibility is well understood in the literature, there is little agreement on how to measure, or even define it. Empirical studies relevant to health care access in China can be somewhat arbitrarily grouped into three main categories based on the criteria used for the measurement of access: 1) utilization of health services, 2) availability of health insurance, and 3) studies creating an index to evaluate accessibility of health services.

Studies examining use of health services found significant and apparently non-random reductions in health care use since the introduction of economic reforms (Bloom, 2001; Bloom & Gu, 1997; Bloom & Xingyuan, 1997; Hesketh & Zhu, 1997; Mao, 2006; Wagstaff & Yu, 2007). For example, between 1985 and 2000 the bed occupancy rate for town health centers dropped from 46.0% to 33.1% and for county hospitals from 82.7% to 60.8% (Liu, 2004). Mao (2006) found that from 1993 to 2003 outpatient visits and hospitalization rates decreased slightly from 1.8 to 1.62 visits per capita and from 4.2% to 3.6% respectively. In contrast, Henderson et al. (1994; 1998) concluded, using CHNS data, that between 1989 and 1993, health care was widely accessible and there was no evidence of declining use of services over this period. Possible explanations for this may be the earlier time period covered in the study or the self-reported nature of the data.

While, theoretically, increased doctor visits are not necessarily a positive outcome for health care reforms, there is evidence that demand for services in China coexists with underuse by a sizeable fraction of the population (Liu & Mills, 1999). According to the findings of Liu et al. (2007) in 2003 only 43% of respondents saw a doctor when they were ill, while 32.2% relied on self-treatment and 15.8% had no treatment at all. For this reason an increase in use of services could be interpreted as an improvement of access to health care, regardless of actual changes in health outcomes (Wagstaff & Yu, 2007).

Not only has there been an overall decline in health care use, but the growing disparities between urban-rural health care utilization rates have also been documented. Liu et al. (1999) have found that between 1985 and 1993 hospitalization days have increased in urban areas by 12.8%, whereas in rural areas they decreased by 10.3%. Similarly, Liu et al. (2007) described the patterns in physician and hospital use among rural and urban populations in China using National Health Services Surveys (NHSS) 2003 data. They found that 53% of respondents who relied on self-treatment and 90% of those who had no treatment at all when were sick were rural residents. Using Center for Health Statistics and Information (CHSI) 2003 data, Meng (2007) found that the non-utilization rates of both outpatient and inpatient care were higher among rural residents by 5% and 2.5% as compared to urban residents primarily due to financial reasons.

A number of studies have also attempted to find the underlying causes of reported utilization practices. A qualitative study assessing health care access barriers was conducted by Hong et al., (2006) concentrating on urban areas of Beijing and Nanjing. Here it was concluded that the high cost of health care, a lack of insurance coverage and exacting work

schedules often resulted in underuse of formal health care, self-treatment and delayed treatment of illnesses. Liu (2004) found that on average, 45% of discharges from inpatient care in rural areas were initiated against medical advice for financial reasons in almost 80% of cases. Liu and Mills (1999; 2005) confirm Liu's findings, demonstrating that user fees for preventative and curative care have been regarded as a significant barrier for utilization of these services. In another qualitative study conducted by Wong, Tang and Lo (2007) assessing people's perceptions of the underlying principles of health care system reform, 86.1% of respondents agreed to the statement "The current medical examination and treatment expenses exceed what the general public can afford" (p. 148).

Health insurance is another commonly used proxy for the measurement of access to health care. It is often cited in the literature as being an important policy instrument with a capacity to improve the access to health services (Ding & Zhu, 2007), in both developed and developing country contexts (Liu et al., 2003). Since the introduction of economic reforms in China, a number of researchers have studied the effects of reforms on disparities in insurance coverage with somewhat inconsistent findings. For the most part, an alarming decline of insurance coverage as a result of reforms has been documented (Gao et al., 2002; Henderson et al., 1998; Yip & Hsiao, 2008). During the 1989-1993 period the proportion of those not covered by any kind of insurance has increased from 69.5% to 74.6% (Henderson et al., 1998). Gao et al. (2002) found that the levels of insurance coverage continued to drop after 1993 from 75.5% to 57.4% in 1998 for urban residents and from 14.4% to 11.7% for rural populations. Although major decreases in insurance coverage were recorded in urban areas, the coverage in rural areas was still almost three times lower than in urban areas. Yip and Hsiao (2008) analyzed the changes in insurance coverage by socio-economic status,

concluding that between 1993 and 2003 the levels of insurance coverage in urban areas have dropped substantially for the lowest and middle income quintiles (by 26.1% and 19.6% respectively), not only worsening the access to health care but rendering it less equitable.

There are a growing number of studies suggesting that while there was an overall decline in insurance coverage since the reforms, these reforms nonetheless had an important positive effect on equity of coverage. Akin, Dow and Lance (2004) examined the changes in distribution of health insurance across socio-economic groups in China over the 1989-1997 period using the CHNS data. Their findings suggest that contrary to expectations, market oriented reforms were successful in reducing disparities in rural-urban health insurance coverage from 70.44% vs.7.37% in 1989 to 51.13% vs. 14.49% in 1997. In addition, insurance coverage disparities across different socio-economic groups narrowed significantly, since senior professionals' insurance coverage declined from 1989 to 1997 (89.64% and 69.29%), while farmers' coverage increased from 3.72% to 8.74% over the same period of time. Similarly, Liu et al. (2002), evaluating the changes in access to health care in response to the urban health insurance reform pilot experiment in Zhenjiang and Jiujiang in 1994, concluded that the reforms not only increased horizontal equity in access by narrowing the gap in use of outpatient care across socio-economic groups, but also managed to maintain vertical equity for basic care (i.e. the chronically sick were more likely to use care).

Although insurance coverage generally acts as a facilitator of access, Wagstaff and Yu (2007) have found that the World Bank's project in Gansu province, which among other goals strived towards commune-based insurance scheme resurrection, had a negative effect

on the use of health services and thus did not improve the access to care. Moreover, a recent study by Wagstaff & Lindelow found that availability of health insurance increases the risk of high and catastrophic spending by encouraging people to seek care when sick and to seek care from higher-level providers (Wagstaff & Lindelow, 2008). This finding might be related to the fact that health insurance schemes in rural areas are largely (80%) funded by personal contributions, while urban residents are required to contribute a considerably smaller share (25%) (Gao et al., 2002). Consequently, there is an adverse selection among people who prefer to buy insurance coverage (Liu, 2004). Moreover, the average effective reimbursement rates of health care costs do not exceed 32%, implying that the largest share of health costs falls on the shoulders of patients (Carrin et al., 1999).

While the utilization of health care and the availability of health insurance are common proxies used for the measurement of access to health care, they are single-variable indicators of access and, consequently, do not reflect the complex nature of the access concept. In order to closely reflect the concept, access indices can be used. The advantage of these measures lies in a possibility of inclusion of different types of access indicators, creating a complex representative indicator. Although indices are commonly used to study accessibility, to the best of our knowledge there is only one study published in English using this approach to examine health care access in China. In their 2005 study, Akin, Dow and Loh evaluated the changes in access to health care at the community level between 1989 and 1997 using the CHNS data. They built an index comprised of 5 access measures: distance to closest health facility, service charges, time spent waiting to be seen by a health professional, availability of a doctor trained in Western medicine, and availability of basic medicine at the facility. While they call it an index they nonetheless run separate

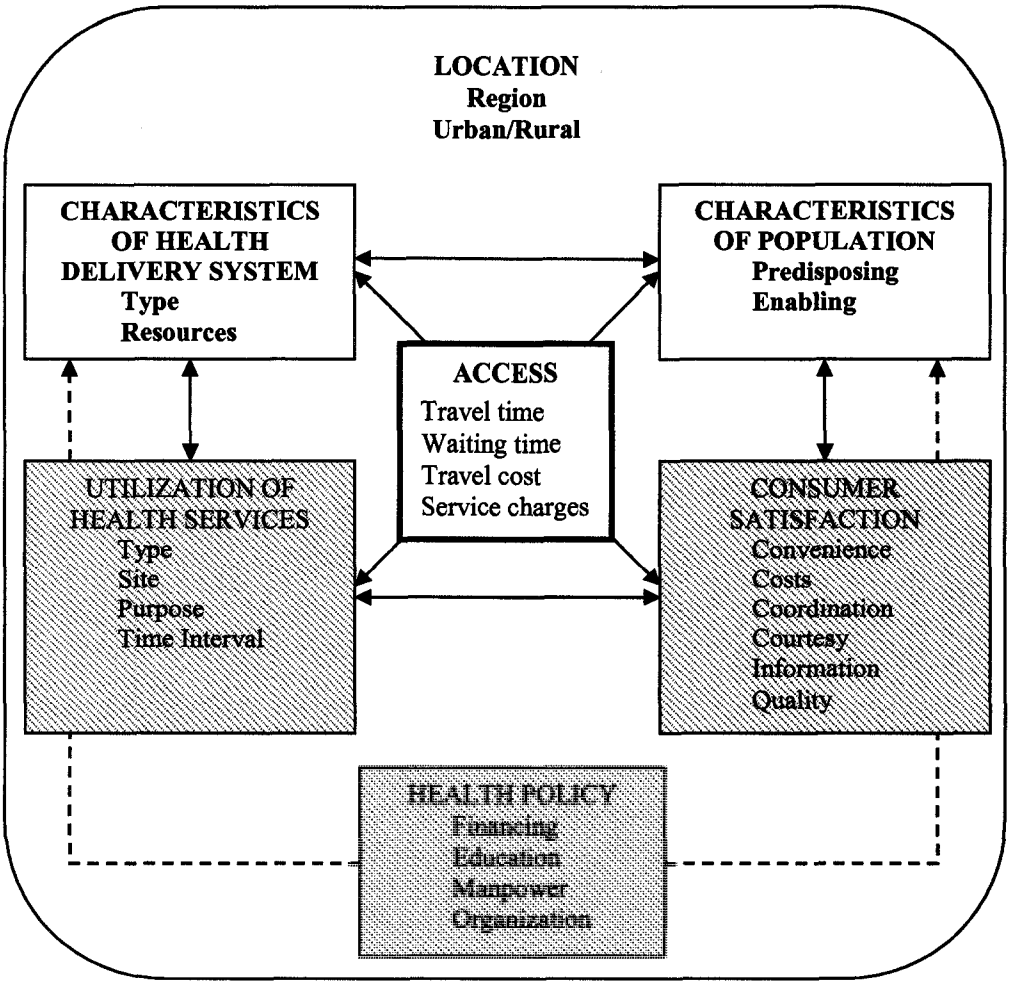
multivariate regressions for each of the access indicators without successfully building a true index. The findings of this study suggest uneven changes to access indicators. The waiting time has fallen, while the service charges have increased for most communities; although the distance to hospitals for poor communities has increased during this period, distance to clinics saw more improvement in poor communities. According to their findings, major service quality improvements were restricted to wealthier areas.

The paucity of literature using indices to study accessibility of health care in China is surprising and might be related to the restriction of our literature review to the articles published in English. Outside of China however this approach is widely used in a range of access studies such as accessibility of urban/rural services, employment and housing, child care, education, recreation, transportation systems, information communication technologies and health care services. Also the accessibility indices used in the field of health care are very diverse. For example, Field (2000) compiled a list of factors that could affect healthcare access, and developed an index of relative disadvantage to define and model the determinants of need for health care. His model is based on components of accessibility of services and relative need. The indicators that Field used to build this index included: health status, socio-economic status, environment, transport availability, personal mobility, and service awareness. Iversen & Kopperud (2003; 2005) developed an accessibility index to measure the access to specialized public and private health care at the municipal level in Norway. Three elements were incorporated into the index: the capacity of the specialized health care in each municipality where the service is provided, the distance from patient's residence to the provider of services, and a distance conversion factor. Wang and Lou (2005) provide a review of accessibility indices used in studies employing GIS to build an

index to examine accessibility to primary healthcare in Illinois. Here they assigned accessibility scores to areas based on spatial access (geographic barriers between consumer and provider), and non-spatial factors (age, sex, ethnicity, income, social class, education and language ability).

Research on access to health care in China has largely focused on health insurance and use of services, with little empirical evidence on urban-rural, provincial and regional disparities. Meanwhile, the research increasingly suggests that geographic location may influence a patient's chance of receiving care (Liu et al., 2007). Along with China's polarized development during the last three decades this demonstrates the need for a geographic focus. Since the reforms of 1978, PRC has been experiencing incredibly uneven economic development that has affected all facets of social, economic and political conditions. In fact, it is impossible to study contemporary China without considering its inequalities. Geographic and socio-economic disparities need to be understood and eliminated for the achievement of the government's goal of creating a harmonious society. Unlike previous studies, this research employs a framework that takes into consideration China's unique context and is designed to highlight geographic disparities in accessibility of care. Figure 2.1 presents the conceptual framework used for this study that was adapted from Aday and Andersen (1974). This framework is the dominant and the most applied theory of health care access that has been used widely as a framework for health care use studies of general populations as well as of minorities, low income, and other vulnerable groups (Andersen, 1995).While the original framework includes 5 main components we add a 6^{th} to underline the importance of location in China. In fact, everything the characteristics of the population and the characteristics of the delivery system, the health policy, the

consumer satisfaction and the use of services, is a function of location. Due to the lack of data we focus on the effect of health delivery system and population characteristics on the access index composed of 4 variables discussed further.



Fugure 2. 1 Conceptual framework for the study of access to health care.
Modified from the study of access proposed by Aday and Andersen, 1974 (Figure 1.4)

2.4 DATA & METHODS

2.4.1 Data

The data used for this project come primarily from the UNC Carolina Population Centre CHNS[3] and from the *China Statistical Yearbook 2005*. The CHNS is an ongoing international collaboration between the University of North Carolina, the National Institute of Nutrition and Food Safety of the United States, and the Chinese Center for Disease Control and Prevention. This is a unique longitudinal publicly available dataset that covers 9 provinces[4] of China that vary considerably in terms of geography, economic development, infrastructure, and health indicators. Figure 2.2 presents the map of the CHNS sample distribution. Since the first round of the CHNS data in 1989, there were six additional panels in 1991, 1993, 1997, 2000, 2004, and 2006. The samples in the survey are drawn using a multistage weighted random cluster process. In each province 4 counties were selected randomly for the survey. In addition, whenever possible, the provincial capital and a lower income city were also chosen[5]. The CHNS survey includes a health services section containing detailed information on insurance coverage, medical providers, and health facilities that the household might use under selected circumstances. The impacts of health care and health behaviours are measured by changes in sets of household and individual economic, demographic, and social factors.

