# Arrangements of Medical Savings Accounts and Equity in Access to Health Care:

## Assessing Two MSA Programs in China

by

**JIE HUANG**

**A Thesis Submitted in Partial Fulfillment of the Requirements of the Degree of Master of Philosophy**

**Under the Supervision of Prof. Peter P. YUEN**

**Department of Management and Marketing**

**The Hong Kong Polytechnic University**

May 2006

## CERFIFICATE OF ORIGINALITY

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**Jie HUANG** (Name of student)

# ACKNOWLEGEMENTS

I would like to give my heartiest gratitude to my thesis supervisor Prof. Yuen, P. Peter for the invaluable support, guidance and patience that he has given to me throughout the thesis process. I would also like to give thanks to Prof. Yan, Hong for his great support on data collection; Prof. Gordon Liu and Dr. Sarah McGhee for their kindly instructions in my thesis revising.

Last but not the least, this thesis is dedicated to my parents, my grandmother, and all my dear friends David, Laura, Wei, Millisa, Una, Lile, Grace, Ada… as they have furnished me with the needed support and love that is necessary to accomplish this important milestone of my life.

March 07, 2007

# ABSTRACT

Abstract of thesis title: Arrangements in Medical Savings Accounts and Equity in Access to Health Care: Assessing Two MSA Programs in China

submitted by Jie HUANG

for the degree of Master of Philosophy

at The Hong Kong Polytechnic University in March 2007

Social security has become an important topic not only for developed nations, but also developing nations because of the fast growing health expenditures and high risks modern society bears considering the outbreak of some contagious disease that spreads rapidly and widely. In the recent decade, China government pushes Medical Savings Account (MSA) health insurance reform in entire urban areas. For a city-based health insurance plan, considerable variations in the benefit coverage and cost-sharing between individual accounts and social insurance fund could be found in different China cities.

The aim of the study is to examine how the adoption of some MSA arrangement influences insured's access and equity in access to health care. Using primary data from the controlled group informants in Zhenjiang and Hefei, this thesis empirically assesses the extent to which two typical MSA arrangements separately achieves its stated goals. Only non-financial access is considered here based on the probability of visiting. Our findings show that insured on higher position have more chance to use diagnosis service. Insured that report better health status have more chance to use emergency service. Under Tongdao MSA program, insured tend to use more emergency service than that under Bankuai program. And different MSA arrangements do have effect on the relationship between insured's education and their probability of emergency service visiting. Under Bankuai MSA program, access to emergency service is more equitable across education subgroup.

We also could see the tendencies that Bankuai MSA arrangement shows more equitable access to health care than the Tongdao MSA arrangement in general. While

in some instance, especially for diagnosis using, the insured under Tongdao MSA arrangement report more equitable access pattern. Although it indicates that Tongdao MSA arrangement helps to improve access to outpatient service, emergency service, and inpatient service, it may induce overuse and even moral hazard transferring outpatient service to inpatient service based on the findings of equity improvement.

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# CHAPTER I INTRODUCTION

Medical Savings Accounts, a creative health financing approach which is proposed to contain the rapid health care cost inflation from demand side, have been nationally or locally implemented in several countries in the recent two decades. MSAs are the tax-deferred banks or savings accounts set up for individuals and families to pay for their health care expenses and medical insurance, and to allow them to accumulate savings to pay for future medical expenses and for other more general uses. Lyke and Peterson (2003) define MSAs to be the tax-advantaged individual savings accounts that can also be used for unreimbursed expenses. Hot debates have continued for a long time among researchers and policy makers about whether or not MSAs could prevent consumer moral hazard and create proper incentives for wise health care purchasing decisions (Massaro and Wong, 1995; Song and Liu, 2001; Hanvoravongchai, 2002; Shortt, 2002).

The continuous deviant inflation in health expenditure in China not only loaded heavy burdens on the patients but also embarrassed the practice of economic reform in 1990s. At the end of 1998, the State Council promulgated the *Decision about Establishing the Basic Medical Insurance for Employees (BMIE) in Urban China*. This document illuminates that the main objective of China's health insurance system reform is to establish an affordable basic medical insurance system in urban China, which features of "low level, big pool". All of the employees in urban areas should participate in citywide insurance program. Health financing adopts "Citywide Social Medical

Insurance Fund plus Medical Savings Accounts" program; both the employers and employees have the responsibility of contribution. By the end of 2004, BMIE has covered 124 million people in mainland China, which just accounted for a small part in 1998 (National Statistic Bureau, 2005).

Generally speaking, governments tend to introduce uniform MSA insurance program in their nations. And through a longitudinal analysis before-after implementation, health care researchers could understand macro-level equity improving in health care across socioeconomic background and health condition groups. However, the diversity of MSA insurance programs in urban China provides us valuable opportunity to conduct horizontal study in seeking the impact different MSA arrangements bring to access to health care and equity in access like that from socioeconomic background or health condition.

As one of the largest countries in the world, China central government pushes MSA health insurance reform in entire urban areas. By the end of 2004, the basic MSA health insurance program has covered 124 million people of mainland China (National Statistic Bureau, 2005). The MSA programs in China involves 2 components: first, an individual savings account from which routine medical expenses are paid and to which contributions are made by some combination of the individual (usually with tax-exempt funds), employers; and second, an accompanying city wide pooling social insurance fund to cover catastrophic medical expenses, the premiums for which also come from the employers. Generally, the first component of MSAs may have restrictions on the types of services that can be purchased and may involve, as with other types of

insurance, deductibles or co-payments. As well, the rules governing MSA plans vary in terms of how surplus funds in individual accounts are used at the end of coverage periods and whether supplementary assistance is provided in the event that expenditures exceed resources.

For a city-based MSA health insurance plan, considerable variations in the benefit scopes or payment sequence under individual accounts and social insurance fund could be found in Chinese cities which depend greatly on their history, current institutions, and the trade-offs in objectives that a city is willing to achieve. Thus different influences on the equity in access would be engendered considering the diversiform allocations of health resource under China's MSA programs. While previous equity studies on MSAs only focus on the equity improvement the latest health financing reform brings to one city or the general Chinese population, little have ever concerned about the relationship between equity improving and the particular arrangement of MSA programs. The aim of the study is to examine how the adoption of some MSA arrangement influences the equity in access of policy holders.

Informants from the controlled groups will be involved in our questionnaire survey in two typical cities. When collecting the first hand data from demand side, I focus on the health care utilization in terms of probability of visiting, model the access situations according to enrollees' socioeconomic background, chronic-determined and self-report health condition, and the insurance arrangement, finally test the model to see how the different MSA arrangements influence the equity in access to health care.

The thesis is divided into a number of chapters. In the next chapter, I will descript the background of health care security system as well as the history of MSAs. Detailed information about urban China's social insurance reform, the insurance program structure and the target MSA arrangement present study focus on could be also found in this section. In the third chapter, a thorough review of the extant literature of equity theory will be conducted to identify the essential measurement of equity in access to and the theoretical foundations for the proposed framework. The gaps are identified in the literature and significance of this study is provided. In the fourth chapter, a theoretical framework will be established based on the individual characteristic-based view of equity in health care. And the predictors are viewed as direct or moderate association with access to health care. Based on the proposed model, a series of hypotheses are suggested for the postulated relationships. In the fifth chapter, the methodology will be presented; the sixth chapter reports the analysis results. In the last chapter, a discussion will be made on the research findings, limitations of the research, future research directions, and contributions of this important study.

# CHAPTER II RESEARCH BACKGROUND

Health is viewed as one of the human rights. Health care has also moved quite a way from absolute self-resolved matter and has tended to be concerned as public product in modern society. Governments are under an obligation to secure that suitable medical services could be delivered to needed people but not only the ones who could afford them. Health security system is just born on this notion. However, many industrialized nations suffer from the "double whammy" of economic crisis and rapid health care cost inflation in the 1970s. Increasing health care needs, aging population, and improving on medical technology and drugs load heavy burden on health security system of both developed and developing nations. Changing disease patterns, high-cost technology and drugs make it more and more difficult for developing nations to assure their health service provide just based on previous health system (Hsiao, 2000).

On one side, social security system including health security is reputed as “Social Safety Net” and “Social Stabilization Machine” concerning about its great influences on socioeconomic development. On the other side, health security issue has turned into a global problem along with sustaining the elderly, unemployment etc. Now health security system, coming along with social security issues has become one of the most intractable problems governments have to face. How to finance the expensive health care and how to distribute the scare health care resource always attract great attention when efforts are tried to find a solution.

The search for solutions with regard to more equal access to health care involves both the formal and informal sectors of the economy. Efforts are aimed in particular at social health insurance for salaried workers, the self-employed, immigrants asylum seekers, illegal workers, domestic and agricultural workers, and family dependents (Xenia, 2001). Under the circumstances, a few countries, Singapore, Malaysia, India, Indonesia, and China, adopt the new Medical Saving Plan system.

## 2.1 The Essential of MSAs

Medical Saving Plan is a compulsory system; it requires employees and employers set up medical saving accounts based on individual unit or family unit to pay for health care in the future. The implementation of Medical Saving Plan is protected by legislation. Governments make every employed person raise money for their whole life health care demands. Thereby health expenditure won't be transferred to the next generation. Here, self-security and self-responsibility are particularly emphasized. Health consumption should keep along with national economic development. Generally the premium is same to all and independent of personal health characters. The balance could only be used on health consumption. Government need to establish law and regulation, maintain or add the cash value of saving account balance, and provide health care organizations proper subsidization. Patients can consume health services according to their ability to pay. The better they take the more they pay. Such plan is expected to control over use from demand side, however vertical balance on individual or family unit can't pool money to

guard against the sudden economic consequences of sickness in whole society. Meanwhile social equity can not be guaranteed.

As Hsiao (2000) says, health care financing policy and health policy are the two sides of the same coin; one cannot be effective without the other. The creative Medical Saving Plan is just coming along with the great efforts in searching for ways to improve the efficiency and financial sustainability of health care systems.

Health care is financed with different sources of funds, some from the government and some from the private sector. Private financing refers to funds paid directly to health care providers from private sources, including direct household expenditures such as out-of-pocket payments, expenditures through private insurance plans, employers' direct payments for health services, and charitable contributions (Schieber and Maeda, 1997). The facts illustrated that the critical roles private financing of health care are significantly different by level of economic development. For developing and middle-income countries, private financing accounted for almost half of total health expenditures. The major methods of financing are: government revenue, social and private insurance, user fees, and community financing (Hsiao, 2000).

## 2.2 MSAs in Other Country

User fees, a form of private financing, is used specifically for the amount that patients have to pay for services rendered by public facilities (Hsiao, 2000). Tracing back the history of health, public sector providers rarely charge patients significant user fees.

However, it is said that the demand-side restrict from user-fee financing could help improving resource allocation efficiency, fostering greater responsibility of users and accountability of providers to improve quality of services and expand coverage. Although some critics about this public-private mixed kind of financing form is raised from the egalitarian philosophy, many nations have involved cost sharing in their latest health care reforms conserved the low price elasticity of demand for health services.

Medical Savings Accounts could be viewed as a form of cost-sharing health plan, in which majority of health care expenditures are actually paid by patients. In 1983, Singapore firstly implemented Medisave Scheme throughout of the country, which was a compulsory individual savings account for payment of hospital costs and selected expensive outpatient treatments. Government continued to subsidize a major share of the total health expenditure. However, the tax funds were targeted to subsidize public polyclinics and “C” class services in public hospitals. Eight years later, Singapore established a public catastrophic insurance scheme Medishield; premium was deducted from each beneficiary’s Medisave account. Singapore’s “3M” health care system is viewed as a typical public and private combined health financing system, in which user fees is creatively adopted on a strong social value of “self-reliance”. Since then, a few nations orientated their health care financing along this fresh trace like Malaysia, India, and Indonesia. China spent nearly ten-year time establishing her national MSA social health insurance system. While it is said that an even longer history MSAs has experienced is in the States since the mid-1970s (Bunce, 2001).

## 2.3 Equity Studies on MSAs

MSAs have been proposed as a choice of health system reform. Under the co-payment arrangement from both demand-side and public financing, MSAs is considered as a help to prevent consumer moral hazard and create proper incentives for wise health care purchasing decisions (Massaro and Wong, 1995; Song and Liu, 2001; Hanvoravongchai, 2002; Shortt, 2002). Theoretically proponent and opponent claims about MSAs have generated considerable discussions in recent years. It seems that both sides get something there and the discussions finally turn into unsettled debates. From the empirical studies with concerned effectiveness of MSAs and the influence it brings to patients and providers we could see that, some are around the inequalities issues in publicly funded system.

The evidence about the equity effects of MSAs in Singapore is quite sparse. It appears that the mix of safety nets continues to assure adequate access to health care in Singapore, as indicted by continuing improvements in the population's health status (Lim, 2004). On the other hand, Singapore's arrangements assure that everyone has reasonable access to basic medical services by establishing 3M and subsidizing clinics and different class hospital beds (Hsiao, 1995). Given the magnitude of out-of-pocket costs borne by individuals, the costs of medical care in Singapore often can not be met by elderly people, especially elderly widows who were never employed outside the home, and poor people (Hsiao, 1995; Barr, 2001; Hanvoravongchai, 2002; Shortt, 2002). What's more, as the MSA system provides no risk pooling between individuals and

exposes them more fully to the costs of health services, it can be said that demand for health care in Singapore is rationed implicitly through consumer purchasing power in the market (Phua, 1997; Hanvoravongchai, 2002).

As Bunce (2001) said, MSA balances would provide individuals greater freedom to change jobs and worry less about jeopardizing their health insurance coverage, consequently improving access to health care in the general population. And RAND research found that MSAs in US were attractive to the sick and the healthy, the rich and the poor (Keeler, et al, 1996).

In China, MSAs increase equity of health care by pooling the risk at the city level, thus allowing the profitable enterprises to cross-subsidize those that are running deficits (Yip and Hsiao, 1997; Song and Liu, 2001). Over 98% of all eligible employees in Zhenjiang have been covered (Liu, et al, 1999). And the equity in access to basic care provided at outpatient settings was also improved in Zhenjiang (Liu, et al, 2002). However, the structure of benefit costs and personal health accounts transfers income from the frail to the healthy workers covered by the GIS and LIS in a sense (Yip and Hsiao, 1997).

Health care financing policy has a significant impact on patients and providers' behavior and organization of health care delivery. As mentioned earlier, one important argument for MSAs implementation is to reduce moral hazard problems that commonly occur in countries with comprehensive health plans. In other words, high deductibles and high cost sharing may prevent consumer moral hazard (Hanvoravongchai, 2002).

However, empirical studies in Singapore and China provide compelling evidence about the increase demand of overall health services (Hsiao, 1995; Liu, et al, 1999; Hanvoravongchai, 2002).

It has been suggested that the existence of assets that are restricted to use for health spending may give Medisave owners false sense of security and encourage them to spend more than they would usually be able to afford out of current income. Likewise, providers might also respond to the existence of Medisave balances by inducing unnecessary demand for health care services (Hanvoravongchai, 2002). Phua (1997) once reported a dramatic shift in demand from government hospitals to the restructured and private hospitals, and a discernible upgrading from the lower- to higher- priced beds. Lim (1997) also found that in a number of cases Medisave encouraged people to spend beyond their means by choosing higher-class wards than they could reasonably afford. Same overuse situation could also be observed in China. Actually, both patient and provider sides still have incentives of overuse under MSAs if without other accessorial limits (Hsiao, 1995; Yip and Hsiao, 1997; Song and Liu, 2001).

## 2.4 The Evolution of China's MSA Programs

China once has two-pronged health care system distinguishes urban versus rural health care service and delivery. Previously, the Government Insurance Scheme (GIS) and the Labor Insurance Scheme (LIS) have covered about 350 million populations in the urban health care system (Song and Liu, 2001). Government budgets paid government

employees, retirees, disabled veterans, and university teachers and students through GIS. The LIS covered employees and retirees (as well as their dependents) of state enterprises.

Little restriction on both demand side and supply side created inefficient incentives for the use of medical services and cost inflation, which were further exacerbated by the long-term distorted price schedule in China's health market. From 1988, China government began a series of exploratory changes in traditional GIS and LIS system.

Significant headway has been made in 1993 while China central government confirmed the new health-financing program "Citywide Social Medical Insurance Fund plus Medical Savings Accounts". In December 1994, the State Council launched pilot experiment of citywide insurance program in the cities of Zhenjiang and Jiujiang. Based on two years of practical experience, CSMI plus MSAs reform was expanded to more than 50 cities in China. Because the significant different situations each city had faced, city government was permitted to make compatible adjustment of their health care within the reform goals and basic principles. Accompanying with the new health financing system, a series of reforms were going on in health care market, payment system, and drug market. All of the above ensured a favorable goal achievement in the initial stages.

The continuous deviant inflation in health expenditure in 1990s not only loaded heavy burdens on the patients but also embarrassed the practice of economic reform (Fig.1). At the end of 1998, the State Council promulgated the *Decision about*

*Establishing the Basic Medical Insurance for Employees (BMIE) in Urban China*. This document illuminates that the main objective of China's health insurance system reform is to establish an affordable basic medical insurance system in urban China, which features of "low level, big pool". All of the employees in urban areas should participate in citywide insurance program. Health financing adopts "Citywide Social Medical Insurance Fund plus Medical Savings Accounts" program; both the employers and employees have the responsibility of contribution. By the end of 2004, BMIE has covered 124 million people in mainland China, which just accounted for a small part in 1998 (National Statistic Bureau, 2005).

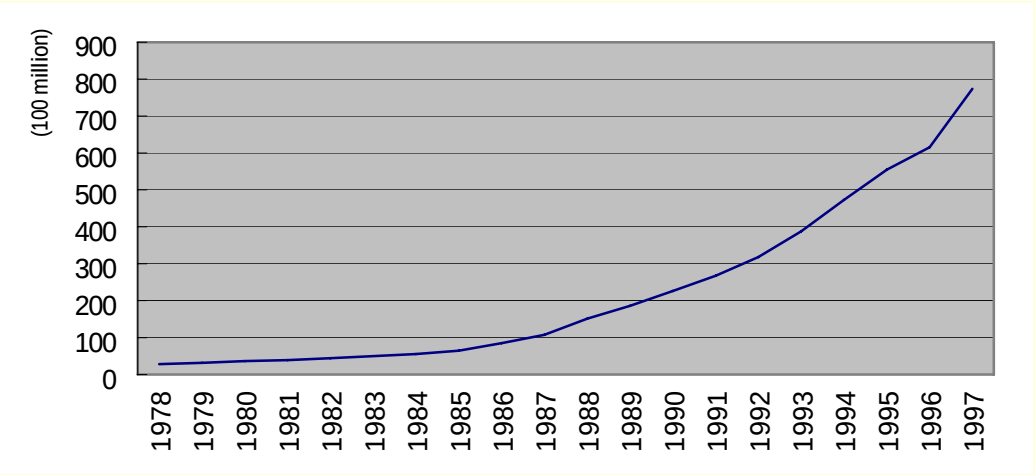



**Fig. 1 Health Care Expenditure of State Owed Enterprises of China 1978-1997**

Source: from *Annuals of China Social Insurance, 1997*

In the *Decision about Establishing the Basic Medical Insurance for Employees (BMIE) in Urban China*, several basic principles of "Citywide Social Medical Insurance Fund plus Medical Savings Accounts" program have been put forward.

- Both the employers and employees have the responsibility of contribution. Employers should contribute about 6% of the total wage bill; each employee should contribute about 2% wage at the initial stages.

- All of the contribution from employees and about 30% of the contribution from employers will be reckoned in the individual accounts; social risk-pool fund will form based on the residual 70% contribution of employers. Balance of individual accounts could be carried forward or inherited, but could not be cashed or embezzled. Social medical insurance institutions will in charge of the total social risk-pool fund.

- Accounting for different health services, social risk-pool fund and individual accounts should be separately reckoned.

- Social risk-pool fund's start point and upper payment limit should be regulated. Generally, the start point is required from 10% annual average wage of a local employee and upper limit is about 4 times of the annual average wage of a local employee. Health service costs under the start point will be paid by individual account as well as out-of-pocket. If the costs exceed the start point are considered catastrophic expenses, under the upper limit social risk-pool fund pay part of them with patients' coinsurance. Aimed to balance the fund's income and expenses, all of above detailed rates would be established by local authorities.

Obviously, the new BMIE system is totally different from China's traditional GIS and LIS (Table 1), which is greatly helpful in breaking the limitation of previous small

insurance pool and the benefits package depends on the length of service for the employer as well as the employers' fiscal condition. From a theoretical level, the advantage of BMIE system is obvious that it has a bigger pool to share risk and a more equal social solidarity to employees within the same area.

**Table 1 Comparison between Traditional Health Care System and the BMIE System**

| | ***Name*** | ***Financing*** | ***Management*** | ***Scope*** | ***Free Services*** | ***Charged Services*** |
|---|---|---|---|---|---|---|
| Traditional Health Care System | GIS | Revenue | Ministry of Health | Government employees, retirees, disabled veterans, and university teachers and students | Treatment, drug, inspection, inpatient admission, operation, procreation, board wages of inpatient admission for business, traveling expenses for long-distance visit, artificial limb etc. | Registration fee and others |
| | LIS | Welfare fund of state owed enterprises | State owed enterprises | Employees (as well as their dependents) and retirees of state enterprises | | Registration fee, 50% outpatient costs for dependents, 100% inpatient costs for dependents, traveling expenses for long-distance visit etc. |
| Social Medical Insurance | BMIE | Contribution from employers and employees, revenue | Ministry of Labor and Social Security, enterprises | All of the employees in urban areas | None | Registration fee, part or all of the costs |

Source: from *Practical Collections of China Health Security Reform*, 1998

With a delicate designed insurance scope and co-payment rate, the administrators of BMIE aim to give the urban employees an equal and effective health insurance schemes. The insurants have the decision rights to choose health service providers from a list of "formulated hospitals" with some prescriptive conditions.

As mentioned before, local authorities are groping the pattern of Social Medical Insurance plus Medical Savings Accounts suitable for the local situations during the reform of BMIE. Since 1996, three original MSA models have been gradually developed in urban China that is 1) *Tongdao model*; 2) *Bankuai model*; 3) *Sanjin Model*. Each of them set different benefit coverage for individual accounts and social insurance fund.

***Tongdao Model*** is the original MSAs pilot framework. Here payment separately arrange as three sections. An enrollee's health care costs will be deducted from his individual account firstly. When MSAs is exhausted, he should pay out-of-pocket expense no more than a fixed percent of local average annual wage. If still not enough, social insurance fund would partly reimburse the inadequate health expenditure; personal co-payment rates decline as the total expenditure grows. Most of the experiment cities adopted Tongdao Model.

***Bankuai Model*** seems more popular since it appeared in Shenzhen in 1994. Soon Hainan adopted similar program a year later. The new basic medical insurance reform in most of the cities also followed this arrangement. Its characteristics are that individual accounts mainly pay costs happened in outpatient visiting and indisposition treatment.

Once exceeding a fixed amount of out-of-pocket, social insurance fund would pay costs arisen in inpatient admissions, catastrophic diseases, and part of the costs of some chronic diseases no need to be treated in hospitals.

***Sanjin Model*** has three tiers of medical funds: 1) Social insurance fund, under the charge of health insurance bureau, pays for expensive treatments and catastrophic diseases; 2) Enterprise relief fund, under the charge of each enterprise, help those enrollees who can't afford their health costs; 3) Balance in individual accounts, held by enrollees and under the charge of their enterprises, pay the general health costs. Many cities in Shandong province, such as Qingdao, Yantai, and Tianjin municipality adopt Sanjin model. All of the cities have a common character that many state owned enterprises exist, which still hold their hospitals to provide employees health services. Concerned about this situation, enterprises interpose medical insurance management that would help adjusting the relationships among health insurance bureau, employers and employees at the initial stage of health care reform.

The model that a city chooses to employ depends greatly on its history, current institutions, and the trade-offs in objectives that the city is willing to achieve. Sanjin Model is just an intergradation during the economic reform and has been replaced by the other two models at this stage. While with an eye to the intending development of China, original Tongdao Model and Bankuai Model have also been revised to balance the responsibility between social insurance fund and individual savings accounts in recent years. The benefit coverage between social insurance fund and individual accounts is no longer strictly separated by outpatient and inpatient services or

completely open.

By the end of 2005, there have been three provinces (Guangdong, Jiangsu and Jiangxi) and Shanghai municipality adopting Tongdao Model. Three provinces (Guangxi, Shandong and Sichuang) suggest both Tongdao Model and Bankuai Model. Despite five non-MSA provinces, Shenzhen special zone, three municipalities (Beijing, Chongqing and Tianjin), and the other fourteen provinces adopt Bankuai Model. Concerned with the number of provinces or cities which prefer specific MSA plan, support rate for Tongdao Model is 19% and that of Bankuai Model is 63% in China.

## 2.5 The Targeted MSA Programs in Present Study

Two typical cities involved in present study are Zhenjiang (located in Jiangsu province) and Hefei (located in Anhui province), where the social medical insurance programs are separately under Tongdao MSA program and Bankuai MSA program.

Zhenjiang city locates in the southwest of Jiangsu province. Total area is about 3,848 sq.km. By 2003, there have been totally 2,671,900 populations. GDP in 2003 has reached 64,356 million RMB. And GDP per capita has reached 24,089 RMB. At the beginning of 1990s, Zhenjiang as one of the first experimental cities of social insurance reform adopted Tongdao MSA program and till now it has become the most famous object many researchers and policy makers focus on in urban China. Experiencing a long time adjustment, the Tongdao MSA insurance program is still on process in Zhenjiang now. So we could achieve valuable information from there.

Hefei city, the capital of Anhui province, locates in the middle of China. Total area is about 7,266 sq.km. Local population is around 4,480,000 and midtown population is 1,465,000. Till the end of 2004, local GDP has reached 721,940 million RMB and GDP per capita has reached 12,448 RMB. From 2001, Hefei city began to carry out new social medical insurance program which followed the relatively conservative Bankuai MSA arrangement.

Both Zhenjiang and Hefei adopt global budget reimbursement approach. At the beginning of the year, local social security authorities would provide every health care institution a budget in the whole year. If expenditures go beyond the upper limit finally, health care institutions need to afford it by themselves. While part of the diseases is reimbursed by DRGs in both cities according to local policy. As Yip and Eggleston (2001) indicate, reimbursement approach has significant influence on health care supply and health expenditure containment. The two target cities we select not only depend on their representative character among similar programs, also because they implement the same reimbursement approach global budget which could help to reduce the intervention from supply side.

The specific arrangements of social medical insurance programs in Zhenjiang city and Hefei city are comparatively described in Table 2.

**Table 2 Medical Insurance Arrangements in Zhenjiang and Hefei**

| | | *Tongdao Model -- Zhenjiang city* | *Bankuai Model -- Hefei city* |
|---|---|---|---|
| **Reimbursement System** | | Global budget, prepayment | Global budget, prepayment |
| **Resources (Based on personal salary of last year)** | **IA** | Age<35, 2%*Employee+1%*Employer<br>35<Age <45, 2%*Employee+2%*Employer<br>Age>45, 2%*Employee+3%*Employer | Age<45, 2%*Employee+1%*Employer<br>Age>45, 2%*Employee+1.5%*Employer |
| | **SF** | Age<35, 8%*Employer<br>35<Age <45, 7%*Employer<br>Age>45, 6%*Employer | Age<45, 7%*Employer<br>Age>45, 6.5%*Employer |
| **Start Point/ Upper Limit** | | 10%*salary (yearly), RMB30,000 | 8~12%*salary (yearly), 400%salary (yearly) |
| **Cost-Sharing (Based on health care expenditure)** | **OP** | 1) Paid by IA<br>2) Under start point, paid by out-of-pocket when IA is exhausted<br>3) Over start point when IA is exhausted<br>In 1st grade hospital<br>8% paid by out-of-pocket; 92% by SF<br>In 2nd grade hospital<br>10% paid by out-of-pocket; 90% by SF<br>In 3rd grade hospital<br>12% paid by out-of-pocket; 88% by SF | 1) Paid by IA<br>2) Paid by out-of-pocket when IA is exhausted |
| | **EM** | (same as above) | (same as above) |
| | **IP** | 1) Paid by IA<br>2) Under start point, paid by out-of-pocket when IA is exhausted<br>3) Over start point when IA is exhausted<br><RMB5,000, 80% paid by SF<br>20% paid by out-of-pocket<br><RMB10,000, 90% paid by SF<br>10% paid by out-of-pocket<br>>RMB10,000, 95% paid by SF<br>5% paid by out-of-pocket | 1) Under start point, paid by out-of-pocket<br>2) Over start point<br>In 1st grade hospital<br>8% paid by out-of-pocket; 92% by SF<br>In 2nd grade hospital<br>10% paid by out-of-pocket; 90% by SF<br>In 3rd grade hospital<br>12% paid by out-of-pocket; 88% by SF |
| | **SD** | 30% paid by out-of-pocket<br>70% paid by SF | 30% paid by out-of-pocket<br>70% less paid by SF (according to the policy) |

IA= Individual account, SF= Social fund;

OP= Outpatient service, EM= Emergency service, IP= Inpatient service, SD= Specific diagnosis.

X%*Employee means resource is mobilized every month from individual insured employee by X% of one's average salary in last year; and X%*Employer means that accordingly from one's employer by X% of one's average salary in last year.

Source: from *Provisional Provisions on Social Medical Insurance of Zhenjiang Municipality*, 2001;
from *Provisional Provisions on Urban Employee Basic Medical Insurance of Hefei Municipality*, 2000.

## 2.6 Problem Statement and Research Gaps

In addition to the difference in policy design, each nation implementing MSAs is under a special history and background. When we talk about the effectiveness as well as the concomitant influences from this new health financing system, there necessarily are some particular issues within each and every nation. Concerned with the situations in China, here progress and problems of MSAs will be particularly illustrated.

Theoretically speaking, it’s too hard to find a perfect MSA program without any problem. Tongdao program, being tested in Zhenjiang and Jiujiang, tends to cause enrollees to consume their individual accounts as soon as possible so as to benefit from social fund. What’s more, the complicated management system makes moral hazard possible under the cooperation of health provider and enrollees. The more popular MSAs, Bankuai arrangement leads to health resource wasting. Many outpatients try to have inpatient services and the inequity of utilization seems to a serious problem existing in enrollee groups with different background. The pilot experiments as well as lots of empirical studies suggest this point to us.

The payment arrangement of Tongdao program, which vertically based on the amount individuals spend on health care, has a broader risk pool of health service costs. Individual accounts not only pay for inpatient outlay, but also expenses of outpatient services. Especially for the patients in catastrophic and chronic diseases, they would benefit a lot from social fund with a lower out-of-pocket expense relatively. However

the virtue of Tongdao arrangement is also the weakness for this kind of policy design. Here, the responsibilities of public and individuals are implicit in health care expenses. Individual accounts just serve as the buffer of social insurance fund. Because individual burden at different payment levels varies a lot, patients have incentive to overspend and finally result in corroding social fund. In this event, enrollees would not like to accumulate for individual accounts, which further intensify health cost inflation and predict latent financing crisis in a long run.

Different from Tongdao arrangement, Bankuai arrangement's payment scope is horizontally divided by the treatment enrollees take as referred before. Expenditures in inpatient admissions and outpatient visits will be separately reimbursed through social insurance fund and individual accounts. Therefore, two independently operating funds clear the responsibilities between public and individuals. On one hand, management cost and the payment risk for social fund are greatly reduced. Enrollees are also much more conscious about their cost containment. On the other hand, the risk-pooling ability of social fund is relatively weak than Tongdao arrangement because the outpatient costs, which account for more than 60% total health expenditures are not under its payment scope. Bankuai arrangement actually has no difference with catastrophic health insurance plan, engendering inequality problems in health care. Social fund hold much balance, whereas part of the enrollees heavily burden and cannot satisfy their normal needs for health care, especially for the elder chronic outpatients.

MSAs, as a universally implemented and gradually enlarging program of health care financing in urban China, has became an important strategic issue to both central

government and every local authority. Every city is trying to revise local MSA program to be more effective and more efficient, meanwhile no expense of the equity and quality in health care. While the essential problem sometimes consists in the policy design, here referring the MSA program a city chooses to implement. As Hsiao (2000) indicated that, the chosen financing approach, combined with the organization of health care delivery and the chosen incentive structure, determine who has access to health care, the cost of health care, productive efficiency, and quality of services. Therefore, to choose what kind of MSA program and how to improve current health insurance program are becoming a more and more important for all of the local authorities in China, as well as other nations that want to induce MSAs. However, the choice between Tongdao arrangement and Bankuai arrangement always seems a dilemma policy makers have to face in the new health financing reform.