[3] [3] UNC Carolina Population Centre (2008) *Chinese Health and Nutrition Survey (CHNS)* http://www.cpc.unc.edu/projects/china

[4] Originally, only 8 provinces participated in the survey (Liaoning, Shandong, Jiangsu, Henan, Hubei, Hunan, Guangxi, and Guizhou). Further, however, the 9th province, Heilongjiang, was added to the survey design. These 9 provinces are located in 3 regions of China as defined by the official definition of the *Chinese Statistical Yearbook*: Eastern region (Liaoning, Shandong, Jiangsu), 4 provinces in the Central China (Heilongjiang, Henan, Hubei, Hunan) and 2 in the Western region (Guangxi, Guizhou).

[5] See Henderson et al. (1995) for more detail on the sampling process and description of the data.

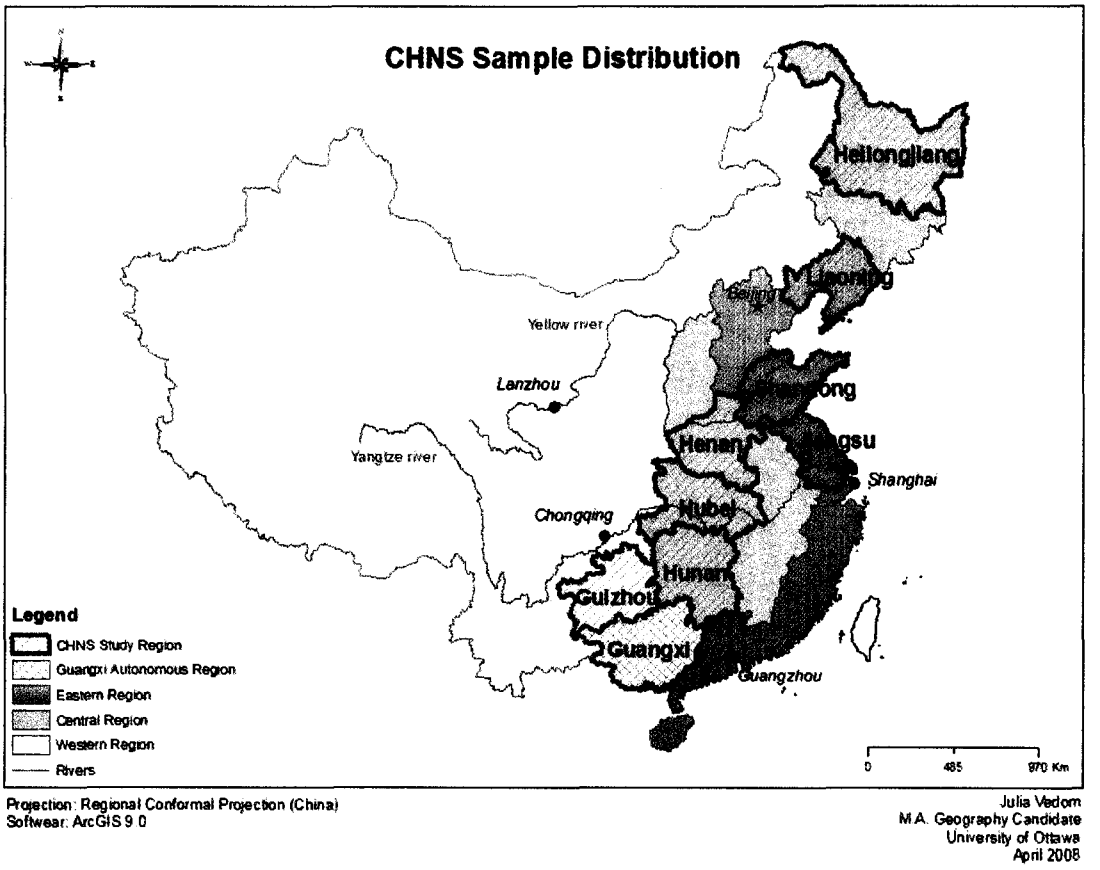


Figure 2.2 CHNS sample distribution.
The darker shaded regions are the provinces where the survey was conducted.

The present analysis uses three years of data: 1989, the baseline year of the survey; 2004, the most recent complete year available; and, 1997, the intermediate year. All data came from longitudinal datasets, except for the income data, which were only available in cross-sectional format. Since the data needed for this research were contained in multiple files they were first sorted based on the household ID and then merged based on the household ID and the respondent's ID. Only responses of the heads of households living in the house were kept for the analysis for two reasons: because it is culturally accepted in China that the head of the household is the most informed member of the family; and, also for assurance of comparability of the answers. Household is thus the unit of analysis. After

excluding all missing and incomplete cases, samples of 1811 households in 1989, 3071 households in 1997 and 2904 households in 2004 were obtained[6].

2.4.2 Defining access and related terms

For the purpose of our research we define accessibility to health care in terms of geographic and financial access at the household level. The access measures include travel time (number of minutes by bicycle one-way) to the facility, cost of travel one way to the facility, waiting time to see a health care professional, and service charges (the average out-of-pocket cost of treatment of cold or flu at the facility of choice). These four continuous variables come from the *Accessibility of health care and medical services* section of the CHNS household survey and are self-reported values. All cases that had any of the access indicators missing were excluded from the analysis.

The current study examines the evolution of access to two types of facilities: clinics and hospitals. Clinics comprise village clinics, private clinics, work unit clinics, town family planning services and other types of clinics. Hospitals include town hospitals, county maternal and child hospitals, county hospitals, city maternal and child hospitals, city hospitals, workers' hospitals and other types of hospitals. It is important to note that the Chinese health care system equally recognizes the Western medicine sand the traditional Chinese medicine. For this reason, health care facilities in China always have both departments (Western and traditional medicine) available at the same facility.

[6] A detailed sample profile breakdown by geographic, socio-cultural and economic aspects is provided in the Appendix 2. Table A.2 summarizes the characteristics of the sample in each year.

2.4.3 Outcome variable - Accessibility index

In order to quantify the measure of access to health care and to reveal the relative access differences as a function of financial and geographic indices, a simple index for the study of access was created. The index is based on 4 equally weighted variables, 2 of which were physical distance measures (travel time[7] and waiting time[8]), and 2 financial measures (travel cost[9] and service charges[10])[11]. Both travel time and waiting time measure the physical distance between the patient and the physician. Travel cost and service charges, on the other hand, measure financial barriers faced by the patient. Such a numerical scale of access permits us to compare the urban-rural and regional differences experienced when accessing health care resources. While the exact relationship between the access and geographic and financial factors is unknown, previous access studies (e.g. Iversen & Kopperud, 2003; 2005) have shown that these factors are useful measures of accessibility.

Since there are substantial differences in physical and financial indicators among clinics and hospitals (Akin et al., 2005), the differences pertaining to the type of facility used were considered in the calculation of the accessibility index. First, the mean values were calculated for each of the indicators considering the type of facility used. According to the gravity model there is an inverse relationship between distance and frequency of utilization of service, such that the utilization of facilities tends to decline as the distance between the user and the facility increases (Morrill, 1974). For this reason, if the indicator measure was lower than the average physical or financial indicator value, then 1 was assigned. If it was

[7] The travel time is the time it takes to travel one way from the respondent's home to the facility used.
[8] The waiting time is the time it takes to see a doctor or health care professional.
[9] The travel cost is the cost of travel one way from the respondent's home to the facility used.
[10] The cost of cold or flu treatment.
[11] Please refer to Appendix 1 for a list of survey questions used for building the access index.

higher, 0 was coded. The zero-based index was then calculated as a simple sum of the 4 indices. Consequently, the higher the index, the better is the access to health services (4 being the best and 0 being the worst). It is important to note that an index of 4 is not 4 times better than the index of 1; it simply implies comparatively better access without quantifying the accessibility gap.

2.4.4 Statistical analysis and explanatory variables

The first phase of the analysis included the elements of central tendency statistics, which allowed describing the evolution of health care access from 1989 to 2004, providing a general picture of changes in the access over the years. Multivariate linear regression (least squares) analysis was performed on the most recent data available (2004), as a second phase of the analysis, in order to examine factors affecting access to clinics and hospitals at urban and rural levels[12]. The access index was regressed on the 10 predictor variables. A multiple regression analysis was applied in order to study the relationship between several independent explanatory variables and the dependent index variable, as well as to identify the individual effects that each of the predictors have on the dependent variable. The independent predictor variables were entered in 3 models (blocks) using the "enter" method. The ***demographic characteristics*** (gender, minority, marital status and education) of the head of the household were entered in the first model, the ***financial attributes*** (availability of health insurance, per capita household income and whether the facility used is a referral facility for the work unit of the head of the household) were entered together with the demographic factors in the second block. Finally, ***geographic factors*** (method of travel to the facility, region of residence and availability of health care facilities) were added to the

[12] Appendix 3 presents the framework for the regression analysis.

demographic and financial attributes and entered all together. The availability of health care was defined by the number of health care facilities per capita in the province of residence of the household. All analysis was conducted using SPSS v.16.

2.5 RESULTS

2.5.1 Evolution of Health Care Access from 1989-2004

2.5.1.1 Geographic access

Figure 2.3a and 2.3b present the changes that occurred from 1998 to 2004 in geographic access indicators. During the 15 years the travel time has changed little overall. Most of the improvements in travel time occurred in urban hospitals where it decreased on average from 17 to 14 minutes. Meanwhile travel time to clinics, particularly in urban areas

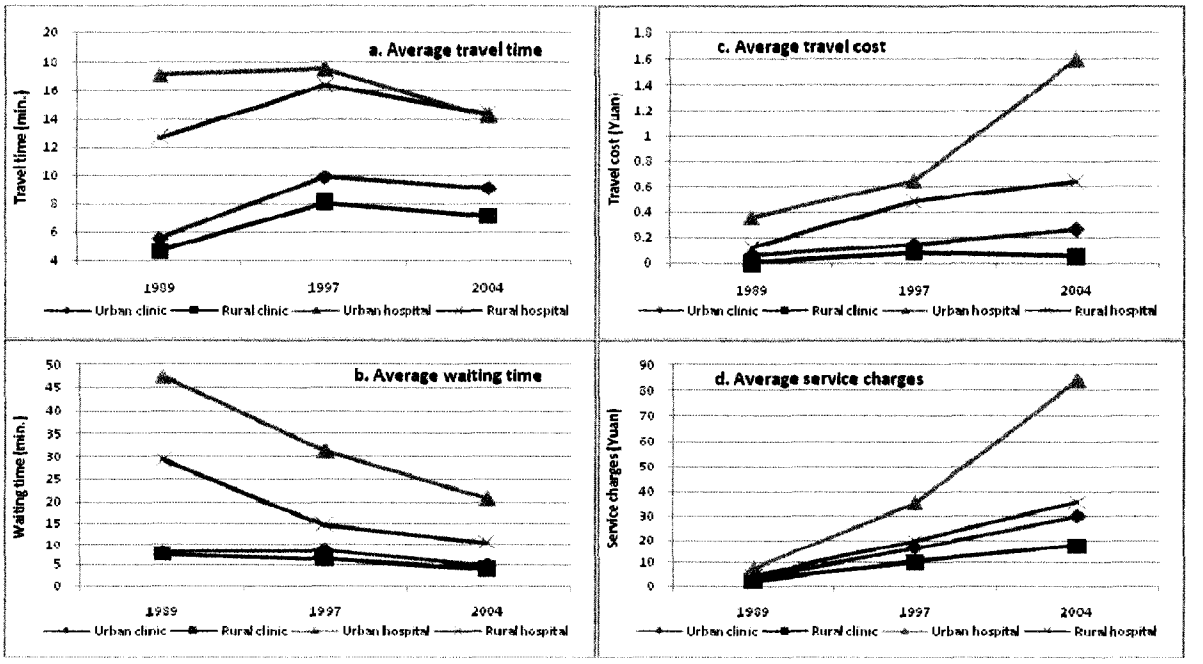


Figure 2. 3 Changes in geographic and financial indicators of accessibility to health care in China between 1989 and 2004.
Source: CHNS 1989, 1998 and 2004.

almost doubled from 5.6 minutes in 1989, to 9.1 minutes in 2004. Both rural clinics and rural hospitals also have seen increases in travel time, but not as pronounced as were recorded for urban hospitals. Nonetheless, travel time to clinics remains about two times lower than travel time to hospitals. Hospitals in urban and rural areas are equally accessible in terms of travel time, while there is a small urban-rural gap in travel time to clinics, favoring rural residents.

The second geographic indicator, average waiting time, has decreased consistently for both types of facilities with significant reductions in hospitals. In fact, in rural hospitals waiting times decreased from an average of almost 30 minutes to 10.5 minutes. Similarly, waiting times in urban hospitals have seen much improvement. Nonetheless, with an average wait of 20.8 minutes, urban hospitals remain the least accessible facilities in terms of waiting time, compared to hospitals in rural areas and particularly to clinics where, on average, patients reportedly wait only 4 minutes.

2.5.1.2 Financial access

Figure 2.3c and 2.3d present the changes in financial indicators of access to health care. Over the study period, both financial indicators of access have seen substantial increases over the years. Travel costs increased considerably only for urban hospitals increasing 4 times over the 15 years. The urban-rural gap in travel costs among the facilities has also grown over the years with urban facilities, especially hospitals that are generally associated with higher costs. Overall, costs associated with travelling to health care facilities remain very low. Mostly, people prefer walking or biking to the facilities, which helps to keep the travel costs minimal.

Service charges have increased at a faster rate. Rural areas have seen prices for a treatment of flu or cold increase 7.5-8 times, while in urban areas service charges increased 9.5-11 times. Hospitals remain more expensive than clinics, charging on average, 2.5 times more for the same service. In fact the urban-rural gap has increased dramatically over the years. In 2004, for example, the cost of an average treatment of a cold in the rural clinic was 17.4 Yuan, while urban hospitals were charging 84.2 Yuan (or almost 5 times higher) for similar treatment.