Health policy makers always make great efforts to find the balance between equity and efficiency. After a trial and error process, many developed nations have committed that the first objective health policy should reconcile is equity (OECD, 1994). Even for some nations under the market oriented health system, equity is also viewed as one of the first coming principles in evaluating health system. Under the environment of rapid cost inflation, one approach to reducing the fraction of public financing is to substitute out-of-pocket payments or private insurance. However, there is a limit to how much out-of-pocket payments can be increased if the goal of equity is to be fulfilled (Gerdtham and Jönsson, 2000). Same problem also lives with MSAs. Several research gaps in this area exist as follows:

First, there are quite a few of empirical researches which focus on the equity issues of China's MSAs. Experiences from foreign nations are quite limited and based on a totally different background we have little to reference. Many researches on China's MSA system still stay on feasibility analysis or from macro level generally stating its performance as well as impact on public health care equity, which cannot well reveal the practical effect of MSA programs. A few empirical studies at the beginning were enslaved to limited data resource providing implicit conclusions. Yip and Hsiao (1997) have argued that although MSAs have become a widely proposed model for global financing health care, there is little empirical evidence on their impact. As we have mentioned, the underlying assumption of social medical insurance program is thought to help enlarging the access to health care for general urban population through a city-wide pooling. Meanwhile, the most recent demand studies' findings indicate the household's utilization of health services are more responsive to changes in price and income than is initially reported by the early demand studies, which seems to be greater among the poor than the rich (Sepehri and Chernomas, 2001). Now under this compulsory insurance, the urban employees in China are forced to adjust their medical behaviours. Restricted by the insurance coverage and co-payment rate, they are supposed to initiate economizing their costs to pull back the pace of the rising individual health-care expenditure. Does this mean that we have to distort people's normal medical behaviour and the depressed expenditure will be achieved at the cost of health equity?

Second, the comparative studies among various MSA programs are even sparse. The original two MSA programs, Bankuai arrangement and Tongdao arrangement come forth in the pilot experiments. However no comprehensive empirical evidences help

later comers make a sensible decision from research side. Now MSA programs in majority Chinese cities are closed to Bankuai arrangement. A few cities adopt Tongdao arrangement. Each of them is sure to have its reasons. While in a same country holding similar culture and background, the different choice means their different considerations and objectives about the MSA program. Then from a long run, which one more helps in equity improving of the health care?

Finally, most of the areas in China still have little capability in health-risk protection despite that a health care security system now is under established. So far the demand side researches designed to investigate health care financing in China are less developed compared with the developed countries as well as some developing countries, and need much more explorations to delve further into this area.

## 2.7 Significance of the Study and Research Objectives

Health input refers to the approach used to allocate health resource. When people or enterprises put their money into different health insurance program to achieve prospective security, the authority of allocating these resources is forwarded to organizations in charge of the insurance programs. Now health systems are increasingly moving from retrospective reimbursement models to prospective models of budgeting in an effort to control cost and improve efficiency (Rice N and Smith P., 1999; Rosalyn and Alan, 2004). The approaches of reimbursement will directly impact the resource input on whole quantity and quality improvement of health service organizations could

provide. In the meanwhile, the design of health programs on financing, benefic coverage, management will greatly impact the quantity and quality of health care individual enrollees could receive.

Social medical insurance of China aims to establish a basic health security system for the whole urban population. Therefore, the input equity principle of the various MSA programs should firstly keep to allocation to ensure equality of access for general enrollees and then consider the principle of allocation based on need. In other words, based on available health resource general enrollees and registered enterprises expect that the social insurance could provide everyone equitable opportunities in accessing to health care because most of the target population are relatively healthy and seldom use service at this stage.

The research is to focus on the two typical social medical insurance programs in urban China. The equity in access will be assessed under current health security system from health service utilization aspect. Further the impact different MSA arrangements put on access equity will be considered. Significantly different from previous numerous discussions about whether or not MSAs should be viewed as a well health care financing approach, or how well China’s MSA program could achieve the equity improving goal as the policy designers purposed to, this study aims to fill the information gap by finding out the relationship between equity in access and MSA program arrangement. Based on above, present study explores the equity issues under MSAs and preliminary assesses two typical MSA programs in urban China. Finally, it could help us understand to what extend the various arrangements in MSA programs

influence the equity in access to health care and also help to improve local health security program in urban China.

By the end of the research, following questions would be expected to answer:

1) Does any difference exist in access to health care under Tongdao and Bankuai MSA arrangements?

2) And what lead to the differences that have been found above?

3) Which arrangement is a properly structured health financing program capable of improving equity of access to health care across various socioeconomic and health groups?

# CHAPTER III LITERATURE REVIEW

An appropriate theory serves as the backbone of a well-designed research model. The purpose of this chapter is to provide detailed research review on justice and equity in health care. In the first part, the relation between justice and health care is discussed. In the second part, the various equity theories in health care sector are elaborated. And then both theoretical and empirical studies on equity in access are described to help establishing the framework in the next chapter. Finally, we will indicate the research gaps as well as significance of present study.

## 3.1 Equity Theories on Health Sector

### 3.1.1 Justice and Health Care

This part is about justice in the design of a health care system. These problems of individual or micro decision-making are forced on us by biology, technology, and very general moral concerns. Macro decisions determine, such as what kinds of health care services will exist in a society, who will get them and on what basis, who will deliver them, how the burdens of financing them will be distributed, and how the power and control of these services will be distributed, affect the level an distribution of the risk of our getting sick, the likelihood of our being cured, and the degree to which others will help us when we become impaired or dysfunctional (Daniels, 1985).

Some inquires about whether health care is special among other social welfare or not are often raised before we come to just health care. Much of the controversy in public policy reflects conflicting views about the nature of health care as a social good or about the requirements of justice in general (Daniels, 1985). Libertarians emphasize a respect for human rights. And one of Locke's two natural rights is the rights to life (Gillon, 1986; Wagstaff and van Doorslaer, 2000). It is assured that health is ranked on the top of the list of human basic needs among house, food, education, and that people should hold the right to health care. Then society has the duty to its members to allocate an adequate share of its total resources to health related needs, such as the protection of the environment and the provision of medical services. Society has the duty to provide a just allocation of different types of health services, taking into account the competing claims of different types of health needs. And each person is entitled to a fair share of such services.

### 3.1.2 The Notion of Equity

Equity concerns fairness and justice, the idea of balancing legitimate, competing claims of individuals in society in a way that is seen as impartial or disinterested. Distributional equity, which concerns the fair distribution of some good or service of interest, has been the dominant equity concern both of normative economic analysis and of health policy makers (Hurley, 2000). Most theorists and policy makers have reached an agreement on the indication of health care justice that those in ill-health should receive treatment on

the basis of their need for care, not on the basis of non-health-related attributes.

Agreement on the importance of equity concerns doesn't translate into agreement on the relevant notion of equity (Hurley, 2000). Wagstaff and van Doorslaer (2000) notice that studies of equity in the finance of health care have tended to take the premise as their starting point that health care ought to be financed according to ability to pay. However, most of the analytic arguments justifying a focus on distributional equity in the delivery of health sector give rise to much controversy due to the large random components in ill-health and the need for health care which is always beyond control. Many different focal variables have been proposed for the health sector and those received the most sustained attention are variants that fall within three broad distributional equity principles: 1) allocation according to need; 2) organized to ensure equality of access; and 3) allocation to equalize the distribution of health (Wagstaff and van Doorslaer, 2000; Hurley, 2000).

### 3.1.3 What Leaves in Present Study

Each of the equity principles articulated strives in a sense to be a general, universalistic principle to guide resource allocation throughout a health care system. However resources are allocated through myriad decisions in a multiplicity of contexts throughout the health care system, ranging from central government decisions at the national level, through the deliberations of regional and institutional boards, all the way down to each individual clinical encounter. It is hard to keep a single over-arching

equity goal at each level.

According to Hurley (2000), one of the strongest and most consistent messages from the empirical research on moral and ethical reasoning of people is the context-specific nature of such judgments (Walzer, 1982; Yaari and Bar-Hillel, 1984; Elster, 1992; Miller, 1992; Mannix et al., 1995). As one changes decision contexts, factors beyond distribution emerge such as notions of procedural fairness, duty, obligation, due process, informed consent, non-coercion, or rule of rescue. An equitable or just allocation is one that conforms to the relevant principle.

To make the comparative study of influence from the different MSA arrangements, the process framework of distribution equity is suitable here. From the theories, access approach of equity conception is appropriate for this thesis.

The social medical insurance program is not experiencing a long time in China. It is too early to evaluate its consequential impacts in terms of health status at this time. What's more, the MSA program of China is not implemented on population level. Under the current multi-level health security system, weak groups could benefit from other medical insurance program. The notion to allocate resources according to need is not a major concern in the organization of MSA program. And as we mentioned before, the important objectives in establishing the latest health security system include improving access and equity in access to basic health care for all of the urban population. In other words, China government aims to improve the access to health care which is viewed as a significant limitation existing in the previous insurance program.

Therefore, we measure equity impact of MSA health financing program in the principle that whether or not it is organized to ensure equality of access. Early empirical study in this kind (Liu et al, 2002) just follows the path.

## 3.2 Access to Health Care

### 3.2.1 The Conception of Access

Access has been defined as “freedom or ability to obtain or make use of ” according to the dictionary. When the term “access” is used in policy statements and in much of the academic literature it is clear that what is often meant is “receipt of treatment” (Wagstaff and van Doorslaer, 2000). In the review of Wagstaff and van Doorslaer (2000), they well illustrate the history of the definitions on “access” which starts from Tobin’s remark (1970).

Tobin suggests that equality in health care might be taken to mean that “the treatment of an individual depends on his medical condition and symptoms, not on his ability or willingness to pay”. This notion provides practical foundation for empirical studies in many years. The examination of the extent to which access to health care being linked to need actually interpret access in terms of treatment received (Wagstaff et al. 1991a, b; Le Grand, 1991; O’Donnell and Propper, 1991).

Meanwhile, several researchers (Le Grand, 1982; Mooney, 1983, 1991, 1994; Olson and Rodgers, 1991) argue that access to treatment and receipt of treatment are not the

same thing. Le Grand (1982) defined equal access to a good as a situation in which individuals face the same price in terms of both monetary and non-monetary for the good. This has been criticized equal prices are not sufficient to ensure equal “ability to make use of” as two individuals with different income or wealth would have different abilities to pay for good even if they faced identical prices. Le Grand (1987, 1991), therefore, proposes an alternative definition based on the notion that individuals have equal access only if they face the same feasible choice set. This requires that they have the same budget space, where it is also including monetary and non-monetary factors. Individuals would have the same opportunities to trade-off different goods and services at the same rate so differences in consumption would reflect nothing but differences in preferences.

Olson and Rodgers (1991) argue that this definition is too broad. They define access as the maximum attainable level of consumption of medical care, given the individual’s income, and the time and money prices associated with health care consumption (Wagstaff and van Doorslaer, 2000). Here, equal access to a good is viewed as a situation in which everyone is able to consume the same quantity of goods (Hurley, 2000). This definition as they say is consistent with the literal meaning of access and is not obviously inconsistent with a concern for equal access to a particular good. It allows individuals differential ability to purchase other goods and services and implies that if two people with different incomes choose to consume the same quantity of the good in question, they will not be able to consume the same quantity of other goods. Olson and Rodgers further develop the welfare implications of this definition using a two-person,

two-good model.

According to above, “access” pertains to the ability or capacity to do something, and not to whether it is actually done; it is independent of demand or utilization and can not be simply assessed by examining consumption patterns. Therefore in some studies, “access to care” is defined as one’s ability to obtain health service when needed, which is contingent upon financial constraints or non-financial constraints (Yip and Berman, 2001; Liu et al. 2002).

### 3.2.2 Factors Associate with Access to

Empirical work in the area of access involves a complex set of issues because many factors could influence the degree to which care is needed either for the difference of illness or the cost variations in accessing services. It impels researchers to go further to explore the factors associated with people’s access to health care (Khan, 1992; Buchmueller et al., 2004; Atella et al., 2004). Although spatial access to health care has become another topic in equality or equity issues (Rosero-Bixby, 2004; Thorson and Johansson, 2004), the mainstream still stays on patients’ socioeconomic background and their health condition. Factors like income, education, chronic history are the often-used index in conducting macroscopical equity analysis.

One focus of this study is on the effect of insurance arrangement on medical service seeking behaviors, relevant theories and empirical studies about patients’ attitude are reviewed. Concerning its crucial importance of cost-sharing in health policy terms and

the weight attached to it in literature, McGuire et al. (1988) have gone to this point in their book. The arguments in favor of cost-sharing have been mentioned in above section which says that by making the patient bear some of the financial cost at the point of consumption and assuming that there is an identifiable downward sloping demand curve, the quantity of health care demanded will be less than if it were zero money priced. So, the sovereign patient will make more rational choices regarding health care consumption. In turn, cost-sharing provides something which may approximate to the price signals of a market, to supplier-doctor as well as the consumer-patient.

The argument is supposed to be helpful in promoting efficient resource allocation of health care system. However, the asymmetric information existing in health care market brings much trouble to patient's judgment. The supply side of the health care market dominates such an extent that there are limits to how far health care can usefully be viewed in a strictly conventional neoclassical analysis. Cost-sharing would be helpful in improving allocation efficiency only when the patients who fail to attend because of cost-sharing are those for whom the benefit of attending would be least. Obviously, it is not the fact. McGuire et al. report some unintended results caused by cost consciousness in the UK. When prescription charges to the patients for medicines have been raised, part of the supply response by doctors has been to increase the quantity of units of the medicine on the prescription in an attempt to protect the consumer from the full impact of the increased charge. And whether the raising revenue by cost-sharing will result in decreased total costs is however less clear.

Some possible disadvantages of cost-sharing attract much attention in the meanwhile. Firstly, when doctors know that the patient has to afford some direct charge, even if the charge doesn't directly affect the doctor's financial reward, may influence his decision on selection of the treatment. Secondly, it is about the impacts on equity which as well rely on specific assumptions made about household treatment seeking behavior, particularly, the sensitivity of the household's choice of treatment or frequency of visits to changes in access cost and the possibility for substituting alternative sources of treatment (Sepehri and CHernomas, 2001). The role of monetary and non-monetary costs of access and their impact on the demand for health care services has been subject to a growing body of empirical research during the past three decades.

As the form of insurance coverage is an important component in determining the elasticity of demand for health care, many empirical studies from demand side have focused upon the effects of the introduction of particular forms of cost-sharing. And all of them indicate a relation between insurance coverage changing and the consumption of health care services (McGuire et al., 1988). The particular health system arrangements in the USA make it popular to study health service utilization and insurance coverage. One of the most significant studies of this kind is the RAND Health Insurance Experiment (HIE), initiated by the federal government of the States and ranging from 1974 to 1982 (Newhouse et al., 1981). The significance of RAND HIE just lies in this respect in its emphasis on the empirical evidenced on the direction of change in this relationship under controlled conditions and in its attempt to analyze the effect of different patterns of coverage on health.

## 3.3 Operationalization of Equal Access

Since the Rand Health Insurance Experiment in the beginning of 1980s, methodology issues about how insurance plans affect the use of medical service have been developed gradually. Economists compare alternative models to test demand for medical care, in which the probability of positive expense and the level of positive expense are two major concerns (Wagstaff and van Doorslaer, 2002). Considering the complicated arrangement of China's MSA program, the actual level of positive out-of-pocket expense is hard to calculate. We just focus on the probability of positive expense as the index of access to care as previous study (Liu et al, 2002) has ever done. And under MSA insurance program in Mainland China, the probability of positive expense equals to the probability of visiting cause insured need to pay whole or part of expense when using any health care service.

Concerning apparent conflicts among the various definitions of inequity in access, it brings much difficulty to the empirical studies when it comes to ask how to measure. Now the interest in the study of access to health care generally is horizontal equity about whether persons in equal need of treatment receive similar treatment regardless of their income. The issue of vertical equity in access, whether persons in different degrees of need are treated in appropriately different ways, seems to be a big challenge for researchers from economics aspect (Cullis and West, 1979; Mooney, 1996; Wagstaff and van Doorslaer, 2000).

Most studies of equity in the delivery of health care have been based on the concept of horizontal equity, and among them the majority concern with socioeconomic inequity in health care utilization. In other word, the interest is whether, on average, persons in equal need of treatment receive similar treatment regardless of their income. In the context of China mainland, personal socioeconomic background is more complicated. Other factors, such as education history and job status also influence the health treatment a person may receive (Hsiao and Yip, 1997; Liu et al., 2002). Therefore, this study would explore the horizontal equity about whether persons in equal need of treatment receive similar treatment regardless of their income, education history as well as job status.

To ensure an integral evaluation, vertical equity is also involved here. Most empirical studies measure degree of need based on person's health status (Yip and Berman, 2001; Liu et al. 2002). They assume that one holds a higher degree of need in health care if his health condition is not good. Accordingly, the vertical equity would be examined about whether persons in different health status are treated in appropriately different ways.