On the whole, we find clinics to be more accessible than hospitals in terms of geographic and financial indicators in both urban and rural areas. Also, in 2004, there were 3.5 times more clinics than hospitals. These facilities however differ significantly in size and quality (see discussion on section hospital vs. clinics).

2.5.2 Accessibility index

Figure 2.4 summarizes the changes in the access index from 1989 to 2004. Overall, the access index to clinics has changed little, but we see a definite decline in the hospital accessibility index over the study period, particularly noticeable in the central region (Heilongjiang, Hubei, Hunan and Henan provinces) with the access index gradually becoming lower and lower. Interestingly, access to hospitals has always been much higher in the western region (Guangxi and Guizhou), while hospitals were consistently the least accessible in one of the eastern provinces, Shandong province. The changes in the clinic access indices over time are mixed with no noticeable trends, with the exception of Henan province, where access to clinics is generally found to be better. Although the overall index

values have remained more or less stable, the socio-economic, financial and geographic determinants have undoubtedly changed.

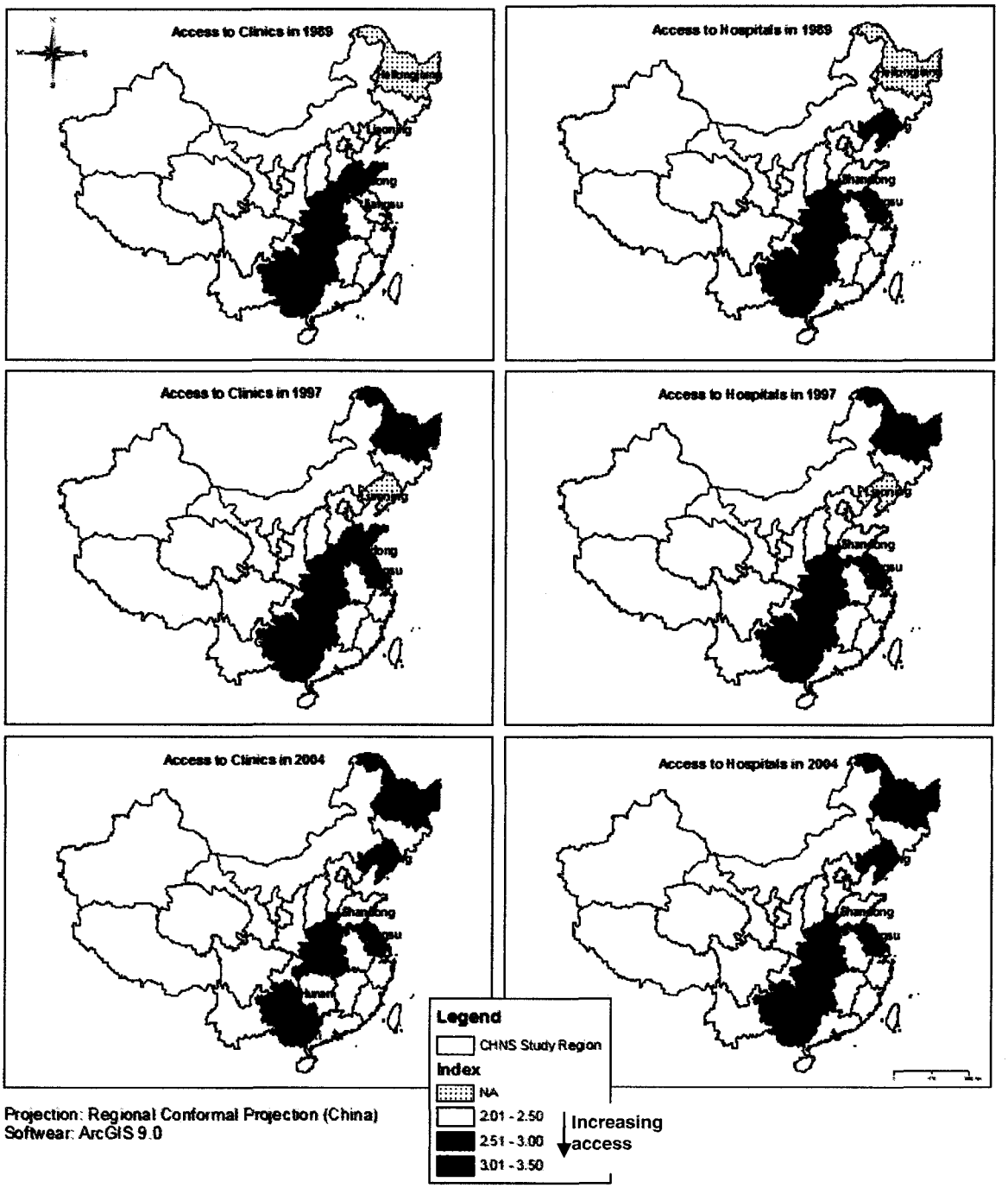


Figure 2. 4 Access index in clinics and hospitals in China from 1989 to 2004.

2.5.3 Determinants of access to health care

While the accessibility of health care facilities varies greatly between clinics and hospitals, the factors affecting it are similar. Access is mostly affected by geographic factors, such as the method of travel to the facility, the location of the facility, and the availability of infrastructure in the province[13]. Multiple regression analysis results are contained in Table 2.1. Standardized coefficient, Beta, values reflect the weight associated with the partial correlation coefficients. They represent the relationship between the independent variable in question and the dependent variable with the influence of the other predictor variables held constant (Munro, 2005). The individual contributions of each of the models are presented in Table 2.2. R^2 change indicates the change in the proportion of variance accounted for in the dependent variable by each of the blocks entered. The higher the R^2 change value, the greater its explanatory power.

Variable		HOSPITAL		CLINIC	
		Urban (n=552)	Rural (n=874)	Urban (n=296)	Rural (n=1182)
	R	0.509***	0.338***	0.443***	0.279***
	R square	0.259	0.114	0.196	0.077
		Beta	Beta	Beta	Beta
Demographic	Gender (female)	0.004	0.014	-0.045	-0.092**
	Minority	0.024	0.009	0.097	0.140***
	Marital Status (married)	-0.059	0.047	-0.017	-0.097***
	Education	-0.013	0.083**	-0.058	0.005
Financial	Health insurance	-0.099**	-0.109***	-0.060	-0.181***
	Income (per capita)	0.017	0.044	-0.030	0.033
	Referral facility for work unit	0.059	0.059*	0.023	-0.061**
Geographic	Travel method	-0.335***	-0.205***	-0.273***	-0.126***
	Region	0.270***	0.201***	0.242***	-0.145***
	Infrastructure	0.282***	0.221***	0.135**	-0.153***

Table 2.1 Regression results of determinants of access to health care in China.
*** significant at p=0.01, **significant at p=0.05, * significant at p=0.1.

[13] Detailed regression results are enclosed in Appendix 4

2.5.4 Access to hospitals

Four of ten independent variables (health insurance, travel method, region, and infrastructure) used to explain the accessibility of urban hospitals contributed significantly to the analysis. The predictor variables cumulatively explain 26% of the variance in the dependent variable (access to urban hospitals) significant at $p<0.001$. The geographic factors account for 21.6% of this variance. The method of travel (Beta=-0.335) is the most important predictor of access to hospitals in urban areas. It contributes negatively, meaning that those who are able to walk to clinics in urban areas enjoy better access than those who rely on other means of transportation. The higher availability of hospitals (second predictor, Beta=0.282) and the region of residence (third predictor, Beta=0.270) are positively correlated with the outcome, leading to better access in the West of the nation and in provinces with denser infrastructure. Demographic factors do not contribute significantly to the model, but one of the financial aspects, possession of health insurance, is negatively related to the dependent variable. Insured patients have significantly lower access to hospitals in urban areas than uninsured ones.

		Hospital			Clinic		
Block	**Location**	**R**	**R^2**	**R^2 change**	**R**	**R^2**	**R^2 change**
1*		0.113	0.013	0.013	0.262	0.069	0.069
2	**Urban**	0.196	0.043	0.030	0.276	0.076	0.007
3		0.509	0.259	0.216	0.443	0.196	0.119
1		0.123	0.015	0.015	0.132	0.017	0.017
2	**Rural**	0.188	0.035	0.020	0.203	0.041	0.023
3		0.338	0.114	0.079	0.279	0.078	0.037

Table 2.2 Regression model summary.

*Note Block1 includes demographic factors only, Block 2 includes both demographic and financial factors; and Block 3 includes everything.

In the case of rural hospitals, again the geographic predictors account for the largest proportion of the variance (7.9% of 11.4% explained by all 10 predictors together). Rural residents of the eastern region and those who have to rely on alternative to walking means of transportation have lower access to hospitals. Higher availability of hospitals per 10,000 population in the province of residence is the most important access determinant for rural hospitals (Beta=0.221), leading to better access to health care resources. Travel method (Beta=-0.205) and region (Beta=0.201) are also significantly correlated with the outcome. Again, among rural residents, those who were able to walk to health care facilities and those residing in western provinces, were the most likely to enjoy better access to rural hospitals. As in urban hospitals, insured patients have worse access to hospitals than uninsured ones. It is important to note that education affects the access to hospitals in rural areas in a positive way (Beta=0.083). In fact, it is the only area where the patients' level of education is significantly related to the outcome variable. Individuals with higher levels of completed education tend to enjoy better access than those who have lower educational attainments.

2.5.5 Access to clinics

There is a comparatively strong relationship between our 10 predictor variables and access to clinics within urban areas, R=0.443 and R^2=0.196 with the overall model significant at p<0,001. The accessibility to clinics is predominantly affected by geographic factors, as seen by the fact that the change in R^2 (0.119) is the largest when this group is entered (Table 2.2). Three geographic variables contribute significantly to the analysis. Both the region of residence and the density of health care infrastructure are positively related to the access measure, implying that access is better in the central and western

region's provinces where there is higher availability of health care facilities. Demographic and financial measures do not seem to be significantly related to the access of clinics in urban areas.

The association between the predictor variables and the access is less strong in rural clinics, with R=0.279. Interestingly, the geographic factors contribute less in the rural clinic model than in the case of urban clinic model (R^2 change=0.037). Nonetheless, they remain the most influential predictor group in the equation, accounting for most of the variance in the dependent variable. All geographic variables contribute negatively, meaning that residents of the East and those who are able to walk to facilities enjoy better access to rural clinics. Surprisingly, greater availability of clinics in rural areas is associated with reduced access. Contrary to urban clinic model, here the financial and socio-cultural characteristics are significant. Financial factors such as availability of health insurance and referral from the work unit, explaining 2.3% of variance in access, affect the access to rural clinics negatively. Minority status also plays an important role facilitating the access to clinics in rural areas (Beta=0.140). Moreover, gender and marital status affect the access to clinics in rural areas, with single male household heads having better access than their married female counterparts.

2.5.6 Hospitals vs. clinics

Overall the correlations between the predictors and the outcome measure are slightly stronger for hospitals than they are for clinics. The access to both clinics and hospitals is primarily affected by geographic measures. For both types of facilities, the access is higher if the patients are able to walk in order to receive care, because usually it takes them less

time to get to the facility and there is no cost associated with the travel, as opposed to those who have to rely on public means of transportation and taxis. What differs, however, between the facilities, is the relative importance of the predictors. In urban hospitals and clinics the method of travel is the most important predictor of access, while in rural hospitals it is the density of infrastructure, and in rural clinics it is the availability of health insurance.

Our results suggest that for the most part, access to health care is higher in the western region for all types of facilities except for rural clinics. This is contrary to findings of previous studies, suggesting that the situation is considerably worse in this region. Since we did not compare the actual utilization rates of the facilities we can not conclude that doctor visits and hospitalization rates are also higher in the western region.

Finally, demographic factors (gender, marital status, ethnicity, etc.) or factors predisposing people to use health care are generally found to be related to the use of care and thus to the access to health services (Aday & Andersen, 1974). In our study however, demographic factors were found to be significantly related to the outcome variable only in rural clinics. Although statistical significance might be a result of a large number of cases, since the number of people using rural clinics is substantially higher than the number of users of other facilities. It is also possible that in traditional rural settings gender and marital status differences are still a lot more important than in modern egalitarian urban areas.

2.6 Discussion

2.6.1 Spatial inequalities and access to health care

The significant impact of geographic factors on the access to health care found in our study is hardly surprising. During the last three decades China has been experiencing considerable economic growth, as well as widening geographic (coastal-inland), sectoral (urban-rural), and social (majority-minority) disparities (Cao, 2008; Chang, 2002; Colin, 2005; Lin, 2002). Following the economic reforms in the late 1970s, China has clearly emphasized the development of urban and coastal areas, believing that these regions would stimulate the prosperity of the whole county (Chaolin, Jianfa, & Taofang, 2004). Incredibly uneven economic development in China since the reforms of 1978 has resulted in substantial differences in health expenditures between the poorest rural areas of the West and developed eastern areas of China. Blumenthal & Hsiao (2005) discovered that health charges were seven times higher in Shanghai (eastern China) than in the less-developed regions of the West. A number of previous studies emphasized the pronounced urban-rural income disparities (Ng, 2007; Sicular et al., 2007), health insurance coverage inequalities (Gao et al., 2001; Liu et al., 2002), striking gaps in infant mortality ratios (Zhang & Kanbur, 2005), at least twice higher tuberculosis prevalence rates in rural areas (Zhao, 2006), urban-rural differences in health status and in the use of facilities (Henderson et al., 1994; 1998), differences in the availability of hospital personnel, beds and bed occupancy rates (Mao, 2006; Meng, 2007), and disparities in costs of health care provision (Hougaard, Osterdal, & Yu, 2008). Such unanimity among geographic studies in China reporting striking disparities

between urban and rural households demonstrates the inherent importance of geographic factors in the analysis of access to health care in China.