However, the general regression-based tests concerning about inequity does not enable inequity to be quantified, which is essential if cross-site comparisons or comparisons over time are to be performed. While the regression approach can be extended to allow an index of inequity to be derived (Wagstaff and van Doorslaer, 2000). So far, equity has been taken to mean that the intercepts and slope coefficients in the medical utilization equations should be the same for all income groups.

One approach, suggested by Wagstaff, van Doorslaer and Paci (1991), is to divide one sample into income groups and then compute need-standardized medical care figures for each income group using the direct standardization method (Rothman, 1986). These figures indicate how much medical care people in each income group would have received if they had been in the same degree of need as the sample as a whole. The figures could be obtained by applying the need characteristics of the sample to the mean medical care figures of the income group in question. This method has been largely applied to empirical studies.

# CHAPTER IV THEORETICAL FRAMEWORK

## 4.1 Introduction

Based on the comprehensive review of the literature on access equity issues of health care in the last chapter, reasons of framework constructing are provided from both theoretical and empirical consideration. The proposed framework of MSA arrangement and equity in health care is presented in the next part. To follow a particular description on the background of constructs, hypotheses and conceptual model are gradually developed at the end of this part.

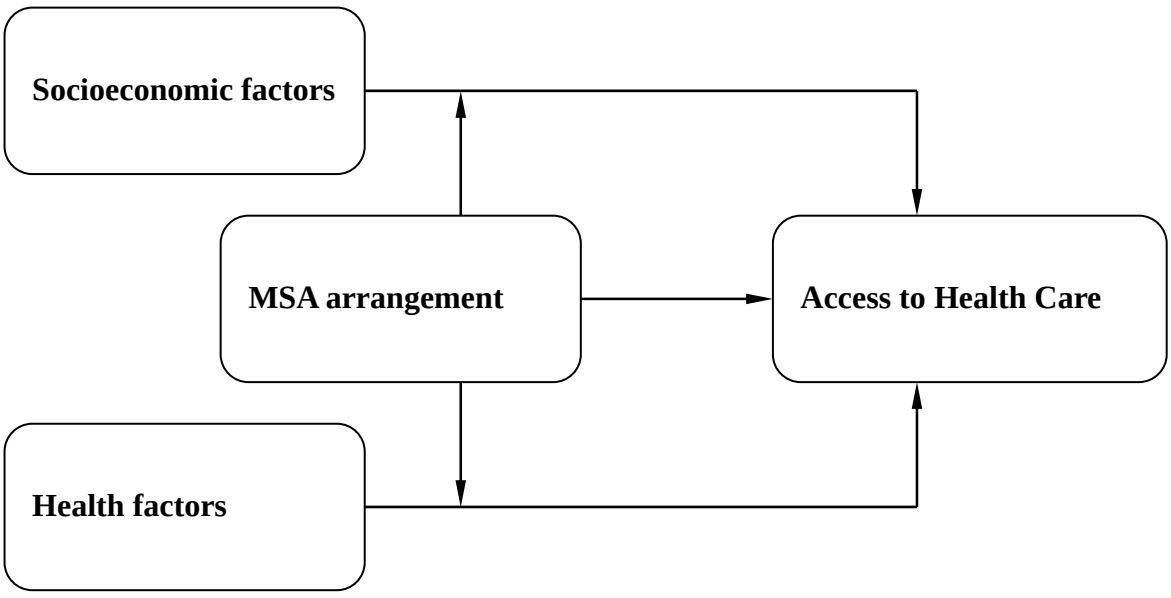
## 4.2 Proposed Framework

Equity should be one of the major objectives in establishing a health security system. Urban China's compulsory MSA program, as the basic and central health security system for majority urban employees might bring impact on their health seeking behaviors.

In this study, how the arrangements of MSA affect access as well as final equity in access to health care are examined. As medical insurance co-payment is one of the most important components influencing health seeking behavior, present study just focuses on the difference of MSA co-payment arrangements. Based on equity theory, my literature review, and research gaps exist, a framework and models are proposed here.

There are a number of constructs included in the models. Predictor ones are socioeconomic factors, health factors, and the MSA program arrangements. The criterion constructs include access to health care. The formal one is measured by non-financial access (probability of visiting), while the later includes both horizontal equity (across socioeconomic groups) and vertical equity (across health condition groups). In this chapter, an analytical framework of the model is built up based on the review of last section and research gaps that exist. The relationships between the predictor constructs and criterion constructs are depicted in Fig.2 as follows. The assessing wants to find out the influence MSA arrangements have brought to access to health care by controlling the socioeconomic background and health condition of survey informants. Specifically, one of the purposes of this study is to empirically examine whether or not the arrangements of MSAs have moderate effect on equity in access to health care across socioeconomic groups and health groups.

**Fig. 2 Schematic Diagram of the Analytical Framework**



## 4.3 Hypotheses Development

According to the review above, “access” pertains to the ability or capacity to do something, and not to whether it is actually done; it is independent of demand or utilization and can not be simply assessed by examining consumption patterns. In some studies, “access to care” is defined as one’s ability to obtain health service when needed, which is contingent upon financial constraints or non-financial constraints (Yip and Berman, 2001; Liu et al. 2002).

What’s more, both horizontal and vertical inequities in access to are examined in present study. Horizontal equity here is talking about whether insured in equal need of treatment receive similar treatment regardless of their socioeconomic background (Cullis and West, 1979; Mooney, 1996; Wagstaff and van Doorslaer, 2000). Most studies of equity in the delivery of health care have been based on the concept of horizontal equity, and the majority concern with socioeconomic inequity in health care utilization. In other word, the interest is whether, on average, persons in various subgroups of income, education, and job status could have similar health care visit rates. The issue of vertical equity in access is whether persons in different degrees of need are treated in appropriately different ways (Cullis and West, 1979; Mooney, 1996; Wagstaff and van Doorslaer, 2000). Similarly, the interest is whether persons across various subgroups of health status have different health care visit rates.

### 4.4.1 Socioeconomic Factors

#### *4.4.1.1 Income*

In general, financial constraints of “access” have close relation with the income an individual or a family could achieve in their daily lives. How much people could earn will directly influence their health services consumption. Therefore, income is always the first concern when coming to talk about the access issue in health care area.

Report from Singapore tells that given the magnitude of out-of-pocket costs borne by individuals, the costs of medical care in Singapore often can not be met by elderly people, especially elderly widows who are never employed outside the home, and poor people (Hsiao, 1995; Barr, 2001; Hanvoravongchai, 2002; Shortt, 2002). What’s more, as the MSA system provides no risk pooling between individuals and exposes them more fully to the costs of health services, it can be said that demand for health care in Singapore is rationed implicitly through consumer purchasing power in the market (Phua, 1997; Hanvoravongchai, 2002).

Most empirical studies of demand side try to explore the factors that tend to influence patients’ health seeking behaviors. One consideration is the “price” of health care. Another variable that is considered to be important in its influence upon demand is income. The most recent findings indicate the household’s utilization of health services are more responsive to changes in price and income than is initially reported by the early demand studies, which seems to be greater among the poor than the rich (Sepehri and Chernomas, 2001; Gertler and van der Gaag, 1990). In Heller’s cross-sectional

study (1982) of Malaysia, household's decisions are modeled as to whether they would seek outpatient care at all, the type of outpatient care sought (government and private clinics, and traditional practitioners) and total outpatient visits. It seems that income has a negligible influence on the household's decision whether to seek outpatient care at all, or total outpatient visits, although it is found to have a statistically significant effect on household choice of providers in Heller's study. The similar study from Gertler and van der Gaag (1990) also shows that price and income play a significant role in the demand for health care, that demand becomes less price elastic as income increases, and that for the lowest income quintal demand is elastic at high price ranges. Accordingly, user charges will reduce total demand moderately, with the reduction in total demand being concentrated in lower income groups. The lowest income quintal account for about 40% of the total decrease in quantity demanded versus 5% decline for the highest income quintal. Same findings have also been indicated in equity studies (Yip and Berman, 2001; Liu et al, 1999; Liu et al, 2002)

Hence, the following hypotheses are proposed:

Hypotheses 1a-d

*H0: Insured's income level isn't positively related to their probability of visiting of (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

*H1: Insured's income level is positively related to their probability of visiting of (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

#### *4.4.1.2 Education*

Among the significant socioeconomic indicators, education could be viewed as the

non-financial constraint on access to health care (Liu et al, 2002). Generally, well-educated persons have rich knowledge on health as well as medical services. They tend to get more chances to consume health care service than poorly educated ones if both of them have similar physical problems. Equity studies, either international or China-based, are used to involve education as an important control variable to measure horizontal inequity against the disadvantage socioeconomic groups.

Hence, the following hypotheses are proposed:

Hypotheses 2a-d

*H0: Insured's education level isn't positively related to their probability of visiting of (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

*H1: Insured's education level is positively related to their probability of visiting of (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

#### *4.4.1.3 Position*

Concerning about the specific situation in China, job status as another important control variable is included in people's socioeconomic factors that may influence their access to health care in previous equity studies (Hsiao and Yip, 1997; Liu et al., 1999; Liu et al., 2002). Empirical studies of China do provide evidence for the relationship between people's job status and their health care consumption. Findings from Liu et al.'s study (2002) indicate that in Zhenjiang city, managerial officers are more likely than workers to use both outpatient services at 0.0001 *p*-value and diagnostic services at 0.0005 *p*-value. While on the other hand, workers are more likely to rely upon the use of emergency care at 0.0005 *p*-value.

Based on above, I postulate the following:

Hypotheses 3a-d

*H0: Insured's job status isn't positively related to their probability of visiting of (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

*H1: Insured's job status is positively related to their probability of visiting of (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

### 4.4.2 Health Factors

According to the definition from World Health Organization in 1947, health is a state of physical, mental, and social well-being. Even medical services are often mistakenly considered to be synonymous with health (Feldstein, 2002), the former is sure to be the most direct and significant factor concerning its substantial assistance in health improving. Health care is only consumed on the presumption that it has investment benefits in health status. The demand for health care is, therefore, a derived demand based upon the consumer's desire for health (McGuire, Henderson, Mooney, 1988).

In equity studies, health factors are employed to illustrate vertical inequity which says that whether persons in different degrees of need are treated in appropriately different ways regardless of their socioeconomic background. Here, chronic disease history and self-reported health are required to report to well indicate insured's health status. The former are often used in previous equity study (van Doorslaer and Wagstaff, 1992; Benzeval and Judge, 1994; Alberts et al., 1997; Smaje and Le Grand, 1997), while the latter presents in health care studies as a subjective variable for individual health status. According to the result from Liu et al. (2002), chronic disease status does appear to be

the most significant determinant of health care utilization at various settings. Compared to individuals without chronic diseases, people with chronic illness are two or four times more likely to use outpatient care, inpatient and emergency care, and expensive diagnosis services at 0.0001 *p*-value.

Hence, the following hypotheses are proposed:

Hypotheses 4a-d

*H0: Insured who have chronic disease history don't tend to use more (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

*H1: Insured who have chronic disease history tend to use more (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

Hypotheses 5a-d

*H0: Insured who have reported poor health condition don't tend to use more (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

*H1: Insured who have reported poor health condition tend to use more (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

### 4.4.3 MSA Arrangement

The individual characteristic-based view of equity in health care (Liu et al, 2002) provides original theoretical basis for the model's expectation. While significant influence from health insurance programs on patient's health care seeking behavior ensure the position of MSA arrangement construct in the model. As you could see in Fig.2, proposed links among the three constructs are developed by controlling the interventions from individuals' socioeconomic background and health condition. A central hypothesis of present study is that besides the individual health condition and socioeconomic status, the arrangement of MSA medical insurance programs is also

among the determinants of care-seeking behavior in various settings.

According to the early demand studies in the early 1980s, prices in terms of cash, time and travel have negligible effects on household's choice of treatment or frequency of visits, and the cross-price elasticity of demand (the degree of substitutability among alternative sources treatment) is small (Heller, 1982; Akin et al., 1986; Birdsall and Chuhan, 1986; Jiminez, 1987). While recent studies, often based on more sophisticated theoretical models, econometrics specifications and estimations, conclude that the household's demand for medical services are more responsive to price changes than what has been reported in the early studies (Mwabu, 1986; Dor et al., 1987; Gertler et al., 1987; Alderman and Gertler, 1988). It shows that the response to price changes tend to be higher for lower income groups than it is for other income groups (Gertler and van der Gaag, 1990). As the form of insurance coverage is an important component in determining the elasticity of demand for health care, many empirical studies (Beck, 1974; Newhouse et al., 1981; Long et al., 1998) from demand side have focused upon the effects of the introduction of particular forms of cost-sharing. And all of them indicate a relation between insurance coverage changing and the consumption of health care services (McGuire et al., 1988).

Hsiao (2000) once indicated that, the chosen financing approach, combined with the organization of health care delivery and the chosen incentive structure, determine who has access to health care, the cost of health care, productive efficiency, and quality of services. Health care financing policy has a significant impact on patients and providers' behavior and organization of health care delivery. As mentioned earlier, one important

argument for MSAs implementation is to reduce moral hazard problems that commonly occur in countries with comprehensive health plans. In other words, high deductibles and high cost sharing may prevent consumer moral hazard (Hanvoravongchai, 2002). Actually, both patient and provider sides still have incentives of overuse under MSAs if without other accessorial limits (Hsiao, 1995; Yip and Hsiao, 1997; Song and Liu, 2001).

Various MSA programs in urban China are distinguished by their benefit scope and payment sequence arrangements between individual accounts and social fund. In early studies, Tongdao arrangement, being tested in Zhenjiang and Jiujiang, tends to cause enrollees to consume their individual accounts as soon as possible so as to benefit from social fund. What's more, the complicated management system makes moral hazard possible under the cooperation of health provider and enrollees (Hsiao and Yip, 1997). Many outpatients try to have inpatient services and the inequity of utilization seems to a serious problem existing in enrollee groups with different background. The pilot experiments as well as lots of empirical studies suggest this point to us. The benefit coverage in Tongdao arrangement, which vertically based on the amount individuals spend on health care, has a broader risk pool of health service costs. Individual accounts not only pay for inpatient outlay, but also expenses of outpatient services. Especially for the patients in catastrophic and chronic diseases, they would benefit a lot from social fund with a lower out-of-pocket expense relatively. However the virtue of Tongdao arrangement is also the weakness for this kind of policy design. Here, the responsibilities of public and individuals are implicit in health care expenses. Individual

accounts just serve as the buffer of social insurance fund. Because individual burden at different payment levels varies a lot, patients have incentive to overspend and finally result in corroding social fund. In this event, enrollees would not like to accumulate for individual accounts, which further intensify health cost inflation and predict latent financing crisis in a long run.

In 1997, Yip and Hsiao conduct a qualitative case study about Zhenjiang MSA program. They find that overall health spending declines during 1994-1995, much of which is derived from the reduction of expensive diagnostic services and drugs. However, utilization pattern and length-of-stay per admission have no significant change. High deductible only slightly reduces demand for visits and hospitalizations, which might be influenced by a case-based prospective payment system (providers have incentives to increase the number of visits and hospital admissions).

A quantitative research assesses the performance of the pilot project according to the results from a continuous pre- and post-reform survey during 1994-1995 in Zhenjiang city (Liu, et al, 1999). As a quick response to the new reform, health service utilization has a shift from inpatient care to outpatient care. The total health care expenditures in that city decrease by 8% among respective service-specific users, 11% for inpatient admissions, 17% for length of stay per admission, and the use of expensive diagnosis and treatment facilities also suggest a decreased trend; meanwhile, the incidence of using any health care services increases by 12% among general population and the inpatient care spending per admission among hospital users remains constant before and after the reform. All of the above indicate positive effect on cost containment, which

may cause by the use of more cost-effective services on patient side and cost control under provider side's reaction to the new fix-payment regulation.

Specific equity studies in health care on urban China health reform come from Gordon G. Liu et al (2002). They evaluated changes in access to health care in response to the pilot experiment of urban China's health insurance reform in terms of the pre- and post-reform changes in the likelihood of obtaining various health care services across sub-population groups with different socioeconomic status and health conditions, which shed light both on vertical and horizontal equity measures in health care utilization. The main findings show that before the insurance reform, the likelihood of obtaining basic care at outpatient setting is much higher for those with higher income, education, and job status at work, indicating a significant measure of horizontal inequity against the lower socioeconomic groups. After the reform, the new insurance plan lead to a significant increase in outpatient care utilization by the lower socioeconomic groups, making a great contribution to achieving horizontal equity in access to basic care. What's more, the new plan also has maintained the measure of vertical equity in the use of all types of care. There seems to be no evidence suggesting vertical inequity against people of chronic disease conditions in access to care at various settings. Despite reform, people with poor socioeconomic status continue to be disadvantaged in accessing expensive and advanced diagnostic technologies.