The quality of care was not assessed in this study, but facilities vary greatly in terms of size and services offered. The facilities in the western region are comparable with the facilities in the rural areas, where hospitals have considerably fewer beds and qualified medical personnel on staff. While urban hospitals have on average 128.5 beds and 170.4 employees, rural hospitals have only 16.1 beds and 24.8 staff members (China Statistical Yearbook, 2005). In 2004, the urban-rural ratio in hospital beds per 10,000 of population was 2.2 and 2 in health care personnel employed (China Statistical Yearbook, 2005). Not only are there two times less medical professionals in rural areas, but the quality of their training is also considerably lower in the under-developed poor areas (Eggleston et al., 2005; Meng, 2007). In 2003, a study of 46 poor counties by Wang et al., found that 70% of village doctors did not have any formal medical education and have received on average 20 hours of training (Eggleston et al., 2008). Consequently, in under-developed areas, patients' level of wealth and education is a critical predictor of the quality of health care services that patients receive, because those who are aware of quality differences "substitute the benefits of choice for the inconvenience of a longer journey" (Haynes, Lovett, & Suennenberg, 2003, p. 1733).

Although the urban-rural disparities have been widely documented and became a center of access equity discussions in recent years, studies of regional disparities in health care access remain very limited, concentrating on particular aspects of access (e.g. availability of health insurance). Such paucity of emphasis on regional disparities is somewhat surprising considering the historical developments in the PRC since the economic

reforms of the late 1970s. Provincial and particularly regional inequalities in China have been increasing consistently since 1980s as a result of government programs favouring the development of the eastern region (Ng, 2007). To the best of our knowledge, there have been only a handful of studies taking into account the importance of regional disparities in health care in China. Their findings however point at the importance of regionalism in China. Zhang and Kanbur (2005) found alarming differences in both male and female infant mortality rates between coastal and inland China; Liu et al. (2007) report regional differences in physician visits, hospitalization rates, and insurance coverage; Blumenthal & Hsiao (2005) discovered that the health expenditures are seven times higher in Shanghai (eastern China) than in the poorest areas of the West. Considering the polarized development of geographic regions in China, it becomes evident that more health care research is needed in this area. Incorporating the regional aspect into the analysis, our study fills an important gap, contributing both to the literature on regional disparities and health care literature.

2.6.2 Income and access to health care

Our findings confirm substantial increases in service charges in both hospitals and clinics between 1989 and 2004, but using the multivariate analysis, surprisingly, we found no significant correlation between per capita income and the access to health care either in urban or rural areas. Since regression results present the partial correlation coefficients it is possible that the role of per capita income, although undoubtedly important, is relatively less important compared to the role of the region where the income is earned. As was mentioned in the previous section, unbalanced development and pronounced regional disparities are

such a prominent phenomenon in China that everything becomes a function of a region and urban-rural sector of residence[14]. Although the accessibility gap between the different types of facilities has decreased between 1989 and 2004 in terms of travel and waiting times, the gap in financial accessibility has escalated over the years, making urban hospitals the least accessible facilities. These findings are consistent with the research of Akin et al. (2005) who found a decline in access to hospitals between 1989 and 1997 compensated by an improved access to clinics. As a result of the government-imposed price regulation system, publicly owned hospitals have a poor revenue-generating capacity unless they earn profits from the use of new drugs, tests and high-tech care, keeping the hospital charges high. In rural areas, however, it is estimated that one third of drugs dispensed are counterfeit, which simultaneously keeps charges low and profits high (Mao, 2006).

The link between price and demand for health care has been widely documented (Shengelia et al., 2005; Strombom, Buchmueller, & Feldstein, 2002). Generally, utilization of medical care tends to decrease with an increase in price of services. Due to a rapid health care inflation triggered by the economic and health care reforms, the share of out-of-pocket expenses paid by the patients has been increasing steadily from 16% of overall health care expenditures in 1980, to 38% in 1988, and to 61% in 2001 (Zhang & Kanbur, 2005). Higher costs can be partially explained by general inflation and aging population. However, the outcomes of hospital financial reforms, such as abusive usage of more expensive high-technology and over prescription of drugs and services, accounts for a progressively larger share of personal health care costs (Liu & Hsiao, 1995; Wong, Tang, & Lo, 2007). These

[14] Another possible explanation is related to the nature of the variables used. The per capita income variable is a combined variable that is calculated based on the earned and unearned income information, taking into account the income from subsidies and bonuses, both at the individual and household levels.

increases in health-related expenses along with the reductions in health insurance coverage caused greater gaps in access to health services particularly among urban-rural residents (Liu, 2004; Liu et al., 2002). Significant reductions in health care use and visible declines in bed occupancy are well documented (Bloom, 2001; Bloom & Gu, 1997; Bloom & Xingyuan, 1997; Hesketh & Zhu, 1997; Liu, 2004a; Mao, 2006; Wagstaff & Yu, 2007). Analyzing the Chinese Ministry of Health 2003 data, Hougaard (2008) found that the ratio between people who reported illness but did not seek formal care for financial reasons increased from 36.4% in 1993 to 48.9% in 2003 and was particularly high in low-income rural areas (63.7% in 1998 and 75.4% in 2003). Moreover, Liu (2004) found that on average, 45% of discharges from inpatient care in rural areas are initiated against medical advice and in almost 80% of cases for financial reasons. In fact, another study by Liu et al., (2007) reported that in 2003 physician visits were lower in poor less-developed regions (mid and western China) and only 43% of respondents saw a doctor when they were ill, while 32.2% relied on self-treatment and 15.8% had no treatment at all. People rely on self-treatment or ignore health issues for as long as they can, in hopes of avoiding the related expenses. Although the health-related charges are lower in less developed areas, such as in the West of the country, they nonetheless place a comparatively heavier burden on the shoulders of the western rural residents. Mao (2006) concluded that in 2003 the average hospital admission fee was equivalent to 27.9% of the average per capita urban wage, while 149.1% of the average rural wage. Health insurance is yet another financial factor often cited in access literature as a policy instrument with a capacity to improve the use of health services rendering the access to health care more equitable (Ding & Zhu, 2007). Although, some studies found that the lack of health care coverage prevents people from getting the

needed medical care (Zhao, 2006), others suggest that the availability of coverage encourages people to seek care when sick and to seek care from higher-level providers, in turn increasing the risk of high and catastrophic spending (Wagstaff & Lindelow, 2008). Also, the majority of people who purchase insurance coverage are sick and are predisposed to having higher-than-average out-of-pocket payments. Since our accessibility index is based on average health charges, higher than average health expenditures are interpreted as lower access, which explains why residents of the eastern region appear to have worse access than those who live in the West of the country. While interpreting these results we should keep in mind that insurance schemes are also very different in nature. Health insurance schemes in rural areas are largely (80%) funded by personal contributions, while urban residents are required to contribute considerably smaller shares ranging from 0 to 25% depending on the type of the employment sector (Gao et al., 2002). The coverage schemes vary considerably not only between the employment sectors, but also between the urban and rural areas, as well as between provinces. The financial aspect is thus still an important barrier restricting access to health care among the poor and the residents of less developed western provinces.

2.7 Conclusion

This study has examined the access to health care facilities and evaluated the effects of demographic, financial and geographic factors on the access to health care services, extending the literature assessing the changes in access to care. Our work quantified the access to health care, focusing more on geographic factors than earlier access literature (Akin et al., 2005; Gao et al., 2001). There is no previous published research in English that

has directly examined the factors affecting the accessibility of health care facilities in China. Although, the determinants of the use of health care facilities have been studied earlier (Henderson et al., 1994; 1998), to the best of our knowledge, there has been no research on determinants of access. We find a pronounced correlation between the geographic factors (method of travel, region, and availability of infrastructure in the province of residence) and the quality of access received. This finding is supported by Liu et al., (2006) who found that in 2003 for 73% of rural and for 46% of urban residents proximity was the most important reason for choosing the usual source of care. Our results are expected to be of interest to decision- and policy-makers, because they advocate that it is not the demographic or even financial factors that play the primordial role in accessibility of health services, but the geographic ones. This suggests that regional disparities are already leading to differences in access to health care and potentially to important differences in health status among the regions. It is not only the traditional urban-rural disparities that should be considered, but also the provincial and regional disparities that less frequently are accentuated in health care research in China.

We also found that between 1989 and 2004 the accessibility gap between hospitals and clinics in terms of geographic indicators has decreased, while the gap in financial accessibility has increased, making urban hospitals the least accessible facilities. Access to both hospitals and clinics in urban and rural areas is mostly conditioned by geographic factors, namely the travel method, region of residence and the availability of health care facilities. Patients who were able to reach the facilities on foot usually enjoyed better access than those who were not. Similarly, residents of the West along with the provinces with higher availability of health care facilities also tended to have better potential access than their eastern counterparts. This surprising conclusion might be related to the fact that

Guangxi and Guizhou (the 2 western provinces analyzed in the survey) are not typical western provinces and thus might not be representative of the general health care access situation in the West.

This study however is subject to some limitations. Firstly, while establishing the access measurement index allowed us to quantify the accessibility, the index proposed here is based on only four variables. In order to better reflect the reality, the index should include more dimensions of access (quality, size, and ownership of the facilities, as well as use of services and satisfaction) and the variables in the index should be weighted, since some access barriers are more important than others. In fact, constructing a more representative measure would require far more information concerning the prices or quality of facilities than CHNS or other publicly available data source can offer. Thus, future research should address this issue when data become available. Secondly, although, CHNS is considered to be one of the best available Chinese datasets, the utility of the data for geographic analysis is somewhat limited due to confidentiality restrictions. The studied communities are held confidential and thus the smallest identifiable geographic unit that can be used is the province. Also some of the measurement units used in the longitudinal master files (e.g. travel time by bicycle) are not meaningful since not everyone uses this particular means of transportation. Hougaard, Osterdal and Yu (2008) go further, suggesting that any empirical analysis of the Chinese health care system will suffer from considerable data uncertainties and a crucial lack of relevant data. Thirdly, CHNS data used for the analysis are self-reported and not confirmed by a health-care provider (concerning average waiting times and service charges) or by GIS estimations (concerning the travel time); however, such self-reports have been validated previously. Despite these limitations, this study provides

theoretical, methodological and empirical contributions, filling the gap in geographic literature on accessibility of health care in China.

2.8 ACKNOWLEDGEMENTS

The author gratefully acknowledges the financial support of the University of Ottawa, as well as of the Canada-China Scholar's Exchange Program 2007-2008, jointly administered by the Department of Foreign Affairs and International Trade Canada and the Ministry of Education of China. Also, the UNC Carolina Population Centre is thanked for the CHNS data and assistance in merging data files.

CHAPTER 3

3.1 SUMMARY AND CONCLUSIONS

3.1.1 Review of the research results

Using the CHNS data, this study has examined the access to health care facilities in nine provinces of China between the years 1989 and 2004, evaluating the effect of demographic, financial and geographic factors. Several issues defined the scope of our research. First, the continued pursuit of the market-oriented reforms introduced in China in the late 1970s has resulted in increasing sectoral (urban-rural), regional and social (majority-minorities) disparities (Zhao, 2006). Gradually, this resulted in the pronounced differences in availability of health services and the overall inequity in social welfare in urban and rural areas and particularly in equity of access to health care, which has long played a major role in shaping China's national health care policies (Liu et al., 2002; Liu et al., 2003). Precisely thirty years after the reforms, empirical evidence suggests that urban-rural and regional health status disparities still continue to grow, which can be attributed to increasing income disparities, changes in health care financing and organization, as well as dramatic reduction of insurance coverage over the years (Liu, Hsiao, & Eggleston, 1999). These findings are cause for concern from an equity perspective and suggest trends that should be closely monitored. Secondly, there has been a general lack of geographic focus in health care access studies performed in China. Although a number of studies have included the urban-rural aspect, the provincial and regional disparities are rarely analyzed. Moreover, to date,

there has been only one study that has applied the index approach to analyze the accessibility of health care in China (Akin et al., 2005). In addition, the majority of existing studies is descriptive in nature, failing to establish a statistical importance of independent variables and quantitatively measure their importance. In light of these issues, this study addressed the following two objectives:

1. to describe the geographic and financial disparities in access to clinics and hospitals in nine provinces of China during the 1989-2004 period, and
2. to explore the demographic, socio-economic and geographic factors affecting the access to health care.

3.1.2 Summary of findings

3.1.2.1 Objective 1: to describe the geographic and financial disparities in access to clinics and hospitals in nine provinces of China during the 1989-2004 period

Our findings show that the geographic indicators (travel time and waiting time) have seen substantial improvements over the study period, particularly in urban hospitals where travel time decreased from 17 to 14 minutes and waiting time declined from 48 minutes to 20.5 minutes. Nonetheless, both travel time and waiting time in clinics remained about two times lower than in hospitals, making them geographically more accessible than hospitals.

In terms of the financial indicators of access (travel cost and service charges) we observed slight increases in travel cost and pronounced increases in service charges in both types of facilities. Costs associated with travelling to health care facilities remained very low throughout the years of study, because most of the respondents were able to walk to facilities when they needed care. Service charges on the other hand have increased at a faster

rate, from 7.5-8 times in rural areas and an even faster 9.5-11 times in urban areas. Overall, we find that hospitals remain more expensive than clinics, charging on average 2.5 times more for similar types of services offered.

While geographic accessibility gap between hospitals and clinics has decreased between the years 1989 and 2004, the gap in financial accessibility has grown, making urban hospitals the least accessible compared to other types of facilities. These findings are consistent with the research of Akin et al. (2005) that found a decline in access to hospitals between 1989 and 1997 compensated by an improved access to clinics.

3.1.2.2 Objective 2: to explore the demographic, socio-economic and geographic factors affecting the access to health care

A simple index for the study of access was created based on two financial and two geographic indicators ranging from zero to four. The building of the index was an intermediate step and a preparation for the multivariate analysis of the factors affecting the access to health care. Our findings suggest that access to both hospitals and clinics in urban and rural areas is mostly affected by geographic factors, namely the travel method, region of residence and the availability of health care facilities in the province of residence. The scale of importance of these factors varied depending on the area and the type of the facility used with access to urban hospitals and clinics mostly affected by travel method; access to rural hospitals influenced by availability of infrastructure in the province, and access to rural clinics mostly conditioned by the availability of health insurance. Generally, patients who were able to reach the facilities on foot usually enjoyed better access than those who could not. Also residents of the western region and of provinces with higher availability of health care facilities also tended to have better access than their counterparts.

In terms of the financial characteristics, only the availability of health insurance was consistently significantly correlated with the access index. Overall, we found that insured patients faced lower levels of access to care, most likely because the charges related to their treatments were higher than for those who were uninsured. According to the findings of Wagstaff & Lindelow, availability of coverage increases the risk of high and catastrophic spending, encouraging people to seek care when sick and to seek care from higher-level providers (Wagstaff & Lindelow, 2008). Since the accessibility index proposed in this study is based on average health charges, higher than average health expenditures were interpreted as lower access.

While demographic factors (gender, marital status, ethnicity, etc.) are generally found to be related to the use of care and thus to the accessibility of health services (Aday & Andersen, 1974), our analysis demonstrated their significance only in access to rural clinics.

3.2 Contributions of the study

This thesis makes several important contributions relevant to the understanding of health care access issues in China that are essential for informing public decision- and policy-making aimed at improving living conditions. Precisely, this study has theoretical, methodological and empirical contributions which are summarized in the following sections.

3.2.1 Theoretical contributions

The theoretical contributions of this study are related to the development and application of the conceptual framework for the study of access to health care in China (Figure 1.6). This framework is based on the model for the study of access proposed by

Aday and Andersen, 1974 (Figure 1.4), with one important modification. In the context of China, empirical evidence has demonstrated growing disparities (geographic, sectoral and social), suggesting that characteristics of both the health care facilities (availability and quality of resources), and households' socio-economic status are location-dependent (Zhao, 2006). It was thus essential to include the location in our framework, evaluating it at two levels: the regional and the sectoral (urban and rural). The advantage of our model, compared to the original one, is that it is contextually adapted, reflecting more closely the health care situation in China with its increasingly polarized development. The results of the regression analysis confirm the foremost importance of the geographic factors in predicting the access to health care facilities. While our conceptual framework was designed for the particular study of accessibility of health care in China, it can be applied potentially to any country with regional, provincial or neighborhood disparities in access. Such wide applicability and great potential of our framework suggests the need for future research to shift its focus towards spatial and geographic analysis, including more factors that have not been included in models thus far.

3.2.2 Methodological contributions

In addition to the conceptual developments made, this work also contributes methodologically to the access literature. In this study we quantified the access to health care in the nine provinces of China, considering more geographic factors than earlier access literature (Akin et al., 2005; Gao et al., 2001). Methodological contributions of this study thus stem primarily from the development of the accessibility index. The index has proven itself as an important instrument for the comparison of urban-rural and regional differences

experienced when accessing health care resources. It also allowed us to reflect the complex and multidimensional nature of the concept of access, defining it in terms of an array of variables instead of equating it with the use of facilities. While the use of indices to study access to health care is relatively common, to date in China there has been only one study using this approach. This thesis has successfully shown the utility of this index approach. Since the index presented in this research is based on only four equally weighted indicators of access, it may not always prove to be the most effective in representing the actual accessibility (please see the discussion in the limitations of the study). Nonetheless it is a starting point, a tool which can be improved and elaborated upon.

3.2.3 Empirical contributions

Firstly, this research has led to a better understanding of issues related to the accessibility of health care in nine provinces of China. While typically the determinants of accessibility have been attributed to the financial or demographic characteristics of patients, this research has identified the foremost importance of geographic factors in the accessibility of health care. Our results have shown that such geographic factors as the region of residence and availability of infrastructure, as well as the method of travel all play an extremely important role in either facilitating or restricting the access to care. This new angle offers a better understanding of accessibility issues in China and provides the grounds for need of more geographic studies of health care access. Secondly, the most recent data available were used in this research and thus provides the latest portrait of accessibility updating the published literature on the subject.

3.3 Limitations & Directions for Future Research

While this thesis has made a number of important contributions broadening our understanding of access issues in China, it also has some limitations and certainly one must be careful in interpreting our findings. We defined the accessibility index based on physical and financial measures of distance. The differences in quality and size among the facilities, the ownership of the facilities, as well as the respondent's satisfaction with the services received at the facility were not considered due to data limitations, though they might play a very important role. Moreover, our study did not distinguish between the types of medical care (primary versus specialist versus hospitalization), while the extent of inequalities in access of health care appears to be sensitive to the measurement of these issues (Macinko & Starfield, 2002). Our findings constitute additional empirical evidence for the inclusion of these variables into the analysis of future studies.

Moreover, establishing a measurement index allowed us to quantify the accessibility enabling spatial comparison of index values. However, the index proposed here is based only on four variables. In order to come closer to the true nature of accessibility, the index should include more dimensions of access (quality, size, ownership, satisfaction, opening hours, etc.). Also, the variables in the index should be weighted, because some access barriers are more important than others. Constructing a more representative measure would require far more information concerning the prices and quality of facilities than CHNS or other publicly available data sources currently can offer. When the information becomes available a more exhaustive index should be investigated.

Due to another technical restriction of CHNS data, province was used as a spatial unit of reference for the availability (or supply) of health care facilities. Since there are substantial urban-rural and intra-communal disparities in China, availability measured for smaller geographic units (such as community) would lead to more precise results.

Although CHNS is considered to be one of the best available Chinese datasets, the usability of the data for geographic analysis is somewhat limited due to confidentiality restrictions. The studied communities are held confidential and thus the smallest identifiable geographic unit that can be used is the province. Also some of the measurement units used in the longitudinal master files, like travel time by bicycle, are not meaningful since not everyone uses this particular means of transportation. Hougaard, Osterdal and Yu (2008) go further, suggesting that any empirical analysis of the Chinese health care system will suffer from considerable data uncertainties and often even a crucial lack of relevant data.

Last but not least, we performed cross-sectional analysis (snap shots) of the three years of longitudinal data, while the longitudinal analysis would control better for changes in unobserved individual characteristics, clarifying the cause-effect relationships between the variables. CHNS provides the longitudinal panel data, but due to time restrictions the longitudinal analysis was not attempted in this research. In future research, a longitudinal analysis should be undertaken to uncover predictors of certain experiences differences in accessibility to health cervices between the households.

REFERENCES

Aday, L. A., & Andersen, R. M. (1974). A Framework for the Study of Access to Medical Care. *Health Services Research, 9*(2), 208-220.

Akin, J. S., Dow, W. H., & Lance, P. M. (2004). Did the distribution of health insurance in China continue to grow less equitable in the nineties? Results from a longitudinal survey. *Social Science and Medicine, 58*(2), 293-304.

Akin, J. S., Dow, W. H., Lance, P. M., & Loh, C. P. A. (2005). Changes in access to health care in China, 1989-1997. *Health Policy and Planning, 20*(2), 80-89.

Andersen, R. M. (1995). REvisiting the Behavioral Model and Access to Medical Care: Does it Matter? *Journal of Health Behavior, 36*, 1-10.

Bloom, G. (2001). Equity in health in unequal societies: meeting health needs in contexts of social change. *Health Policy, 57*(3), 205-224.

Bloom, G., & Gu, X. (1997). Introduction to health sector reform in China. *IDS Bulletin, 28*(1), 1-11.

Bloom, G., & Xingyuan, G. (1997). Health sector reform: Lessons from China. *Social Science and Medicine, 45*(3), 351-360.

Blumenthal, D., & Hsiao, W. (2005). Privatization and its discontents - The evolving chinese health care system. *New England Journal of Medicine, 353*(11), 1165-1170.

Cameron, N. (1995). *Defining and measuring the spatial dimension of accessibility.* University of Ottawa, Ottawa.

Cao, H. (2008) Spatial Inequality in Children's Schooling in Gansu, Western China: Reality and Challenges, *The Canadian Geographer*, 55:3 331-350.

Carrin, G., Ron, A., Hui, Y., Hong, W., Tuohong, Z., Licheng, Z., et al. (1999). The reform of the rural cooperative medical system in the People's Republic of China: Interim experience in 14 pilot counties. *Social Science and Medicine, 48*(7), 961-972.

Chang, G. H. (2002). The Cause and cure of china's widening income disparity. *China Economic Review, 13*, 335-340.

Chaolin, G., Jianfa, S., & Taofang, Y. (2004). Urban and Regional Development. In Y. M. Yeung & S. Jianfa (Eds.), *Developing China's West. A Critical Path to Balanced National Development* (pp. 177-213). Hong Kong: The Chinese University Press.

Colin, M. (2005). China's ethnic minorities and the middle classes: an overview. *International Journal of Social Economics, 32*(9), 814-826.

Curtis, S. (2006). *Health and Inequalities: Geographical Perspectives*. London: Sage.

Ding, J., & Zhu, M. (2007). Welfare effects of public health insurance reform: the case of urban China. *Frontiers of Economics in China, 2*(3), 289-323.

Eggleston, K., Ling, L., Qingyue, M., Lindelow, M., & Wagstaff, A. (2006). *Health service delivery in China: A literature review*: World Bank.

Eggleston, K., Ling, L., Qingyue, M., Lindelow, M., & Wagstaff, A. (2008). Health service delivery in China: A literature review. *Health Economics, 17*(2), 149-165.

Gao, J., Qian, J., Tang, S., Eriksson, B., & Blas, E. (2002). Health Equity in Transition from Planned to Market Economy in China. *Health Policy and Planning, 17*(Suppl 1), 20-29.

Gao, J., Tang, S., Tolhurst, R., & Rao, K. (2001). Changing access to health services in urban China: Implications for equity. *Health Policy and Planning, 16*(3), 302-312.

Gulliford, M., Figueroa-Munos, J., & Myfanwy, M. (2003). Meaning of 'acces' in health care. In M. Guilliford & M. Myfanwy (Eds.), *Access to Health Care* (pp. 1-13). London Routledge.

Haynes, R., Lovett, A., & Su?nnenberg, G. (2003). Potential accessibility, travel time, and consumer choice: Geographical variations in general medical practice registrations in Eastern England. *Environment and Planning A, 35*(10), 1733-1750.

Henderson, G., Akin, J., Zhiming, L., Shuigao, J., Haijiang, M., & Keyou, G. (1994). Equity and the utilization of health services: Report of an eight-province survey in China. *Social Science and Medicine, 39*(5), 687-699.

Henderson, G. E., Akin, J. S., Hutchinson, P. M., Jin, S. G., Wang, J. M., Dietrich, J., et al. (1998). Trends in health services utilization in eight provinces in China, 1989- 1993. *Social Science and Medicine, 47*(12), 1957-1971.

Hesketh, T., & Zhu, W. X. (1997). Health in China. The healthcare market. *British Medical Journal, 314*(7094), 1616-1618.

Hong, Y., Li, X., Stanton, B., Lin, D., Fang, X., Rong, M., et al. (2006). Too Costly to Be Ill: Healthcare Access and Health-Seeking Behaviours among Rural-to-Urban Migrants in China. *World Helath and Population*, 1-14.

Hougaard, J. L., Osterdal, L. P., & Yu, Y. (2008). *The Chinese Health Care System: Structure, Problems and Challenges* (Discussion paper). Copenhagen: University of Economics, Department of Economics.

Iversen, T., & Kopperud, G. S. (2003). The impact of accessibility on the use of specialist health care in Norway. *Health Care Management Science, 6*(4), 249-261.

Iversen, T., & Kopperud, G. S. (2005). Regulation versus practice - The impact of accessibility on the use of specialist health care in Norway. *Health Economics, 14*(12), 1231-1238.

Li, J., Zhang, K., & Tian, L. (2006). Multiple facets of China's health inequality. *Lancet, 367*(9520), 1397.

Lin, G. C. S. (2002). The growth and structural change of Chinese cities: a contextual and geographic analysis. *Cities, 19*(5), 299-316.

Liu, G. G., Wu, X., Peng, C., & Fu, A. Z. (2003). Urbanization and health care in rural China. *Contemporary Economic Policy, 21*(1), 11-24.

Liu, G. G., Zhao, Z., Cai, R., Yamada, T., & Yamada, T. (2002). Equity in health care access to: Assessing the urban health insurance reform in China. *Social Science and Medicine, 55*(10), 1779-1794.

Liu, M., Zhang, Q., Lu, M., Kwon, C. S., & Quan, H. (2007). Rural and urban disparity in health services utilization in China. *Medical Care, 45*(8), 767-774.

Liu, X., & Mills, A. (1999). Evaluating payment mechanisms: How can we measure unnecessary care? *Health Policy and Planning, 14*(4), 409-413.

Liu, X., & Mills, A. (2005). The effect of performance-related pay of hospital doctors on hospital behaviour: A case study from Shandong, China. *Human Resources for Health, 3*.

Liu, Y. (2004a). China's public health-care system: Facing the challenges. *Bulletin of the World Health Organization, 82*(7), 532-538.

Liu, Y. (2004b). Development of the rural health insurance system in China. *Health Policy and Planning, 19*(3), 159-165.

Liu, Y., Berman, P., Yip, W., Liang, H., Meng, Q., Qu, J., et al. (2006). Health care in China: The role of non-government providers. *Health Policy, 77*(2), 212-220.

Liu, X., & Hsiao, W. C. L. (1995). The cost escalation of social health insurance plans in China: Its implication for public policy. *Social Science & Medicine, 41*(8), 1095-1101.

Liu, Y., Hsiao, W. C., & Eggleston, K. (1999). Equity in health and health care: The Chinese experience. *Social Science and Medicine, 49*(10), 1349-1356.

Macinko, J. A., & Starfield, B. (2002). Annotated bibliography on equity in health, 1980-2001. *International Journal for Equity in Health, 1*, 1-20.

Mao, Z. (2006). *Health System of China. Overview of Challenges and Reforms*: UNESCAP.

Meade, M. S., & Earickson, R. J. (2000). *Medical Geography*. New York: Guilford Press.

Meng, Q. (2007). Developing and implementing equity-promoting health care policies in China. A case study commissioned by the Health Systems Knowledge Network. 27.

Morrill, R. L. (1974). *The spatial organization of society* (Second ed.). North Scituate, Mass.: Duxbury press.

Munro, B. H. (2005). *Statistical Methods for Health Care Research* (Fifth Edition ed.): Williams & Wilkins.

National Bureau of Statistics. (2005). *Statistical Yearbook of China.*

Ng, Y. C. (2007). Gender earnings differentials and regional economic development in urban China, 1988-97. *Review of Income and Wealth, 53*(1), 148-166.