Different from Tongdao arrangement, benefit scope under Bankuai arrangement is horizontally divided by the treatment enrollees take as referred before. Expenditures in inpatient admissions and outpatient visits will be separately reimbursed through social

insurance fund and individual accounts. Therefore, two independently operating funds clear the responsibilities between public and individuals. On one hand, management cost and the payment risk for social fund are greatly reduced. Enrollees are also much more conscious about their cost containment. On the other hand, the risk-pooling ability of social fund is relatively weak than Tongdao program because the outpatient costs, which account for more than 60% total health expenditures are not under its coverage. Bankuai program actually has no difference with catastrophic health insurance plan, engendering inequality problems in health care. Social fund hold much balance, whereas part of the enrollees heavily burden and cannot satisfy their normal needs for health care, especially for the elder chronic outpatients.

Details about the social insurance programs in our target cities, Zhenjiang (Tongdao MSA program) and Hefei (Bankuai MSA program), could refer to Table 2. According to the principle that demand for medical services is negatively responsive to price, the higher cost share insured may afford the less medical service they consume.

Based on above, I postulate the following:

Hypotheses 6a

*H0: Under Tongdao MSA program, insured don't tend to use more outpatient services than that under Bankuai MSA program.*

*H1: Under Tongdao MSA program, insured tend to use more outpatient services than that under Bankuai MSA program.*

Hypotheses 6b

*H0: Under Tongdao MSA program, insured don't tend to use more emergency services than that under Bankuai MSA program.*

*H1: Under Tongdao MSA program, insured tend to use more emergency services than that under Bankuai MSA program.*

Hypotheses 6c

*H0: Under Tongdao MSA program, insured don't tend to use less inpatient services than that under Bankuai MSA program.*

*H1: Under Tongdao MSA program, insured tend to use less inpatient services than that under Bankuai MSA program.*

Hypotheses 6d

*H0: Under Tongdao MSA program, insured don't tend to use more diagnosis services than that under Bankuai MSA program.*

*H1: Under Tongdao MSA program, insured tend to use more diagnosis services than that under Bankuai MSA program.*

Hypotheses 7a-d

*H0: MSA program arrangement doesn't moderate the relationship between insured's income and their access to (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

*H1: MSA program arrangement moderates the relationship between insured's income and their access to (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

Hypotheses 8a-d

*H0: MSA program arrangement doesn't moderate the relationship between insured's education and their access to (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

*H1: MSA program arrangement moderate the relationship between insured's education and their access to (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

Hypotheses 9a-d

*H0: MSA program arrangement doesn't moderate the relationship between insured's position and their access to (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

*H1: MSA program arrangement moderates the relationship between insured's position and their access to (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

Hypotheses 10a-d

*H0: MSA program arrangement doesn't moderate the relationship between insured's chronic disease condition and their access to (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

*H1: MSA program arrangement moderates the relationship between insured's chronic*

*disease condition and their access to (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

Hypotheses 11a-d

*H0: MSA program arrangement doesn't moderate the relationship between insured's self-reported health condition and their access to (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

*H1: MSA program arrangement moderates the relationship between insured's self-reported health condition and their access to (a) outpatient, (b) emergency, (c) inpatient, and (d) diagnosis services.*

# CHAPTER V METHODOLOGY

## 5.1 Introduction

This chapter presents how the quantitative research is conducted. At the beginning, questionnaire development, sampling method and data collection design are delineated. The elaborations on operational measurement of variables and control variables are outlined at the end.

## 5.2 Questionnaire Development

Access to care is one's ability to obtain health services when needed, which is contingent upon financial constraints or non-financial constraints (Liu, et al, 2002). Hurley (2000) has said that equal access, implies that everyone in society is equally able to obtain or make use of health care. As an explorative study to comparatively assessing two MSA insurance programs in urban China, we just focused on one dimension (non-financial) concerned with their deep roots in health care access researches. Generally, non-financial constraints are measured by the probability of health care visiting.

To explore the access pattern of health service on enrollees from targeted two MSA programs can provide us reliable and valid quantitative evidence on the inequality impact caused by MSA arrangements in benefit scope and payment sequence. One of

the significant differences of the two MSA programs is lying in its benefit coverage of between individual account and social fund for various health services. In other word, under different MSA insurance program patients would afford different financial burden for the same kind of health service. Insured under Bankuai MSA program could benefit more from some service using, while insured under Tongdao MSA program may benefit more from another service using. According to the medical insurance policy statement, previous studies have generally discussed four categories of health services (outpatient/ emergency/ inpatient/ diagnosis) in evaluating urban China's MSA program. Therefore, the utilizations of those categories of health care were examined in present study.

In order to minimize recall bias as well as the time difference of data collection between two cities, access in terms of utilization will be measured by the probability of visiting health care provider, which is reported as a latest 1-year recall period use for outpatient, emergency services, and 5-year recall period use for inpatient, diagnosis services, respectively.

The hospital using depended on the incidences which had occurred on individual informant in the time span. The scope of diagnosis was needed to be presented specifically. Diagnosis was defined as the expensive diagnostic procedures patients had taken during their treatments. Consulting from Golden Liu's (2002) approach and the coverage arrangement in the targeted MSA programs, diagnostic items include the use of sixteen major medical technologies: CT, MRJ, ECT, TCT, color-doppler, beta-ultrasound, HOLTER, PCR, aetiology assay of allergy, DSA, cardiovascular examination, cardiac electro-physiology, electrophysiologic study picture, UCG

(ultrasonic cardiogram), analysis of sound spectrography, enzyme-linked immuno sorbent assay, endoscopic ultrasonography, electrogastroscope, electrical sigmoid coloscope, electrocoloscope, electrocholedochofiberscopy, electrobronchoscope, electroenteroscopy. Other specific medical examinations or treatments no less than RMB 300 were also involved.

The personal information contains individual employee demographic and socioeconomic characteristics, including age, gender, education, income, job status, chronic disease status, self-reported health condition, and the year tenure involved in local MSA insurance program. The most frequently diagnosed chronic diseases in China were concluded as hypertension (except hypertensive cardiopathy), chronic gastroenteritis, rheumatic arthritis, chronic obstructive pulmonary disease, cerebrovascular disease, cholelithiasis and cholecystities, diabetes, intervertebral disk disease, ischemic heart disease, digestive ulcer, chronic bronchitis, coronary heart disease, hyperlipidemia, depression, chronic liver disease and hepatocirrhosis, renal disease, osteoarthritis, tumour, pharyngitis, laryngitis, tonsillitis, and trachitis, Trachoma, other diseases of the motor system, other diseases of the digestive system, and other cardiac diseases.

Income, education and position were viewed as three key predictors that may influence people’s access to health care in terms of socioeconomic factors. Served as the base of horizontal equity measuring, these items were all categorized into three subgroups and provided informants three options in completing questionnaire.

What's more, self-reported health condition was adopted in this study as a subjective health factor to make up health status measurement. Previous equity study (Liu et al., 2002) has mentioned that one's health status might not be well controlled using chronic morbidity status because a majority of individuals without chronic diseases still had poor health status. According to this, self-reported health condition directly from each informant could help to solve the problem. Here, the scale of self-reported health with often used 5-point response Likert scale (1= poor, 2= not good, 3= common, 4= good, 5= excellent).

Questionnaires of English and Chinese version could be found in appendix.

## 5.3 Sample and Data Collection

This was a cross-city comparative study which aimed to shed light on the equity pattern under two typical MSA programs in urban China. The target population of equity evaluation here was established according to the questions we sought to answer, which concerned with the whole enrollees being involved in local social medical insurance (MSA program) in each typical city. As the uniform secondary data of different areas were hard to access in Mainland China, primary data were collected separately from part of the insured population who belonged to the same enterprises.

Considering the "context specific" nature of China MSAs, two typical cities involved in present study were Zhenjiang (located in Jiangsu province) and Hefei (located in Anhui province). Zhenjiang as one of the first experimental cities of social insurance

reform adopted Tongdao MSA program and till now it has become the most famous object many researchers and policy makers focus on in urban China. From 2001, Hefei city began to carry out new social medical insurance program which followed the relatively conservative Bankuai MSA arrangement. The two cities adopt same kind of reimbursement approach.

Concerned with the compatibility of two study samples, some baseline variables should be controlled. Liu et al. (2002) used multiyear survey data to test how the access pattern changed over time in response to the insurance reform. One-period data might lead that the observed differences in the probability of seeking services were not truly due to the different MSA settings, but the sample selection bias or something regardless of the MSA settings.

Limited to resource and time constraints, the informants were all from the several branches of one rising large-scale enterprise, but not from a cluster of enterprises with diversified backgrounds. Therefore the survey mainly focused on one type of large-scale enterprises in urban China which was under modern management mechanism and held little burdens many traditional Chinese enterprises had had. All of above indicated that the target population was actually restricted to part urban enrollees who had assured income, relatively young and healthy. Obviously, the average levels of all indexes we obtained were not representative concerning the diversity of enrollees in local population, especially the vulnerable social groups like elder, poor health condition enrollees. However, the target population could be nicely viewed as a middle-level group of general population, neither too poor nor too good. By setting this sort of

enterprise as our target population, we achieved more insightful and significant findings from the equity study. Liu et al. (2002) once mentioned that a control group design can well reduce the result instability from some confounding factors such as policy shocks or market forces other than insurance itself. Therefore in thought of the comparability in present study, the basis from demographic characters and enrollee composing of MSA program was significantly avoided according to the informants involved in our survey. The eligible members of the target population were identified by the time point one employee registered in. All of employees of the enterprise who had registered in local MSA program one year before and never divorce from that till the end of 2004 were involved in Zhenjiang and Hefei.

As David Grembowski (2001) has mentioned the sample size for answering descriptive questions depends on the following three factors, they are the precision or accuracy of the answer, population size, and the variation of the characteristic in the population. Salant P. and Dillman D. (1994) provide a series of expected minimum sample sizes needed for various population sizes and characteristics at three levels of precision (under 95% confidence level). For population on 1,000,000 levels, sample size around 1,000 would ensure $\pm$3% sample error whatever the population characteristics are, 50/50 split or 80/20 split. For population around 1,000 levels, sample size 400 would ensure $\pm$3% sample error, 200 for $\pm$5% sample error, and 60 for $\pm$10% sample error whatever the population characteristics are, 50/50 split or 80/20 split. As the number of formal employees in each branch was around 100-200 relatively small, nonrandom sampling was necessary in present study. Whilst the response rate of the

mail survey is ensured with the assistant of local HR department, it's better to involve all of the available informants to promise higher quality information.

In this research, data were collected via surveys. The study was cross-regional in nature and the unit of analysis was at the individual level as the research interest was on the changes of individuals' health care seeking behavior specific MSA arrangement might bring to. To test the hypotheses as proposed, logistic regression analyses were performed using the computerized statistical package of SPSS.

Employees working in this Mainland national enterprise normally had university degree or high school degree above, so they should have a good understanding of questionnaire items. In addition, English language is not generally used as the medium for communication in such enterprise, using Chinese version questionnaire prepared by previous researchers should not present any communication problems. Nevertheless, to ensure that the questionnaire was relevant to their benefit system and in words and terms those were easily understandable and comprehensible to this group of people, I conducted a pilot study before launching the full-scale study. Two similar large-size national enterprises were selected. We sent questionnaires to 20 employees in Beijing branch (local MSA program is on level 2) and totally got 13 feedbacks. Their comments on wordings of the questionnaire items and relevancy of theses questions to their benefit were generally positive. While we still needed to adjust several items to better fit acceptable limits. Little employees actually hold PHD degree there, so Doctor Degree was taken out from education and the upper limit was abbreviated as Master degree or above. The item concerning position information turned to be option group but not fill a

vacancy freely. All kinds of positions were categorized into three levels to get uniform reply, non-managerial employee, front-line manager, and middle and top manager. Several places that tended to engender misunderstanding were clarified also.

Data collection was permitted by the headquarters of the enterprise we would conduct survey first. Then close contacts with Zhenjiang and Hefei branches were beginning. With assist of local HR departments, all packets of questionnaires were sent to the target employees who were asked to fill the questionnaires after office hour to avoid the interferences with work. Later the completed questionnaires were anonymously returned to HR departments. In the cover letter, we stated the purpose of the survey while the anonymity of the respondents and confidence of the feedback are guaranteed. To assure a higher response rate, local HR officers helped to explain any enquire from informants and made certain the entire informant returned questionnaire on time as could as possible. The whole data collection process lasted around one month in each site. And there was a half year interval between surveys in Zhenjiang and Hefei cities.

Of the two branches contacted, we totally received 125 responses from Zhenjiang and 102 from Hefei. The demographic characteristics of informants who participated in this study were summarized in Table 3. The age structure was relatively young. About 83.2% of informants in Zhenjiang fell into ages of under 40, whereas 80.4% of them in Hefei fell into ages of under 40. Among the 125 informants in Zhenjiang, 72.8% were male and 26.4% were female. Among the 102 informants from Hefei, 67.6% were male and 32.4% were female. Young informants generally had better education background compared to the elder ones. 80.0% of them had university or postgraduate qualifications

in Zhenjiang, while 100% in Hefei.

Average level of total mensal income was RMB 6437.96 in Zhenjiang (equals to US$ 804.75), RMB 4892.80 in Hefei (equals to US$ 611.6). Here, the benchmarks of income groups were calculated just based on the quantile of whole informant sample we've achieved. There were 39 informants falling into quantile 1 ($\leq$ 3,000 RMB); 79 informants fell into quantile 2 (3,000-5,000 RMB); 83 informants fell into quantile 3 (>5,000 RMB). As you could see, the distribution of Zhenjiang from low income group to high income group was separately 15.69%, 57.84%, and 17.65%. While in Hefei, 53.6% informants fell into low income group, 16% fell into middle income group and 16.8% fell into high income group.

There were totally 30.4% informants reporting chronic disease history. According to self-report, 0.4% informants indicated excellent health condition. While 24.2% informants said good; 41.4% said common; 32.2% said not good; 1.3% said poor health condition. It seemed that Zhenjiang informants reported better health status than Hefei peers. In addition, informants in Zhenjiang had an average 7 years of tenure being involved in local MSA program, compared to 3.8 years of Hefei's informants. This tallied with the development history of MSA program in Mainland.