Ottenbacher, K. J., & Graham, J. E. (2007). The State-of-the-Science: Access to Postacute Care Rehabilitation Services. A Review. *Archives of Physical Medicine and Rehabilitation, 88*(11), 1513-1521.

Pechansky, R., & Thomas, J. W. (1981). The Concept of Access: Definition and Relationship to Consumer Satisfaction. *Medical Care, 19*, 127-140.

Ricketts, T. C., & Goldsmith, L. J. (2006). Access in Health Services Research: The Battle of the Frameworks. *Nurs Outlook, 53*(6), 274-281.

Shengelia, B., Tandon, A., Adams, O. B., & Murray, C. J. L. (2005). Access, utilization, quality, and effective coverage: An integrated conceptual framework and measurement strategy. *Social Science & Medicine, 61*(1), 97-109.

Sicular, T., Ximing, Y., Gustafsson, B., & Shi, L. (2007). The urban-rural income gap and inequality in China. *Review of Income and Wealth, 53*(1), 93-126.

Strombom, B. A., Buchmueller, T. C., & Feldstein, P. J. (2002). Switching costs, price sensitivity and health plan choice. *Journal of Health Economics, 21*(1), 89-116.

Tang, S., & Bloom, G. (2000). Decentralizing rural health services: A case study in China. *International Journal of Health Planning and Management, 15*(3), 189-200.

Wagstaff, A., & Lindelow, M. (2008). Can insurance increase financial risk?. The curious case of health insurance in China. *Journal of Health Economics*.

Wagstaff, A., & Yu, S. (2007). Do health sector reforms have their intended impacts?. The World Bank's Health VIII project in Gansu province, China. *Journal of Health Economics, 26*(3), 505-535.

Wang, F., & Luo, W. (2005). Assessing spatial and nonspatial factors for healthcare access: towards an integrated approach to defining health professional shortage areas. *Health & Place, 11*(2), 131-146.

Watts, J. (2006). China's rural health reforms tackle entrenched inequalities. *Lancet., 367*(9522), 1564-1565.

Wei, Y. D., & Fang, C. (2006). Geographical and Structural Constraints of Regional Development in Western China: A Study of Gansu Province. *Issues and Studies, 42*(2), 131-170.

WHO. (2005). *Health Situation Assessment of the Peoples Republic of China.*

Wong, C. K., Tang, K. L., & Lo, V. (2007). Unaffordable healthcare amid phenomenal growth: The case of healthcare protection in reform China. *International Journal of Social Welfare, 16*(2), 140-149.

World Bank. (2005). *The World Bank's Assistance to China's Health Sector.* Washington, D.C.: The World Bank Operations Evaluation Department.

Yip, W., & Hsiao, W. C. (2008). The Chinese health system at a crossroads. *Health Affairs, 27*(2), 460-468.

Zhang, X., & Kanbur, R. (2005). Spatial Inequality in Education and Health Care in China. *China Economic Review, 16*, 189-204.

Zhao, Z. (2006). Income inequality, unequal health care access, and mortality in China. *Population and Development Review, 32*(3), 461-483.

APPENDIX 1

CHNS survey questions providing the variables used to build the access index:

Facility: If household members are sick or want to see a doctor, dentist, nurse, or other health worker, which clinics and hospitals can they use (private or public)?

Travel time: How long does it take to travel one way to this facility? (Minutes)

Waiting time: On average, how long must you wait to be seen by a health worker at this facility? (Minutes)

Travel cost: How much does the transportation cost to travel one way there? (Yuan)

Service charges: In this facility, approximately how much money does a self-pay person pay for treatment of cold or flu? (Yuan)

APPENDIX 2

Profile of the sample

Geographic portrait

Table A.2 summarizes the characteristics of the sample in each year. The CHNS sample is fairly equally distributed among the participating provinces with slight variations between the years. Although, if we separate provinces in three geographic regions: Eastern, Central and Western, over the years the Central region (39.7% of the sample in 1989, 48.4% in 1997 and 41.2% in 2004) appears to be much better represented than the Eastern and particularly than the Western region (27.1%, 28.2% and 21.8% respectively). This, however, reflects the national distribution of the population with the central region being the most populated. In 1989 and 1997, the CHNS scheme also has effectively over-represented urban areas with 31.5% of the sample in 1989, and 34% in 1997 coming from urban areas, while only 26.21% and 31.91% correspondingly of total national population was in urban areas (National Bureau of Statistics, 2005). In 2004, on the other hand, urban areas have been substantially under-represented with only 29.2% of the sample coming from urban respondents, while nationally 41.76% of population resided in urban areas (National Bureau of Statistics, 2005). The CHNS data are collected from 4 strata: urban city, suburb, rural town and rural village, this allows us to perform the analysis of disparities not only among urban and rural areas, but also permits the analysis of the disparities within these areas. Although rural towns are located in rural areas these are in fact urbanized areas and while suburbs are located in urban areas, these areas possess characteristics of rural regions. The

proportions collected from each stratum have remained stable over the years of the survey, with approximately half of the sample coming from rural villages, and 15-16% from each other strata: urban city, suburb and rural town.

		1989 (n=1811)		1997 (n=3071)		2004 (n=2904)	
		N	%*	N	%	N	%
Age	18-30	256	14.1	227	7.4	51	1.8
	30-45	789	43.6	1116	36.3	809	27.9
	45-60	495	27.3	1025	33.4	1189	40.9
	60+	271	15.0	704	22.9	855	29.4
Gender	Male	1536	84.8	2550	83.0	2464	84.8
	Female	275	15.2	522	17.0	460	15.2
Marital status	Single	117	6.5	404	13.2	446	14.6
	Married	1694	93.5	2656	86.5	2481	85.4
Ethnicity	Majority (Han)	1384	76.4	2699	87.9	2496	86
	Minority	292	16.1	341	11.1	408	14
Education	None	651	35.9	823	26.8	518	17.8
	Primary school	482	26.6	774	25.2	756	26
	Lower middle school	411	22.7	851	27.7	926	31.9
	Upper middle school	144	8.0	349	11.4	396	13.6
	Technical/vocational	52	2.9	135	4.4	162	5.6
	College/university	43	2.4	99	3.2	146	5.0
Occupation	Senior professional/manager	167	9.2	290	9.4	229	13.2
	Junior professional/skilled worker	273	15.1	331	10.8	236	13.6
	Farmer/fisherman	972	53.7	1404	45.7	844	48.6
	Unskilled worker	165	9.1	174	5.7	150	8.6
	Service worker/housekeeper	163	9.0	201	6.5	200	11.5
	Other	28	1.5	96	3.1	78	4.5
Per Capita Income	Below 700 Yuan	700	38.7	659	21.5	455	15.7
	700-1500 Yuan	752	41.5	1061	34.5	638	22
	1500+ Yuan	359	19.8	1351	44.0	1811	62.4
Health insurance	No	1254	69.2	2136	69.5	2005	69
	Yes	557	30.8	915	29.8	887	30.5
Strata	Urban	571	31.5	1043	34.0	848	29.2
	Rural	1240	68.5	2029	66.0	2056	70.8
Province	Liaoning	266	14.7			369	12.7
	Heilongjiang			449	14.6	337	11.6
	Jiangsu	205	11.3	375	12.2	377	13.0
	Shandong	131	7.2	343	11.2	309	10.6
	Henan	214	11.8	354	11.5	353	12.2
	Hubei	296	16.3	390	12.7	269	9.3
	Hunan	209	11.5	294	9.6	258	8.88
	Guangxi	175	9.7	441	14.4	266	9.2
	Guizhou	315	17.4	426	13.9	366	12.6
Region	Eastern	602	33.2	718	23.4	1055	36.3
	Central	719	39.7	1487	48.4	1217	41.2
	Western	490	27.1	867	28.2	632	21.8

Table A.2 Profile of the sample.

Note: [a] column percentage in each group may not sum up to 100% due to missing values.

Socio-cultural situation

Since only the responses of the heads of households were chosen for this study, the proportion of females in the sample is much lower than the national average, ranging from 15.2% to 17% of the sample over the years. The proportion of married respondents has gradually decreased from 93.5% in 1989 to 85.4% in 2004. Although this tendency can be traced in all strata, it is the most pronounced in urban areas where it has dropped by 13% over the years from 93.1% to 79.9%. In fact the gender and marital status in our sample are highly correlated with female heads of the household mostly being single and male heads of the household mostly married.

The size of families also decreased over the years of the survey from average of 4.25 persons per household in 1989 to the average of 3.4 in 2004. In 1989, 38.1% of respondents had families of 5 people or more, while only 18.7% in 2004. The drop was most pronounced in rural villages, where the proportion of such large families has decreased from 44.5% to 22.7%. The average family sizes seem to be smaller in eastern part of China and larger in the western part, and particularly large-sized in the autonomous region of Guangxi.

The proportion of respondents belonging to minority groups ranged from 11.1% in 1997 to 14% in 2004, which is substantially higher than the national average of 8.04% in 1990 and 8.4% in 2000 (National Bureau of Statistics, 2005). The overall proportion of minorities is a lot lower in urban areas, especially in cities (5.5%) than in rural areas. In villages the concentration of minorities is the highest reaching 17.6% in 2004. Generally, between 1997 and 2004 we see a slight increase in the proportion of minorities, which is especially pronounced in rural areas. Dominant minority groups varied slightly over the

years, with Man (4.3%) being the most dominant group in 1989 followed by Miao (3.7%) and Tujia (3.4%); Buyi (3.5%), Miao (3.1%), and Tujia (1.5%) in 1997; and Man (3.8%), Buyi (3%) and Miao (2.9%) in 2004. In our sample, minorities are not equally distributed across China. The proportions of minorities are the largest in the West (38.3% of population) and the lowest in central China (4.3%). Liaoning and Guizhou provinces have especially high levels of minorities that ranged over the years of survey from 30.8 to 30.4% and from 54 to 56% respectively. Shandong and Jiangsu, on the other hand have the lowest minority population (0.3-0.5%).

In terms of the highest level of education attained by the head of the household we can see a gradual improvement over the years. In 1989, the majority of respondents (35.9%) were illiterate; however, in 2004 only 17.8% were illiterate and 31.9% had at least lower middle school completed. Urban cities have seen the most improvement where illiteracy rates have gone down from 35.6% to 13.8%; contrary to suburbs where in 2004, 20.7% of respondents had no completed education, even higher than in rural villages (18.7%). Provincially, illiteracy rates are the highest in Guizhou where in 1989 over half of the population (51.1%), and over third of the population in 2004 did not have any formal education. Liaoning, on the other hand, had the lowest illiteracy rates, ranging from 18% in 89 to 6% in 2004. Regional gap in illiteracy rates was slightly narrower than the provincial one. Eastern region had the lowest illiteracy rates (29.4%-14.6%), while western region's proportion of illiterate respondents was almost twice higher, at 47.6% in 1989 and 27.4% in 2004.

Economic aspects

The constructed and adjusted per capita household incomes were used as proxies for the socio-economic status of respondents enabling us to examine the relationship between respondent's income and use of health care services. The cut-off points for categorizing the income groups that are presented in Table 2.1 were divided on the basis of approximately equal proportions of the population in 1989.

Although the adjusted average per capita income has almost tripled over the years from 1003 Yuan in 1989 to 2890 Yuan in 2004, the total adjusted average household income has seen less improvement, increasing from 4085 to 8913 Yuan. In addition, there are incredible provincial income disparities. For example, the highest per capita average provincial income recorded in Jiangsu (1228 Yuan in 1989 and 4431Yuan in 2004) was twice higher than the lowest provincial income reported in Guizhou (752 Yuan and 2329 Yuan respectively). Eastern region continuously has led in terms of income, with western region lagging behind. Also, income disparities among the participants have escalated dramatically. The ratio between the average and the maximum per capita income has grown from 0.27 in 1989 to 0.07 in 2004. In addition, the proportion of respondents not working has also increased dramatically from 13.4% to 33.6% respectively. In 2004, 59.4% of respondents from urban cities answered that they were unemployed at the time of the survey. This might be partially explained by a progressive decline in the number of farmers/fishermen between 1989 and 2004, which has decreased from 53.7% to 48.6%. This is particularly noticeable in rural villages and suburban areas where it dropped from 78.4% to 47.3 and 53.7% to 21.3% respectively.

APPENDIX 3

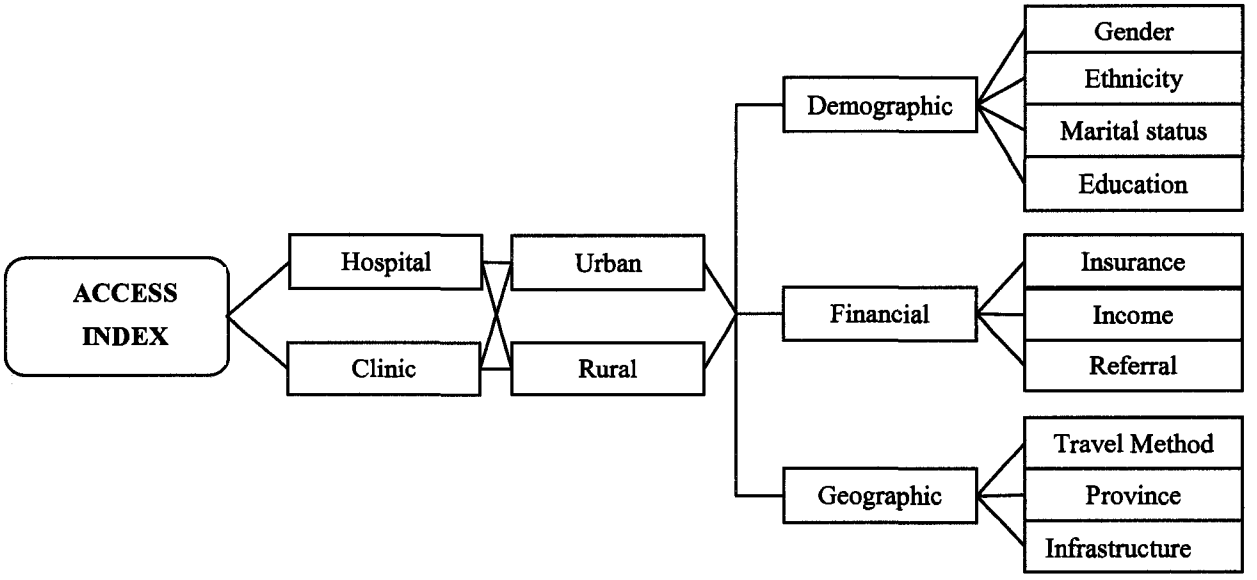


Figure A.3 Framework for the analysis of access.