**Fig. 3 Zhenjiang Sample Characteristics (N=125)**

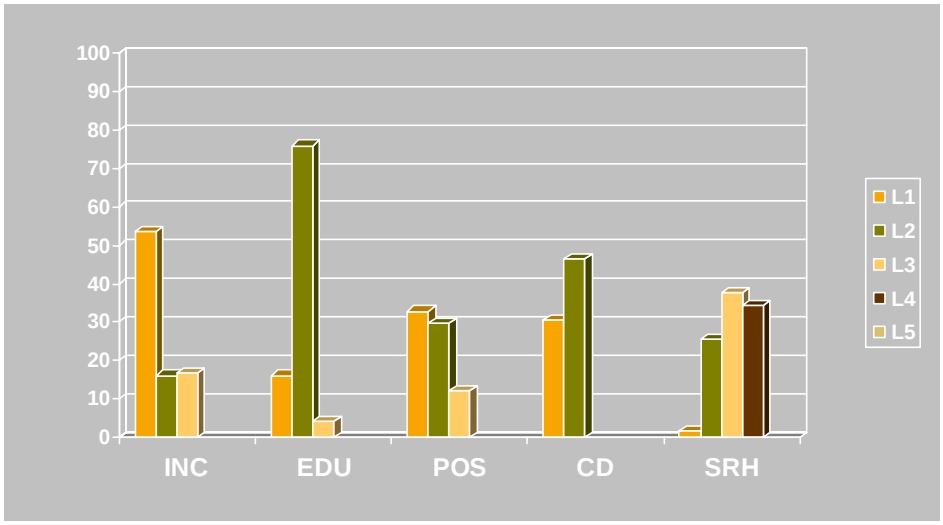



**Fig. 4 Hefei Sample Characteristics (N=102)**

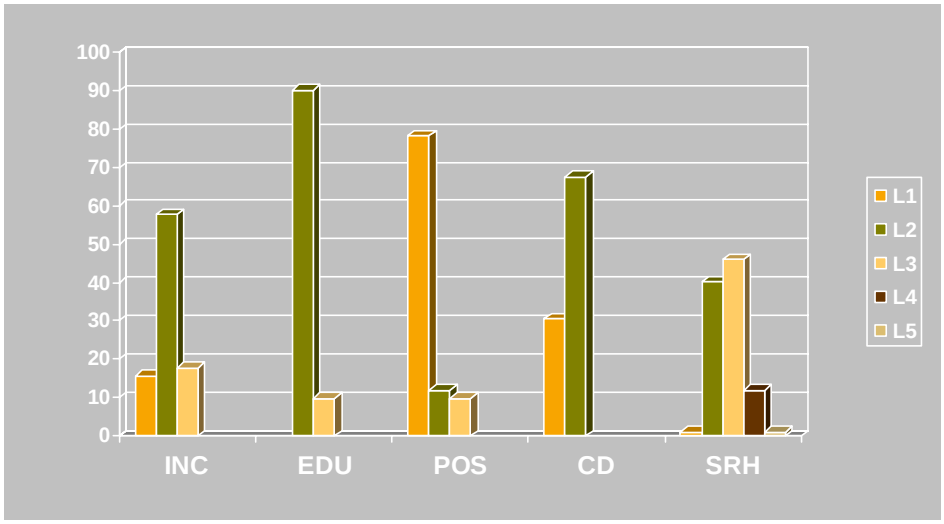


**Table 3 Sample Characteristics**

| Demographics | Total | Zhenjiang (N=125) | Hefei (N=102) |
|---|---|---|---|
| ***Age*** | | | |
| Under 30 | 27.8% | 18.4% | 39.2% |
| 31-40 | 54.2% | 64.8% | 41.2% |
| 41-50 | 13.2% | 14.4% | 11.8% |
| Above 50 | 4.4% | 1.6% | 7.8% |
| Missing | 0.4% | 0.8% | -- |
| ***Gender*** | | | |
| Male | 70.5% | 72.8% | 67.6% |
| Female | 29.1% | 26.4% | 32.4% |
| Missing | 0.4% | 0.8% | -- |
| ***Education*** | | | |
| Secondary educated or below | 8.8% | 16.0% | -- |
| Bachelor degree | 82.4% | 76.0% | 90.2% |
| Master degree or above | 6.6% | 4.0% | 9.8% |
| Missing | 2.2% | 4.0% | -- |
| ***Income*** | | | |
| Average | RMB 5723.02 | RMB 6437.96 | RMB 4892.80 |
| Minimum/ Maximum | RMB 1,000/ 80,000 | RMB 1,000/ 80,000 | RMB 1,000/ 12,000 |
| Missing | 11.5% | 13.6% | 8.8% |
| ***Income Groups*** | | | |
| Low income group (< 3,001 RMB) | 36.6% | 53.6% | 15.7% |
| Middle income group (3,001- 5,001 RMB) | 34.8% | 16% | 57.8% |
| High income group (>5,001 RMB) | 17.2% | 16.8% | 17.7% |
| Missing | 11.4% | 13.6% | 8.8% |
| ***Position*** | | | |
| Non-managerial employee | 53.3% | 32.8% | 78.4% |
| Front-line manager | 21.6% | 29.6% | 11.8% |
| Middle and top manager | 11.0% | 12.0% | 9.8% |
| Missing | 14.1% | 25.6% | -- |
| ***Chronic Disease History*** | | | |
| Yes | 30.4% | 30.4% | 30.4% |
| No | 55.9% | 46.4% | 67.6% |
| Missing | 13.7% | 23.2% | 2.0% |
| ***Self-reported Health Condition*** | | | |
| Excellent | 0.4% | -- | 1.0% |
| Good | 24.2% | 34.4% | 11.8% |
| Common | 41.4% | 37.6% | 46.1% |
| Not good | 32.2% | 25.6% | 40.2% |
| Poor | 1.3% | 1.6% | 1.0% |
| Missing | 0.4% | 0.8% | -- |
| ***Year of Tenure under Local MSA Program*** | | | |
| Average | 5.51 Years | 7 Years | 3.8 Years |
| Minimum/ Maximum | 1/ 10 Years | 1/ 10 Years | 1/ 10 Years |
| Missing | 7.5% | 8.8% | 5.9% |

## 5.4 Operational Measurements

Measurement included the measurement of concepts as well as operational definitions of each item required in a study. Long descriptions had concentrated on the published measures of MSAs performance and equity issues in review part (Liu, et al, 1999; Yip and Eggleston, 2001, 2004; Yip and Berman, 2001; Liu, et al, 2002). Accordingly, present study examined the variation in access to care among different socioeconomic groups and health condition groups, shedding light on the equity impact different MSA arrangements put on.

The operational measures for these variables were described below.

### 5.4.1 Access Factor

Four types of health services were examined in this analysis: outpatient care, emergency care, inpatient care and expensive diagnostic procedures. The using separately was reported by the discrete variables in the latest 1-year recall period for outpatient care and emergency care, specifically 5-year recall period for inpatient care and diagnosis service. According to the above, probability of visiting was recorded by a dummy variable, defining to be 0 for no use, 1 otherwise.

To measure differences in horizontal equity of two cities, three comparison groups were defined based on their socioeconomic status including individual income, education background, and position. While the vertical equity differences were based on

their health status including chronic disease history and self-reported health condition. MSA program effects on health care visiting across each subgroup will be tested. If disadvantage groups could benefit more from some kind of MSA insurance arrangement, it shows that such MSA arrangement is well structured.

### 5.4.2 Socioeconomic Factors

Information of socioeconomic background, such as income, education and job position, were all recorded by the dummy variables. Education was defined to be 1 to 3 what separately equal to secondary educated or below, bachelor degree and master degree or above. Similarly, job position was defined to be 1 to 3 what separately equal to non-managerial employee, front-line manager, middle and top manager. Reported mensal income was from RMB 1,000 to RMB 80,000. Informants were categorized into three groups based on the quantile of whole sample achieved. Income was recorded as 1 for low income group, 2 for middle income group, and 3 for high income group. What's more, income groups were separately recorded by binary variables, defining to be 1 for yes, 0 for no.

### 5.4.3 Health Factors

The chronic disease condition was defined by a physician's diagnosis of any chronic disease. The value of the dummy variable is 1 if a patient has been diagnosed with any

chronic disease when he or she took hospital services and 0 otherwise.

What's more, self-reported health condition was defined to be 1 to 5 what separately equal to excellent, good, common, not good, and poor.

### 5.4.4 MSA Arrangement

In present study, a dummy variable of MSA program was defined to be 0 for Hefei which belonged to Bankuai MSA arrangement, and 1 for Zhenjiang which belonged to Tongdao MSA arrangement.

### 5.4.5 Control Variables

Concerning the different specifications of environment in Mainland China and the different data sets present study based on, several control variables were raised to better illustrate the relationships among targeted variables.

They were gender, age, year of tenure under local MSA program, and the other medical security informants had. The former two were often used ones. A dummy variable of gender was defined to be 1 for female and 0 for male employees. A dummy variable of age was defined to be 1 to 4 separately for four groups from under 30, 31 to 40, 41 to 50, and above 50.

According to social medical arrangement, insured with different year of tenure under local MSA program seemed to have different capability in health care consumption.

Concerning the history of MSA program in Mainland China was no more than 10 years, year of tenure under MSA program was recorded by the discrete variables from 1 to 10.

## 5.5 Data Analysis Technique

As mentioned before, present study aims to estimate the probability of visiting of health care which is the first part of the two-part and four-part model (Duan et al., 1982; Duan, 1983; Wagstaff and van Doorslaer, 2002). Logistic regression is implemented to achieve our expectation because the dependent variable, probability of visiting followed Poisson distribution. In the equal access study of evaluating Egypt's School health insurance, Yip and Berman (2001) used similar analysis method. The data analysis in this study followed their process. It suggests that there are three objectives in the data analysis.

Firstly, get a feel for the data- how good the scales are; how well the coding and entering the data have been done (the mean, the range, the standard deviation, and the variance in the data by using the frequency distribution). Then, test the goodness of the data- submitting the data. Finally, test the hypotheses developed for the research and choose the relevant statistical tests to determine whether the hypotheses are substantiated.

According to above, descriptive statistics was examined firstly. Moreover, I employed logistic regression analytical techniques to look at how the probability of visiting of health care was influenced by predictor factors. Sets of hypotheses proposed for present study were illustrated at the end of next chapter.

# CHAPTER VI ANALYSIS OF RESULTS

In this chapter, the results collected from the survey are analyzed. The chapter is divided into sections that follow the sequence of hypotheses based on the analytical framework that I postulated in Chapter IV.

## 6.1 Descriptive Statistics

In present study, access factor (probability of health care visiting in all settings), socioeconomic factors (income, education, and position), and health factors (chronic disease history and self-reported health condition) were all self-report measures. Table 4 provided us the description of health service using in all setting in the targeted cities.

**Table 4 Description of Health Service Using**

| | Tongdao Model (From Zhenjiang, N=125) | Bankuai Model (From Hefei, N=102) |
|---|---|---|
| ***Outpatient Service Using*** | | |
| Total number of visits | 279 | 249 |
| Average number of visits | 2.29 | 2.52 |
| Minimum/ Maximum number of visits | 0- 6 | 0-30 |
| Std. Deviation | 1.654 | 3.385 |
| Percentage of enrolled consuming service | 122/125 | 99/102 |
| ***Emergency Service Using*** | | |
| Total number of visits | 49 | 29 |
| Average number of visits | 0.42 | 0.30 |
| Minimum/ Maximum number of visits | 0- 3 | 0- 5 |
| Std. Deviation | 0.777 | 0.819 |
| Percentage of enrolled consuming service | 118/125 | 97/102 |
| ***Inpatient Service Using*** | | |
| Total number of visits | 38 | 13 |
| Average number of visits | 0.32 | 0.14 |
| Minimum/ Maximum number of visits | 0- 3 | 0-1 |
| Std. Deviation | 0.627 | 0.346 |
| Percentage of enrolled consuming service | 117/125 | 95/102 |
| ***Diagnosis Service Using*** | | |
| Total number of visits | 175 | 238 |
| Average number of visits | 1.55 | 2.48 |
| Minimum/ Maximum number of visits | 0- 5 | 0- 36 |
| Std. Deviation | 1.637 | 5.742 |
| Percentage of enrolled consuming service | 113/125 | 96/102 |

**Table 5 Variable Means, Standard Deviations, and Correlations**

| Variables | Mean | S.D. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1. Prob. of outpatient visiting** | 0.82 | 0.386 | 1.000 | | | | | | | | | | | | |
| **2. Prob. of emergency visiting** | 0.23 | 0.423 | .151** | 1.000 | | | | | | | | | | | |
| **3. Prob. of inpatient visiting** | 0.20 | 0.403 | .059 | .139** | 1.000 | | | | | | | | | | |
| **4. Prob. of diagnosis visiting** | 0.65 | 0.478 | .092 | .081 | .211*** | 1.000 | | | | | | | | | |
| **5. MSA program** | 0.55 | 0.499 | .049 | .123* | .148** | -.031 | 1.000 | | | | | | | | |
| **6. Income group** | 1.78 | 0.750 | .063 | -.038 | -.018 | .046 | -.298*** | 1.000 | | | | | | | |
| **7. Education level** | 1.98 | 0.397 | -.027 | -.025 | -.013 | -.045 | -.280*** | .128* | 1.000 | | | | | | |
| **8. Position** | 1.51 | 0.713 | -.021 | .009 | .175** | .164** | .285*** | .203*** | -.086 | 1.000 | | | | | |
| **9. Chronic disease history** | 0.35 | 0.479 | .045 | .031 | .129* | .137* | .090 | .126* | -.178** | .141* | 1.000 | | | | |
| **10. Self-reported health** | 3.10 | 0.794 | .036 | .097 | .041 | .050 | -.214*** | .243*** | -.008 | -.082 | .306*** | 1.000 | | | |
| **11. Gender** | 0.29 | 0.456 | .123* | -.051 | .052 | .073 | -.063 | -.078 | -.014 | -.049 | -.134* | .105 | 1.000 | | |
| **12. Age** | 1.94 | 0.767 | .033 | .093 | .154** | .135* | .071 | .258*** | -.256*** | .389*** | .260*** | .031 | -.143** | 1.000 | |
| **13. Years of tenure involved** | 5.54 | 2.742 | .041 | .046 | .160** | .024 | .576*** | -.191*** | -.379*** | .330*** | .226*** | -.126* | -.106 | .362*** | 1.000 |

* 10% significance level; ** 5% significance level; *** 1% significance level.

In Table 5, the means, standard derivations, and correlations of all independent variables, dependent variables and control variables were listed.

The three predictors, MSA program arrangement, position, and chronic disease history showed significant correlations with the probability of inpatient using, supporting the previous arguments that they are positively related to inpatient admission. More over, MSA program arrangement exhibited significant correlations with the probability of emergency using. Position and chronic disease history also showed significant correlations with the probability of diagnosis using. It confirmed the previous argument that it is positively related to the probability of diagnosis using.

Concerning about predictor factors, MSA program arrangement exhibited significant correlations with income, education, position, and self-reported health. Besides MSA program arrangement, income also showed significant correlations with all other predictors. Chronic disease history just showed significant correlations with education, position, and self-reported health. All of these provided us the evidence for further exploring interactions among predictor factors, especially the interactions between MSA program arrangement and other five predictors.

Taking a closer look at the correlation matrix, none of the bivariate correlation coefficients was greater than 0.80, indicating that multicollinearity might not be an issue. According to Rockwell (1975), only when bivariate correlations of two variables exceed 0.80 should the interdependence between them be considered excessive.

To illustrate the equity issues across various subgroups, Table 6 showed the access pattern under the targeted two MSA programs. And the analysis stayed on income, education, position, and health subgroups.

Table 6 presented the mean of probability of health care visiting. According to the distribution, we could get a general idea about the gaps existing in health care access patterns of two target groups. The difference of the probability of visiting between Bankuai MSA sample and Tongdao MSA sample represents the insurance arrangement effect.

**Table 6 Access Pattern under the Target MSA Programs**

| | Outpatient | | Emergency | | Inpatient | | Diagnosis | |
|---|---|---|---|---|---|---|---|---|
| | Bankuai MSA | Tongdao MSA | Bankuai MSA | Tongdao MSA | Bankuai MSA | Tongdao MSA | Bankuai MSA | Tongdao MSA |
| ***Income*** | | | | | | | | |
| Low income group | 0.88 | 0.82 | 0.19 | 0.27 | 0.13 | 0.25 | 0.53 | 0.64 |
| Middle income group | 0.79 | 0.75 | 0.18 | 0.20 | 0.15 | 0.21 | 0.68 | 0.67 |
| High income group | 0.83 | 1.00 | 0.12 | 0.33 | 0.18 | 0.28 | 0.71 | 0.63 |
| ***Education*** | | | | | | | | |
| Secondary educated or below | -- | 0.75 | -- | 0.25 | -- | 0.50 | -- | 0.85 |
| Bachelor degree | 0.80 | 0.83 | 0.16 | 0.20 | 0.13 | 0.26 | 0.68 | 0.61 |
| Master degree or above | 0.80 | 0.80 | 0.38 | 0.80 | 0.25 | 0.20 | 0.56 | 0.80 |
| ***Position*** | | | | | | | | |
| Non-managerial employee | 0.82 | 0.78 | 0.19 | 0.29 | 0.12 | 0.21 | 0.62 | 0.57 |
| Front-line manager | 0.82 | 0.83 | 0.09 | 0.14 | 0.09 | 0.26 | 0.82 | 0.76 |
| Middle and top manager | 0.60 | 0.87 | 0.11 | 0.43 | 0.33 | 0.38 | 0.89 | 0.71 |
| ***Chronic Disease History*** | | | | | | | | |
| Non-chronic disease | 0.78 | 0.81 | 0.16 | 0.28 | 0.12 | 0.23 | 0.62 | 0.66 |
| Chronic disease | 0.86 | 0.81 | 0.19 | 0.29 | 0.19 | 0.34 | 0.79 | 0.76 |
| ***Self-reported Health*** | | | | | | | | |
| Excellent | -- | -- | -- | -- | -- | -- | -- | -- |
| Good | 0.75 | 0.77 | 0.17 | 0.17 | 0.08 | 0.17 | 0.55 | 0.54 |
| Common | 0.80 | 0.89 | 0.19 | 0.30 | 0.12 | 0.36 | 0.71 | 0.73 |
| Not good | 0.80 | 0.87 | 0.17 | 0.40 | 0.18 | 0.24 | 0.63 | 0.65 |
| Poor | -- | 0.50 | -- | 0.50 | -- | -- | -- | -- |

Rates= Share of insured with visit(s) in the latest 1(or 5) years.