APPENDIX 4

Regression results

```
SORT CASES  BY FACILITY T2.
SPLIT FILE SEPARATE BY FACILITY T2.
REGRESSION
 /MISSING LISTWISE
 /STATISTICS COEFF OUTS R ANOVA
 /CRITERIA=PIN(.05) POUT(.10)
 /NOORIGIN
 /DEPENDENT INDEX6

 /METHOD=ENTER GENDER MINORITY MARITAL EDUCATION M1 pcinc M14 M15B REGION availability.
```

Regression

Notes

Output Created		22-Aug-2008 15:01:16
Comments		
Input	Data	H:\Data\Crossectional\FINAL\04_clinics_hospitals.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	FACILITY, 1=URBAN SITE(U) 2=RURAL SITE(R)
	N of Rows in Working Data File	2904
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.
	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT INDEX6 /METHOD=ENTER GENDER MINORITY MARITAL EDUCATION M1 pcinc M14 M15B REGION availability.
Resources	Processor Time	00:00:00.172
	Elapsed Time	00:00:00.109
	Memory Required	5980 bytes
	Additional Memory Required for Residual Plots	0 bytes

[DataSet1] H:\Data\Crossectional\FINAL\04_clinics_hospitals.sav

FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method
1	availability, MINORITY, METHOD OF TRAVEL TO FACILITY, MARITAL STATUS, DOES PERSON HAVE HEALTH INSURANCE?, pcinc, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, EDUCATION, GENDER, REGION[a]	.	Enter

a. All requested variables entered.

b. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

c. Dependent Variable: INDEX6

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.443[a]	.196	.168	.896

a. Predictors: (Constant), availability, MINORITY, METHOD OF TRAVEL TO FACILITY, MARITAL STATUS, DOES PERSON HAVE HEALTH INSURANCE?, pcinc, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, EDUCATION, GENDER, REGION

b. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

ANOVA[b,c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	55.495	10	5.550	6.906	.000[a]
	Residual	227.420	283	.804		
	Total	282.915	293			

a. Predictors: (Constant), availability, MINORITY, METHOD OF TRAVEL TO FACILITY, MARITAL STATUS, DOES PERSON HAVE HEALTH INSURANCE?, pcinc, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, EDUCATION, GENDER, REGION

ANOVA[b,c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	55.495	10	5.550	6.906	.000[a]
	Residual	227.420	283	.804		
	Total	282.915	293			

a. Predictors: (Constant), availability, MINORITY, METHOD OF TRAVEL TO FACILITY, MARITAL STATUS, DOES PERSON HAVE HEALTH INSURANCE?, pcinc, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, EDUCATION, GENDER, REGION

b. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

c. Dependent Variable: INDEX6

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.107	.490		4.302	.000
	GENDER	-.108	.153	-.045	-.703	.483
	MINORITY	.244	.167	.097	1.458	.146
	MARITAL STATUS	-.045	.173	-.017	-.260	.795
	EDUCATION	-.044	.046	-.058	-.955	.340
	DOES PERSON HAVE HEALTH INSURANCE?	-.126	.126	-.060	-.996	.320
	pcinc	-9.596E-6	.000	-.030	-.490	.624
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	.048	.125	.023	.387	.699
	METHOD OF TRAVEL TO FACILITY	-.472	.093	-.273	-5.060	.000
	REGION	.351	.097	.242	3.614	.000
	availability	.331	.141	.135	2.348	.020

a. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

b. Dependent Variable: INDEX6

FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method

1	availability, DOES PERSON HAVE HEALTH INSURANCE?, METHOD OF TRAVEL TO FACILITY, MARITAL STATUS, MINORITY, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, EDUCATION, GENDER, REGION[a]	.	Enter

a. All requested variables entered.

b. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

c. Dependent Variable: INDEX6

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.279[a]	.078	.070	.924

a. Predictors: (Constant), availability, DOES PERSON HAVE HEALTH INSURANCE?, METHOD OF TRAVEL TO FACILITY, MARITAL STATUS, MINORITY, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, EDUCATION, GENDER, REGION

b. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

ANOVA[b,c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	84.187	10	8.419	9.853	.000[a]
	Residual	996.285	1166	.854		
	Total	1080.472	1176			

a. Predictors: (Constant), availability, DOES PERSON HAVE HEALTH INSURANCE?, METHOD OF TRAVEL TO FACILITY, MARITAL STATUS, MINORITY, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, EDUCATION, GENDER, REGION

b. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

c. Dependent Variable: INDEX6

Coefficients[a,b]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		

1	(Constant)	4.572	.263		17.408	.000
	GENDER	-.278	.103	-.092	-2.692	.007
	MINORITY	.366	.085	.140	4.320	.000
	MARITAL STATUS	-.261	.092	-.097	-2.836	.005
	EDUCATION	.005	.029	.005	.175	.861
	DOES PERSON HAVE HEALTH INSURANCE?	-.414	.076	-.181	-5.466	.000
	pcinc	1.490E-5	.000	.033	1.100	.271
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	-.199	.095	-.061	-2.102	.036
	METHOD OF TRAVEL TO FACILITY	-.219	.050	-.126	-4.420	.000
	REGION	-.187	.049	-.145	-3.840	.000
	availability	-.301	.063	-.153	-4.802	.000

a. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

b. Dependent Variable: INDEX6

FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method
1	availability, MARITAL STATUS, METHOD OF TRAVEL TO FACILITY, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, MINORITY, pcinc, DOES PERSON HAVE HEALTH INSURANCE?, EDUCATION, REGION, GENDER[a]	.	Enter

a. All requested variables entered.

b. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

c. Dependent Variable: INDEX6

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.509[a]	.259	.246	.954

a. Predictors: (Constant), availability, MARITAL STATUS, METHOD OF TRAVEL TO FACILITY, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, MINORITY, pcinc, DOES PERSON HAVE HEALTH INSURANCE?, EDUCATION, REGION, GENDER

b. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

ANOVA[b,c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	170.818	10	17.082	18.774	.000[a]
	Residual	487.690	536	.910		
	Total	658.508	546			

a. Predictors: (Constant), availability, MARITAL STATUS, METHOD OF TRAVEL TO FACILITY, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, MINORITY, pcinc, DOES PERSON HAVE HEALTH INSURANCE?, EDUCATION, REGION, GENDER

b. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

c. Dependent Variable: INDEX6

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.547	.344		4.493	.000
	GENDER	.011	.118	.004	.092	.926
	MINORITY	.133	.216	.024	.615	.539
	MARITAL STATUS	-.185	.137	-.059	-1.345	.179
	EDUCATION	-.009	.029	-.013	-.310	.757
	DOES PERSON HAVE HEALTH INSURANCE?	-.217	.093	-.099	-2.342	.020
	pcinc	5.288E-6	.000	.017	.411	.681
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	.135	.092	.059	1.458	.145
	METHOD OF TRAVEL TO FACILITY	-.258	.030	-.335	-8.614	.000
	REGION	.380	.062	.270	6.175	.000
	availability	.504	.075	.282	6.727	.000

a. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

b. Dependent Variable: INDEX6

FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method
1	availability, DOES PERSON HAVE HEALTH INSURANCE?, METHOD OF TRAVEL TO FACILITY, MARITAL STATUS, pcinc, MINORITY, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, GENDER, EDUCATION, REGION[a]	.	Enter

a. All requested variables entered.

b. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

c. Dependent Variable: INDEX6

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.338[a]	.114	.104	.870

a. Predictors: (Constant), availability, DOES PERSON HAVE HEALTH INSURANCE?, METHOD OF TRAVEL TO FACILITY, MARITAL STATUS, pcinc, MINORITY, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, GENDER, EDUCATION, REGION

b. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

ANOVA[b,c]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	83.744	10	8.374	11.060	.000[a]
	Residual	648.883	857	.757		
	Total	732.627	867			

a. Predictors: (Constant), availability, DOES PERSON HAVE HEALTH INSURANCE?, METHOD OF TRAVEL TO FACILITY, MARITAL STATUS, pcinc, MINORITY, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, GENDER, EDUCATION, REGION

b. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

c. Dependent Variable: INDEX6

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.942	.271		7.169	.000
	GENDER	.036	.096	.014	.370	.711
	MINORITY	.022	.087	.009	.260	.795
	MARITAL STATUS	.125	.096	.047	1.295	.196
	EDUCATION	.057	.026	.083	2.208	.028
	DOES PERSON HAVE HEALTH INSURANCE?	-.224	.077	-.109	-2.926	.004
	pcinc	1.197E-5	.000	.044	1.250	.211
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	.143	.087	.059	1.651	.099
	METHOD OF TRAVEL TO FACILITY	-.142	.022	-.205	-6.348	.000
	REGION	.249	.051	.201	4.910	.000
	availability	.319	.061	.221	5.192	.000

a. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

b. Dependent Variable: INDEX6

```
REGRESSION
 /MISSING LISTWISE
 /STATISTICS COEFF OUTS R ANOVA
 /CRITERIA=PIN(.05) POUT(.10)
 /NOORIGIN
 /DEPENDENT INDEX6
 /METHOD=ENTER GENDER MINORITY MARITAL EDUCATION
 /METHOD=ENTER M1 pcinc M14
 /METHOD=ENTER M15B REGION availability.
```

Regression

Notes

Output Created		22-Aug-2008 15:10:28
Comments		
Input	Data	H:\Data\Crossectional\FINAL\04_clinics_hospitals.sav
	Active Dataset	DataSet1
	Filter	<none>
	Weight	<none>
	Split File	FACILITY, 1=URBAN SITE(U) 2=RURAL SITE(R)
	N of Rows in Working Data File	2904
Missing Value Handling	Definition of Missing	User-defined missing values are treated as missing.

	Cases Used	Statistics are based on cases with no missing values for any variable used.
Syntax		REGRESSION /MISSING LISTWISE /STATISTICS COEFF OUTS R ANOVA /CRITERIA=PIN(.05) POUT(.10) /NOORIGIN /DEPENDENT INDEX6 /METHOD=ENTER GENDER MINORITY MARITAL EDUCATION /METHOD=ENTER M1 pcinc M14 /METHOD=ENTER M15B REGION availability.
Resources	Processor Time	00:00:00.468
	Elapsed Time	00:00:00.250
	Memory Required	6100 bytes
	Additional Memory Required for Residual Plots	0 bytes

[DataSet1] H:\Data\Crossectional\FINAL\04_clinics_hospitals.sav

FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method
1	EDUCATION, GENDER, MINORITY, MARITAL STATUS[a]	.	Enter
2	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, DOES PERSON HAVE HEALTH INSURANCE?, pcinc[a]	.	Enter
3	availability, METHOD OF TRAVEL TO FACILITY, REGION[a]	.	Enter

a. All requested variables entered.

b. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

c. Dependent Variable: INDEX6

Model Summary[d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.262[a]	.069	.056	.955
2	.276[b]	.076	.054	.956
3	.443[c]	.196	.168	.896

a. Predictors: (Constant), EDUCATION, GENDER, MINORITY, MARITAL STATUS

b. Predictors: (Constant), EDUCATION, GENDER, MINORITY, MARITAL STATUS, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, DOES PERSON HAVE HEALTH INSURANCE?, pcinc

c. Predictors: (Constant), EDUCATION, GENDER, MINORITY, MARITAL STATUS, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, DOES PERSON HAVE HEALTH INSURANCE?, pcinc, availability, METHOD OF TRAVEL TO FACILITY, REGION

d. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

ANOVA[d,e]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19.476	4	4.869	5.342	.000[a]
	Residual	263.439	289	.912		
	Total	282.915	293			
2	Regression	21.590	7	3.084	3.375	.002[b]
	Residual	261.325	286	.914		
	Total	282.915	293			
3	Regression	55.495	10	5.550	6.906	.000[c]
	Residual	227.420	283	.804		
	Total	282.915	293			

a. Predictors: (Constant), EDUCATION, GENDER, MINORITY, MARITAL STATUS

b. Predictors: (Constant), EDUCATION, GENDER, MINORITY, MARITAL STATUS, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, DOES PERSON HAVE HEALTH INSURANCE?, pcinc

c. Predictors: (Constant), EDUCATION, GENDER, MINORITY, MARITAL STATUS, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, DOES PERSON HAVE HEALTH INSURANCE?, pcinc, availability, METHOD OF TRAVEL TO FACILITY, REGION

d. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

e. Dependent Variable: INDEX6

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.797	.316		8.850	.000
	GENDER	-.060	.161	-.025	-.371	.711
	MINORITY	.559	.146	.222	3.819	.000
	MARITAL STATUS	-.070	.181	-.026	-.386	.700

	EDUCATION	-.072	.044	-.097	-1.636	.103
2	(Constant)	2.857	.321		8.910	.000
	GENDER	-.064	.163	-.027	-.396	.693
	MINORITY	.536	.153	.213	3.494	.001
	MARITAL STATUS	-.095	.183	-.036	-.519	.604
	EDUCATION	-.050	.048	-.066	-1.038	.300
	DOES PERSON HAVE HEALTH INSURANCE?	-.180	.134	-.086	-1.346	.179
	pcinc	-9.377E-6	.000	-.029	-.453	.651
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	.054	.131	.026	.413	.680
3	(Constant)	2.107	.490		4.302	.000
	GENDER	-.108	.153	-.045	-.703	.483
	MINORITY	.244	.167	.097	1.458	.146
	MARITAL STATUS	-.045	.173	-.017	-.260	.795
	EDUCATION	-.044	.046	-.058	-.955	.340
	DOES PERSON HAVE HEALTH INSURANCE?	-.126	.126	-.060	-.996	.320
	pcinc	-9.596E-6	.000	-.030	-.490	.624
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	.048	.125	.023	.387	.699
	METHOD OF TRAVEL TO FACILITY	-.472	.093	-.273	-5.060	.000
	REGION	.351	.097	.242	3.614	.000
	availability	.331	.141	.135	2.348	.020

a. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

b. Dependent Variable: INDEX6

Excluded Variables[c,a]