### 6.1.1 Outpatient Service

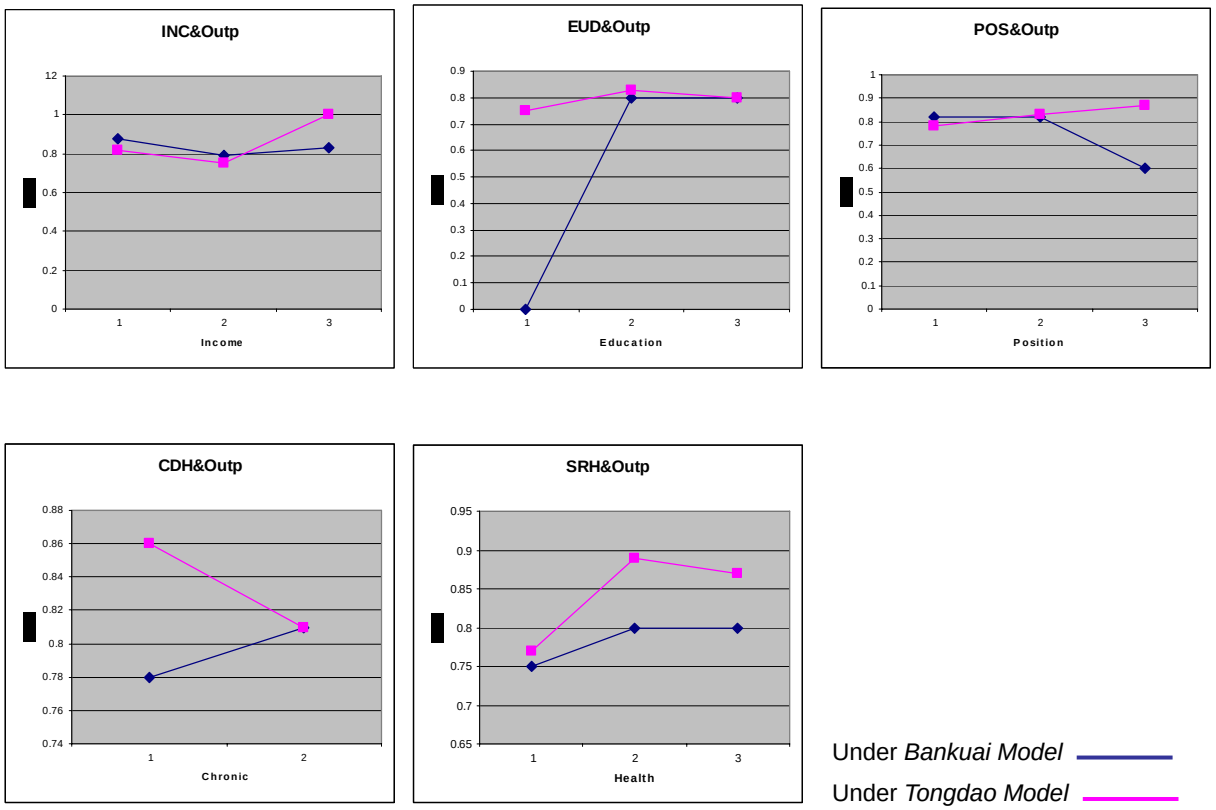



**Fig. 5 Compared Probability of Outpatient Visiting across Subgroups**

Across income groups, the gaps in the probability of visiting between the high and low income insured are narrower for those in Bankuai MSA sample. And the low income insured even indicates the highest probability of visiting in Bankuai MSA sample. Across education groups, no gap exists in the probability of visiting between the bachelor degree insured and the insured with master degree or above with Bankuai MSA arrangement, while the gaps in the probability of visiting could be observed with Tongdao MSA arrangement. What's more, the gaps in probability of visiting across

position groups are narrower with Tongdao MSA program. It indicates that the horizontal access under Bankuai MSA arrangement is more equitable across income groups and education groups; the horizontal access under Tongdao MSA arrangement is more equitable across position groups.

Compared with the insured without chronic disease, the probability of visiting of the chronic disease insured is higher in Bankuai MSA sample. No gap could be found for those with Tongdao MSA program. Across health condition groups, the gaps in the probability of visiting between the good health and not good health insured are narrower for those in Bankuai MSA sample. It means that the vertical access under Bankuai MSA arrangement is more equitable across chronic disease groups, while the vertical access under Tongdao MSA arrangement is more equitable across health condition groups.

### 6.1.2 Emergency Service

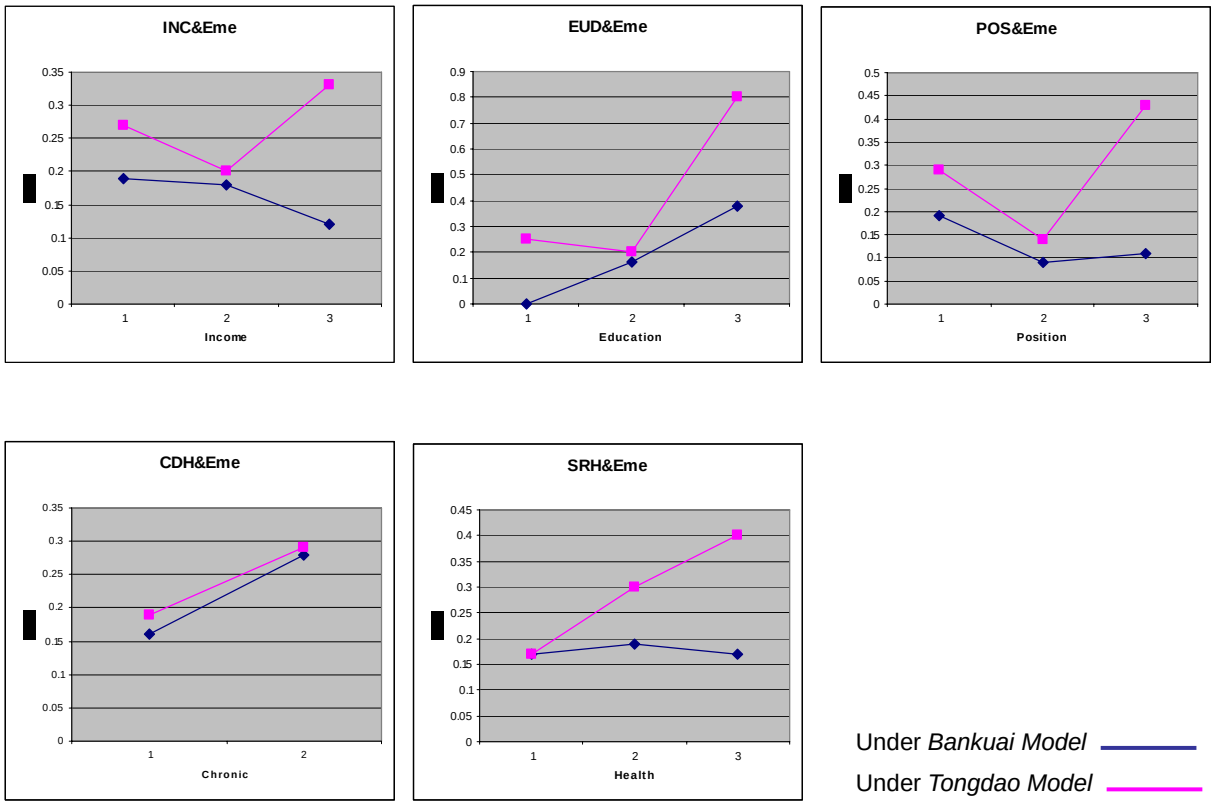



**Fig. 6 Compared Probability of Emergency Visiting across Subgroups**

Across income groups, the gaps in the probability of visiting between the high and low income insured are similar in both samples. While the low income insured indicates the highest probability of visiting in Bankuai MSA sample. Across education groups, the gaps in the probability of visiting between the bachelor degree insured and the insured with master degree or above are narrower with Bankuai MSA arrangement. Across position groups, the gaps in the probability of visiting between the non-managerial employee insured and the middle and top manager insured are narrower in Bankuai MSA sample. It indicates that the horizontal access under Bankuai MSA arrangement is

more equitable across all socioeconomic groups.

Compared with the insured without chronic disease, the probability of visiting of the chronic disease insured is higher in both samples. The gaps between them are narrower with Tongdao MSA program. It shows that the disadvantaged health group has a higher probability of visiting in both samples. Across health condition groups, the gaps in the probability of visiting between the good health and not good health insured are narrower for those in Bankuai MSA sample. The results show that the vertical access under Bankuai MSA arrangement is more equitable across chronic disease groups, while that under Tongdao MSA arrangement is more equitable across health condition groups.

### 6.1.3 Inpatient Service

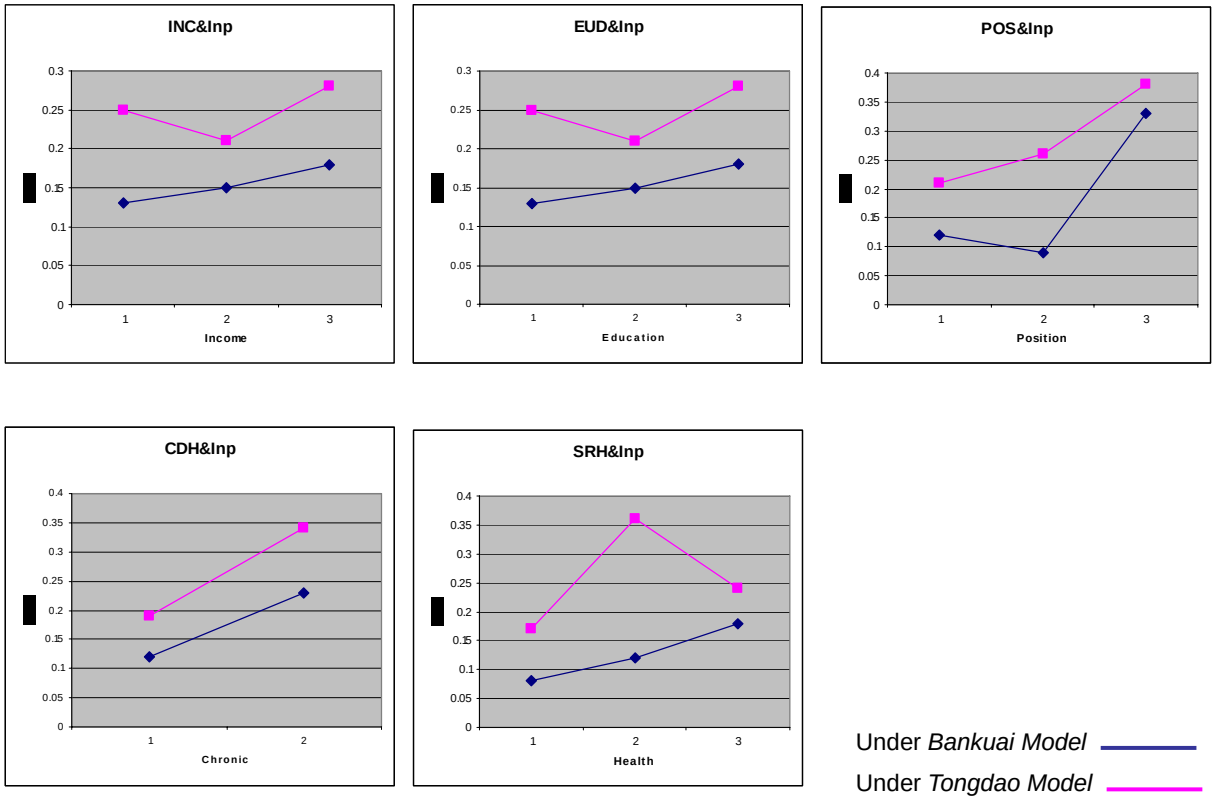



**Fig. 7 Compared Probability of Inpatient Visiting across Subgroups**

Across income groups, the gaps in the probability of visiting between the high and low income insured are narrower with Tongdao MSA program. Across education groups, the gaps in the probability of visiting between the bachelor degree holding insured and the insured with master degree or above are narrower with Bankuai MSA arrangement than the gaps with Tongdao MSA program. Across position groups, the gaps in the probability of visiting between the non-managerial employee insured and the middle and top manager insured are narrower in Tongdao MSA sample. It indicates that the horizontal access under Tongdao MSA arrangement is more equitable across income

groups and position groups; the horizontal access under Bankuai MSA arrangement is more equitable across education groups.

Compared with the insured without chronic disease, the probability of visiting of the chronic disease insured is higher in both samples. The gaps between them are narrower with Bankuai MSA program. It shows that the disadvantaged health group has a higher probability of visiting in both samples. Across health condition groups, the gaps in the probability of visiting between the good health and not good health insured are narrower for those in Tongdao MSA sample. It means that the vertical access under Tongdao MSA arrangement is more equitable across chronic disease groups, while that under Bankuai MSA arrangement is more equitable across health condition groups.

### 6.1.4 Diagnosis Service

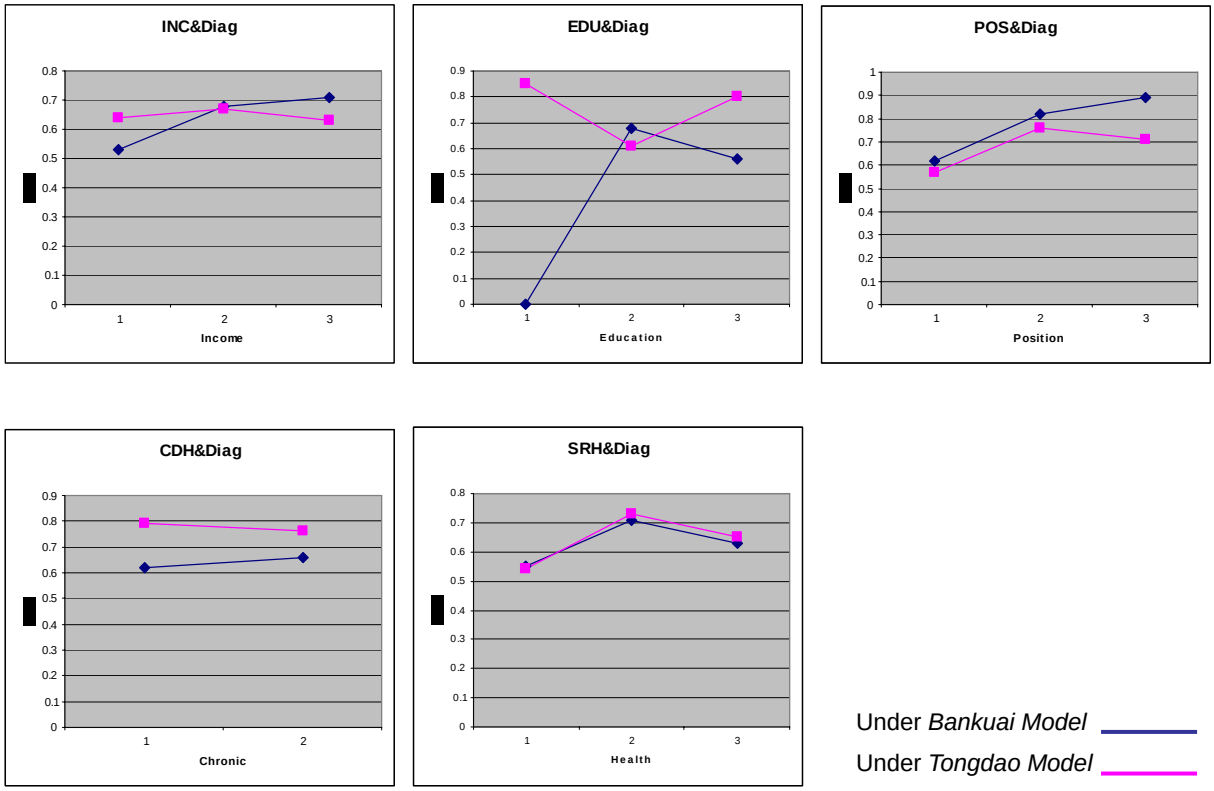



**Fig. 8 Compared Probability of Diagnosis Visiting across Subgroups**

Across income groups, the gaps in the probability of visiting between the high and low income insured are narrower in Tongdao MSA sample. Across education groups, the gaps in the probability of visiting between the high educated group and the low educated group are narrower with Tongdao MSA arrangement. Across position groups, the gaps in the probability of visiting between the non-managerial employee insured and the middle and top manager insured are narrower in Tongdao MSA sample. It indicates that the horizontal access under Tongdao MSA arrangement is more equitable across all socioeconomic groups.

Compared with the insured without chronic disease, the probability of visiting of the chronic disease insured is higher in both samples. The gaps between them are narrower with Tongdao MSA sample. It shows that the disadvantaged health group has a higher probability of visiting in both samples. Across health condition groups, the gaps in the probability of visiting between the good health and not good health insured are narrower for those in Bankuai MSA sample. It indicates that the vertical access under Bankuai MSA arrangement is more equitable across chronic disease groups, while that under Tongdao MSA arrangement is more equitable across health condition groups.