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
1	DOES PERSON HAVE HEALTH INSURANCE?	-.082[a]	-1.395	.164	-.082	.925
	pcinc	-.044[a]	-.708	.480	-.042	.819
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	-.004[a]	-.070	.944	-.004	.945
	METHOD OF TRAVEL TO FACILITY	-.281[a]	-5.139	.000	-.290	.990
	REGION	.207[a]	3.190	.002	.185	.742
	availability	.064[a]	1.131	.259	.066	.992
2	METHOD OF TRAVEL TO FACILITY	-.285[b]	-5.166	.000	-.293	.977

	REGION	.201[b]	3.066	.002	.179	.729
	availability	.063[b]	1.108	.269	.065	.983

a. Predictors in the Model: (Constant), EDUCATION, GENDER, MINORITY, MARITAL STATUS

b. Predictors in the Model: (Constant), EDUCATION, GENDER, MINORITY, MARITAL STATUS, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, DOES PERSON HAVE HEALTH INSURANCE?, pcinc

c. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

d. Dependent Variable: INDEX6

FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method
1	EDUCATION, MINORITY, MARITAL STATUS, GENDER[a]	.	Enter
2	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, DOES PERSON HAVE HEALTH INSURANCE?[a]	.	Enter
3	METHOD OF TRAVEL TO FACILITY, availability, REGION[a]	.	Enter

a. All requested variables entered.

b. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

c. Dependent Variable: INDEX6

Model Summary[d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.132[a]	.017	.014	.952
2	.203[b]	.041	.036	.941
3	.279[c]	.078	.070	.924

a. Predictors: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER

b. Predictors: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, DOES PERSON HAVE HEALTH INSURANCE?

c. Predictors: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, DOES PERSON HAVE HEALTH INSURANCE?, METHOD OF TRAVEL TO FACILITY, availability, REGION

d. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

ANOVA[a,e]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.896	4	4.724	5.215	.000[a]
	Residual	1061.576	1172	.906		
	Total	1080.472	1176			
2	Regression	44.596	7	6.371	7.190	.000[b]
	Residual	1035.877	1169	.886		
	Total	1080.472	1176			
3	Regression	84.187	10	8.419	9.853	.000[c]
	Residual	996.285	1166	.854		
	Total	1080.472	1176			

a. Predictors: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER

b. Predictors: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, DOES PERSON HAVE HEALTH INSURANCE?

c. Predictors: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, DOES PERSON HAVE HEALTH INSURANCE?, METHOD OF TRAVEL TO FACILITY, availability, REGION

d. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

e. Dependent Variable: INDEX6

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.334	.184		18.094	.000
	GENDER	-.251	.106	-.084	-2.373	.018
	MINORITY	.243	.076	.093	3.192	.001
	MARITAL STATUS	-.260	.095	-.096	-2.742	.006
	EDUCATION	-.016	.029	-.017	-.559	.576
2	(Constant)	3.381	.184		18.335	.000
	GENDER	-.256	.105	-.085	-2.435	.015
	MINORITY	.176	.076	.067	2.299	.022
	MARITAL STATUS	-.254	.094	-.094	-2.709	.007
	EDUCATION	.000	.029	.000	.014	.989
	DOES PERSON HAVE HEALTH INSURANCE?	-.300	.071	-.131	-4.234	.000

	pcinc	1.259E-5	.000	.028	.926	.355
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	-.219	.096	-.068	-2.275	.023
3	(Constant)	4.572	.263		17.408	.000
	GENDER	-.278	.103	-.092	-2.692	.007
	MINORITY	.366	.085	.140	4.320	.000
	MARITAL STATUS	-.261	.092	-.097	-2.836	.005
	EDUCATION	.005	.029	.005	.175	.861
	DOES PERSON HAVE HEALTH INSURANCE?	-.414	.076	-.181	-5.466	.000
	pcinc	1.490E-5	.000	.033	1.100	.271
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	-.199	.095	-.061	-2.102	.036
	METHOD OF TRAVEL TO FACILITY	-.219	.050	-.126	-4.420	.000
	REGION	-.187	.049	-.145	-3.840	.000
	availability	-.301	.063	-.153	-4.802	.000

a. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

b. Dependent Variable: INDEX6

Excluded Variables[c,d]

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics
						Tolerance
1	DOES PERSON HAVE HEALTH INSURANCE?	-.140[a]	-4.755	.000	-.138	.955
	pcinc	-.003[a]	-.092	.927	-.003	.972
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	-.096[a]	-3.304	.001	-.096	.978
	METHOD OF TRAVEL TO FACILITY	-.126[a]	-4.386	.000	-.127	.999
	REGION	-.012[a]	-.382	.703	-.011	.831
	availability	-.091[a]	-3.079	.002	-.090	.957
2	METHOD OF TRAVEL TO FACILITY	-.125[b]	-4.358	.000	-.126	.987
	REGION	-.080[b]	-2.327	.020	-.068	.689
	availability	-.090[b]	-3.081	.002	-.090	.955

a. Predictors in the Model: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER

b. Predictors in the Model: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, DOES PERSON HAVE HEALTH INSURANCE?

c. FACILITY = Clinic, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

d. Dependent Variable: INDEX6

FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method
1	EDUCATION, MINORITY, GENDER, MARITAL STATUS[a]	.	Enter
2	pcinc, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, DOES PERSON HAVE HEALTH INSURANCE?[a]	.	Enter
3	METHOD OF TRAVEL TO FACILITY, availability, REGION[a]	.	Enter

a. All requested variables entered.

b. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

c. Dependent Variable: INDEX6

Model Summary[d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.113[a]	.013	.006	1.095
2	.196[b]	.038	.026	1.084
3	.509[c]	.259	.246	.954

a. Predictors: (Constant), EDUCATION, MINORITY, GENDER, MARITAL STATUS

b. Predictors: (Constant), EDUCATION, MINORITY, GENDER, MARITAL STATUS, pcinc, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, DOES PERSON HAVE HEALTH INSURANCE?

c. Predictors: (Constant), EDUCATION, MINORITY, GENDER, MARITAL STATUS, pcinc, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, DOES PERSON HAVE HEALTH INSURANCE?, METHOD OF TRAVEL TO FACILITY, availability, REGION

d. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

ANOVA[d,e]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.436	4	2.109	1.758	.136[a]
	Residual	650.072	542	1.199		

	Total	658.508	546			
2	Regression	25.289	7	3.613	3.075	.003[b]
	Residual	633.219	539	1.175		
	Total	658.508	546			
3	Regression	170.818	10	17.082	18.774	.000[c]
	Residual	487.690	536	.910		
	Total	658.508	546			

a. Predictors: (Constant), EDUCATION, MINORITY, GENDER, MARITAL STATUS

b. Predictors: (Constant), EDUCATION, MINORITY, GENDER, MARITAL STATUS, pcinc, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, DOES PERSON HAVE HEALTH INSURANCE?

c. Predictors: (Constant), EDUCATION, MINORITY, GENDER, MARITAL STATUS, pcinc, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, DOES PERSON HAVE HEALTH INSURANCE?, METHOD OF TRAVEL TO FACILITY, availability, REGION

d. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

e. Dependent Variable: INDEX6

Coefficients[a,d]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.802	.269		10.435	.000
	GENDER	-.091	.134	-.034	-.680	.497
	MINORITY	.508	.239	.091	2.121	.034
	MARITAL STATUS	-.229	.157	-.073	-1.456	.146
	EDUCATION	-.016	.030	-.023	-.532	.595
2	(Constant)	2.931	.269		10.895	.000
	GENDER	-.110	.133	-.041	-.825	.410
	MINORITY	.432	.240	.077	1.802	.072
	MARITAL STATUS	-.215	.156	-.069	-1.382	.168
	EDUCATION	.010	.033	.015	.313	.755
	DOES PERSON HAVE HEALTH INSURANCE?	-.297	.103	-.135	-2.877	.004
	pcinc	-2.453E-5	.000	-.077	-1.708	.088
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	.216	.105	.095	2.062	.040
3	(Constant)	1.547	.344		4.493	.000
	GENDER	.011	.118	.004	.092	.926
	MINORITY	.133	.216	.024	.615	.539
	MARITAL STATUS	-.185	.137	-.059	-1.345	.179
	EDUCATION	-.009	.029	-.013	-.310	.757
	DOES PERSON HAVE HEALTH INSURANCE?	-.217	.093	-.099	-2.342	.020

	pcinc	5.288E-6	.000	.017	.411	.681
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	.135	.092	.059	1.458	.145
	METHOD OF TRAVEL TO FACILITY	-.258	.030	-.335	-8.614	.000
	REGION	.380	.062	.270	6.175	.000
	availability	.504	.075	.282	6.727	.000

a. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

b. Dependent Variable: INDEX6

Excluded Variables[c,d]

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics: Tolerance
1	DOES PERSON HAVE HEALTH INSURANCE?	-.124[a]	-2.726	.007	-.116	.873
	pcinc	-.089[a]	-1.979	.048	-.085	.902
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	.057[a]	1.267	.206	.054	.901
	METHOD OF TRAVEL TO FACILITY	-.389[a]	-9.827	.000	-.389	.990
	REGION	.258[a]	6.016	.000	.250	.931
	availability	.155[a]	3.537	.000	.150	.931
2	METHOD OF TRAVEL TO FACILITY	-.378[b]	-9.454	.000	-.377	.958
	REGION	.234[b]	5.318	.000	.223	.876
	availability	.172[b]	3.948	.000	.168	.916

a. Predictors in the Model: (Constant), EDUCATION, MINORITY, GENDER, MARITAL STATUS

b. Predictors in the Model: (Constant), EDUCATION, MINORITY, GENDER, MARITAL STATUS, pcinc, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, DOES PERSON HAVE HEALTH INSURANCE?

c. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Urban

d. Dependent Variable: INDEX6

FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

Variables Entered/Removed[b,c]

Model	Variables Entered	Variables Removed	Method
1	EDUCATION, MINORITY, MARITAL STATUS, GENDER[a]	.	Enter

2	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, DOES PERSON HAVE HEALTH INSURANCE?[a]	.	Enter
3	METHOD OF TRAVEL TO FACILITY, REGION, availability[a]	.	Enter

a. All requested variables entered.

b. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

c. Dependent Variable: INDEX6

Model Summary[d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.123[a]	.015	.010	.914
2	.188[b]	.035	.027	.907
3	.338[c]	.114	.104	.870

a. Predictors: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER

b. Predictors: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, DOES PERSON HAVE HEALTH INSURANCE?

c. Predictors: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, DOES PERSON HAVE HEALTH INSURANCE?, METHOD OF TRAVEL TO FACILITY, REGION, availability

d. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

ANOVA[d,e]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.995	4	2.749	3.287	.011[a]
	Residual	721.632	863	.836		
	Total	732.627	867			
2	Regression	25.875	7	3.696	4.498	.000[b]
	Residual	706.752	860	.822		
	Total	732.627	867			
3	Regression	83.744	10	8.374	11.060	.000[c]
	Residual	648.883	857	.757		
	Total	732.627	867			

a. Predictors: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER

b. Predictors: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, DOES PERSON HAVE HEALTH INSURANCE?

c. Predictors: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, DOES PERSON HAVE HEALTH INSURANCE?, METHOD OF TRAVEL TO FACILITY, REGION, availability

d. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

e. Dependent Variable: INDEX6

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.835	.182		15.593	.000
	GENDER	.037	.101	.014	.367	.714
	MINORITY	.208	.084	.084	2.481	.013
	MARITAL STATUS	.097	.101	.037	.965	.335
	EDUCATION	.051	.024	.075	2.126	.034
2	(Constant)	2.855	.181		15.749	.000
	GENDER	.027	.100	.010	.268	.788
	MINORITY	.194	.084	.078	2.305	.021
	MARITAL STATUS	.092	.100	.035	.917	.359
	EDUCATION	.071	.027	.103	2.666	.008
	DOES PERSON HAVE HEALTH INSURANCE?	-.330	.078	-.160	-4.207	.000
	pcinc	7.978E-6	.000	.030	.802	.423
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	.148	.090	.061	1.651	.099
3	(Constant)	1.942	.271		7.169	.000
	GENDER	.036	.096	.014	.370	.711
	MINORITY	.022	.087	.009	.260	.795
	MARITAL STATUS	.125	.096	.047	1.295	.196
	EDUCATION	.057	.026	.083	2.208	.028
	DOES PERSON HAVE HEALTH INSURANCE?	-.224	.077	-.109	-2.926	.004
	pcinc	1.197E-5	.000	.044	1.250	.211
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	.143	.087	.059	1.651	.099
	METHOD OF TRAVEL TO FACILITY	-.142	.022	-.205	-6.348	.000
	REGION	.249	.051	.201	4.910	.000
	availability	.319	.061	.221	5.192	.000

a. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

b. Dependent Variable: INDEX6

Excluded Variables[c,d]

Model		Beta In	t	Sig.	Partial Correlation	Collinearity Statistics: Tolerance
1	DOES PERSON HAVE HEALTH INSURANCE?	-.135[a]	-3.772	.000	-.127	.872
	pcinc	.009[a]	.244	.807	.008	.879
	REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?	.022[a]	.622	.534	.021	.916
	METHOD OF TRAVEL TO FACILITY	-.222[a]	-6.743	.000	-.224	.997
	REGION	.085[a]	2.485	.013	.084	.962
	availability	.120[a]	3.317	.001	.112	.863
2	METHOD OF TRAVEL TO FACILITY	-.214[b]	-6.518	.000	-.217	.991
	REGION	.073[b]	2.112	.035	.072	.923
	availability	.114[b]	3.184	.002	.108	.862

a. Predictors in the Model: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER

b. Predictors in the Model: (Constant), EDUCATION, MINORITY, MARITAL STATUS, GENDER, REFERRAL HOSPITAL/CLINIC FOR WORK UNIT?, pcinc, DOES PERSON HAVE HEALTH INSURANCE?

c. FACILITY = Hospital, 1=URBAN SITE(U) 2=RURAL SITE(R) = Rural

d. Dependent Variable: INDEX6