## 6.2 Regression Results and Tests of Hypotheses

To test the hypotheses, logistic regression analysis was performed using the computerized statistical package of SPSS. Binary logistic regression techniques were used to test the relationships between the probability of visiting and MSA arrangement, socioeconomic factors, and health factors, the influences of interactions of MSA arrangement and other predictor variables on the probability of visiting in all settings. Significance of the statistical results was reported in the three different ways as suggested by Coolican (1999). Based on the p value, the result was significant if $p < .10$, highly significant if $p < .05$ or very highly significant if $p < .01$. Probability of visiting was entered as dependent variable separately on four health services. Age, gender, and year tenure involved in MSA program were entered in each model as control variables. MSA program variable was replaced by sets of MSA interaction factors in evaluating the equity influences. Moreover, Hosmer and Lemeshow tests were performed to know the model fit in each case.

According to the first-run results, there were some implausibly high beta values and thus odds ratios. Moreover, there were about 80 missing values in every regression model. This was an unacceptably large proportion of missing values concerning our small sample size, therefore re-coding was done to help reducing this and including more data values. Here, missing value in probability of visiting was transferred into 0 if its mean was smaller than 0.5; missing value was transferred into 1 if its mean was larger than 0.5. Missing values in each subgroup of socioeconomic factors and health status factors were transferred into zero. Missing values in each age subgroup were also

transferred into zero. And missing values of years involved were transferred into 6 as its mean is between 5.5 and 6. Based on above, the second-run data analysis showed better results.

### 6.2.1 Direct Effects of Predictor Variables on Access

#### *6.2.1.1 Socioeconomic Factors*

Direct effects of predictor variables on the probability of visiting (Hypotheses 1-6) are shown in Table 7. To facilitate interpretation, coefficient estimates were translated into odds ratios. In Model 1, predictors in categorical measures were entered as independent variables. Income only indicated positive relations with the probability of outpatient visiting $\beta$ =0.460 (p>.10). While education was positively related to the probability of visiting of emergency service $\beta$ =0.275 (p>.10), inpatient service $\beta$ =0.370 (p>.10). The third socioeconomic factor position showed positive relation with inpatient service $\beta$ =0.272 (p>.10) and significant positive relation with diagnosis service $\beta$ =0.533 (p<.05). Based on above, only Hypothesis 3d was supported for its null hypothesis being rejected at 10% significant level.

#### *6.2.1.2 Health Factors*

Here, chronic disease showed positive relations with the probability of inpatient visiting $\beta$ =0.157 (p>.10) and diagnosis visiting $\beta$ =0.459 (p>.10) in Model 1. And

self-reported health was positively related to the probability of visiting in all sets. Specifically, the coefficient was $\beta$=0.177 (p>.10) for outpatient service, $\beta$=0.571 (p<.05) for emergency service, $\beta$=0.275 (p>.10) for inpatient service, and $\beta$=0.064 (p>.10) for diagnosis service. Based on these findings, only Hypothesis 5b was supported for its null hypothesis being rejected at 5% significant level.

#### *6.2.1.3 MSA Arrangement*

MSA arrangement effects, how MSA influences the probability of visiting could be achieved from Model 1. The MSA coefficient represents the average effect of MSA program arrangement across different socioeconomic and health groups. It showed that MSA was positively related to the probability of outpatient visiting $\beta$=0.266 (p>.10), emergency visiting $\beta$=0.900 (p<.10) and inpatient visiting $\beta$=0.460 (p>.10), while negatively related to diagnosis visiting $\beta$=-0.308 (p>.10). Therefore, only Hypothesis 6b was supported for its null hypothesis being rejected at 10% significant level.

**Table 7 Regression Results for Predictor Variables and Health Care Visiting**

| | Probability of visit: logistic model 1 | | | |
|---|---|---|---|---|
| | **Outpatient (n=178)** | **Emergency (n=178)** | **Inpatient (n=178)** | **Diagnosis (n=178)** |
| **MSA** | 1.305 | 2.459* | 1.585 | 0.735 |
| | (0.266) | (0.900) | (0.460) | (-0.308) |
| **INC** | 1.584 | 0.637 | 0.569* | 0.790 |
| | (0.460) | (-0.450) | (-0.563) | (-0.236) |
| **EDU** | 0.951 | 1.316 | 1.448 | 0.861 |
| | (-0.050) | (0.275) | (0.370) | (-0.149) |
| **POS** | 0.673 | 0.839 | 1.313 | 1.704* |
| | (-0.396) | (-0.175) | (0.272) | (0.533) |
| **Chronic disease** | 0.962 | 0.873 | 1.170 | 1.582 |
| | (-0.038) | (-0.136) | (0.157) | (0.459) |
| **SRH** | 1.194 | 1.770** | 1.317 | 1.067 |
| | (0.177) | (0.571) | (0.275) | (0.064) |
| **Age** | 1.420 | 1.717* | 1.948** | 1.592 |
| | (0.351) | (0.541) | (0.667) | (0.465) |
| **Female** | 6.734*** | 1.058 | 1.983 | 1.188 |
| | (1.907) | (0.056) | (0.685) | (0.173) |
| **Years of tenure involved** | 1.052 | 0.900 | 1.026 | 0.977 |
| | (0.050) | (-0.105) | (0.026) | (-0.024) |
| **Hosmer and Lemeshow test:** | | | | |
| | $Chi^2(8)$= 5.442 | $Chi^2(8)$= 3.864 | $Chi^2(8)$= 7.794 | $Chi^2(8)$= 4.854 |
| | Sig.= 0.709 | Sig.= 0.869 | Sig.= 0.454 | Sig.= 0.773 |

*10% significance level; ** 5% significance level; *** 1% significance level.

Coefficients were translated into Odds ratio; and coefficients were showed in bracket.

### 6.2.2 Interaction of MSA Arrangement and Socioeconomic Factors

Model 2 and Model 3 differentiate the MSA effect separately by socioeconomic factors and health factors. Predictors here were categorized into subgroups and measured by dummy variables. Referring to the results from access pattern analysis, we just focused on three of the five self-reported health groups; they were good, common and not good. Subgroup predictors were entered as independent variables here.

To facilitate interpretation, coefficient estimates (parameters showed in bracket) were translated into odds ratio. Odds ratio is a measure of effect size particularly important in Bayesian statistics and logistic regression. It is defined as the ratio of the odds of an event occurring in one group to the odds of it occurring in another group. An odds ratio of 1 indicates that the condition or event under study is equally likely in both groups. An odds ratio greater than 1 indicates that the condition or event is more likely in the first group. And an odds ratio less than 1 indicates that the condition or event is less likely in the first group.

By way of example, MSA coefficient represents the variation of insured under Tongdao MSA program on the probability of visiting compared with that under Bankuai MSA program. The Income2 coefficient represents the variation of middle income group on the probability of visiting. Similarly, the Income3 coefficient measures the variation of high income group on the probability of visiting. And the difference between their coefficients measures the increase in access owing to income increase. While the odds ratio of income2 represents the multiple of the probability of visiting of middle income group compared with that of low income group. The odds ratio of

income3 represents the multiple of the probability of visiting of high income group compared with that of middle income group.

Findings in Model 1 confirmed that higher income insured tended to use more outpatient service. The results in Model 2A further explored the gaps change in the probability of visiting across income groups engendered by MSA program arrangement.

#### *6.2.2.1 MSA and Income Groups*

Results of the interaction effects of MSA and income on three levels (Hypotheses 7) are shown in Table 8.1. Compared with the informants under Bankuai MSA program, the Tongdao MSA arrangement decreased the probability of outpatient visit by 33.3% (1-0.667) for the low income insured, 6.3% (1-0.937) for the middle-income insured, and had significant positive effect on the high income insured. The results show that compared to Bankuai MSA arrangement, Tongdao MSA arrangemnet benefits the high income most and therefore enlarges the inequity in access to outpatient service among insured under Tongdao MSA program.

On the contrary, the Tongdao MSA arrangement increased the probability of emergency visit by 2.212 times for the low income insured, 37.2% for the middle-income insured, and increased that by 4.12 times for the high income insured. Tongdao MSA arrangemnet also benefits the high income most and enlarges the inequity in access to emergency service.

For inpatient admission, the Tongdao MSA arrangement increased the probability of

visit by about 100% for the low income insured, 48% for the middle-income insured, and 1.2 times for the high income insured. Tongdao MSA arrangement benefits the high income insured most and then the low income insured. Compared with Bankuai MSA arrangement, Tongdao MSA arrangement almost has no effect on the inequity in access to inpatient service among Tongdao program insured.

What's more, the Tongdao MSA arrangement increased the probability of diagnosis visit by 2.3% for the low income insured, and decreased that by 20% for the middle-income insured, 32% for the high income insured. It shows that compared to the Bankuai MSA arrangement, the Tongdao MSA arrangement benefits the poor most and therefore helps to improve the inequity in access to diagnosis service among insured covered by Tongdao MSA program.

Results of the Model 2A are consistent with expectation that, MSA program arrangement moderates the relationship between income and access to health care. While at the required significant level, the null hypotheses of Hypotheses 7 can't be rejected. Hypotheses 7 were not supported.

#### *6.2.2.2 MSA and Education Groups*

Results of the interaction effects of MSA and education on three levels (Hypotheses 8) are shown in Table 8.2. Outpatient visit estimation failed due to numerical problem. Possible reasons are: (1) at least one of the convergence criteria LCON, BCON is zero or too small, or (2) the value of EPS is too small (if not specified, the default value that

is used may be too small for this data set).

Concerning with emergency service, the Tongdao MSA arrangement decreased the probability of visit by 27.3% for the insured secondary educated or below, increased that by 74% for the bachelor degree insured, and had significant positive effect on the insured having master degree or above by 14.54 times. Here, Tongdao MSA arrangement also benefits the high educated most and enlarges the inequity in access to emergency service.

Compared with the informants under Bankuai MSA program, the Tongdao MSA arrangement almost had a little negative effect on the probability of inpatient visit for the insured secondary educated or below, increased that by 1.65 times for the insured holding bachelor degree, and had minimal positive effect on the master degree or above insured. The results show that compared to Bankuai MSA arrangement, Tongdao MSA arrangement slightly enlarges the inequity in access to inpatient service among insured under Tongdao MSA program.

For diagnosis visit, the Tongdao MSA arrangement increased the probability of visit by 1.68 times for the secondary educated or below insured, decreased that by 37% for the bachelor degree insured, and increased that by 1.55 times for the insured having master degree or above. Therefore compared to the Bankuai MSA program arrangement, the Tongdao MSA program arrangement benefits the low educated most and helps to improve the inequity in access to diagnosis service among insured covered by Tongdao MSA program.

Results of the Model 2B are consistent with expectation that, MSA program

arrangement moderates the relationship between education and access to health care in emergency and diagnosis services using. While only Hypothesis 8b was supported for its null hypothesis being rejected at 10% significant level.

#### *6.2.2.3 MSA and Position Groups*

Results of the interaction effects of MSA and position on three levels (Hypotheses 9) are shown in Table 8.3. Outpatient visit estimation failed due to numerical problem here also with the same reasons.

Concerning with emergency service, the Tongdao MSA arrangement increased the probability of visit by 82% for the non-managerial employee insured, 1.44 times for the middle and top manager insured, and 8.9 times for the front-line manager insured. Similarly, Tongdao MSA arrangement benefits the ones on high position most and increases the inequity in access to emergency service.

Compared with the informants under Bankuai MSA program, the Tongdao MSA arrangement increased the probability of inpatient visit by 1.14 times for the non-managerial employee insured, and increased that by 2.3 times for the front-line manager insured, 1.55 times for the middle and top manager insured. The results show that compared to Bankuai MSA arrangement, Tongdao MSA arrangement benefits the ones on middle position most and to some extent enlarges the inequity in access to outpatient service among insured under Tongdao MSA program.

Finally, the Tongdao MSA arrangement decreased the probability of diagnosis visit

by 25% for the non-managerial employee insured, had no change on the front-line manager insured, and decreased that by 66% for the middle and top manager insured. Therefore compared to the Bankuai MSA arrangement, the Tongdao MSA arrangement helps to improve the inequity in access to diagnosis service among insured covered by Tongdao MSA program.

Results of the Model 2C are also consistent with expectation that, MSA program arrangement moderates the relationship between position and access to health care. While at the required significant level, the null hypotheses of Hypotheses 9 can’t be rejected. Hypotheses 9 were not supported.

**Table 8.1 Regression Results for Interaction of MSA and Income Groups**

| | Probability of visit: logistic model 2A | | | |
|---|---|---|---|---|
| | **Outpatient (n=225)** | **Emergency (n=225)** | **Inpatient (n=225)** | **Diagnosis (n=225)** |
| **MSA * Inc1** | 0.667 | 3.212 | 2.028 | 1.023 |
| | (-0.405) | (1.167) | (0.707) | (0.023) |
| **MSA * Inc2** | 0.937 | 1.372 | 1.479 | 0.797 |
| | (-0.065) | (0.316) | (0.391) | (-0.227) |
| **MSA * Inc3** | 2.49E+16 | 5.118 | 2.212 | 0.680 |
| | (37.752) | (1.633) | (0.794) | (-0.385) |
| **Income2** | 2.254 | 0.459 | 0.792 | 1.114 |
| | (0.813) | (-0.778) | (-0.233) | (0.108) |
| **Income3** | 5.021* | 0.206 | 0.636 | 0.667 |
| | (-1.614) | (-1.578) | (-0.452) | (-0.405) |
| **Education2** | 0.000 | 0.236 | 1.627 | 1.057 |
| | (-34.275) | (-1.443) | (0.487) | (0.056) |
| **Education3** | 0.000 | 1.714 | 3.838 | 1.644 |
| | (-34.138) | (0.539) | (1.345) | (0.497) |
| **Position2** | 0.188** | 0.196** | 0.487 | 2.135 |
| | (-1.670) | (-1.627) | (-0.720) | (0.759) |
| **Position3** | 0.084*** | 0.562 | 1.268 | 2.012 |
| | (-2.482) | (-0.577) | (0.237) | (0.699) |
| **Chronic disease** | 0.945 | 0.729 | 1.333 | 2.443** |
| | (-0.057) | (-0.316) | (0.287) | (0.893) |
| **Health3** | 2.762 | 0.490 | 3.22E+14 | 5.034 |
| | (1.016) | (-0.714) | (33.407) | (1.616) |
| **Health4** | 1.634 | 0.517 | 2.45E+14 | 3.141 |
| | (0.491) | (-0.660) | (33.134) | (1.144) |
| **Age 31-40** | 0.740 | 0.828 | 0.902 | 1.396 |
| | (-0.302) | (-0.189) | (-0.103) | (0.334) |
| **Age 41-50** | 3.286 | 2.332 | 1.219 | 2.476 |
| | (1.190) | (0.847) | (0.198) | (0.907) |
| **Age above 51** | 1.462 | 2.185 | 3.832 | 1.457 |
| | (0.380) | (0.781) | (1.343) | (0.376) |
| **Female** | 2.725** | 1.081 | 1.850 | 1.621 |
| | (1.002) | (0.078) | (0.615) | (0.483) |
| **Years of tenure involved** | 1.062 | 0.940 | 1.110 | 0.929 |
| | (0.060) | (-0.062) | (0.104) | (-0.074) |
| **Hosmer and Lemeshow test:** | | | | |
| | $Chi^2(8)$= 14.680 | $Chi^2(8)$= 21.649 | $Chi^2(8)$= 8.375 | $Chi^2(8)$= 9.083 |
| | Sig.= 0.066 | Sig.= 0.006 | Sig.= 0.398 | Sig.= 0.335 |

*10% significance level; ** 5% significance level; *** 1% significance level.

Coefficients were translated into Odds ratio; and coefficients were showed in bracket.

**Table 8.2 Regression Results for Interaction of MSA and Education Levels**

| | Probability of visit: logistic model 2B | | | |
|---|---|---|---|---|
| | **Outpatient (n=226)** | **Emergency (n=226)** | **Inpatient (n=226)** | **Diagnosis (n=226)** |
| **MSA * Edu1** | -- | 0.727 | 0.982 | 2.684 |
| | | (-0.319) | (-0.019) | (0.987) |
| **MSA * Edu2** | -- | 1.740 | 2.648 | 0.630 |
| | | (0.554) | (0.974) | (-0.463) |
| **MSA * Edu3** | -- | 15.542* | 1.037 | 2.545 |
| | | (2.744) | (0.036) | (0.934) |
| **Income2** | -- | 0.763 | 1.238 | 0.847 |
| | | (-0.271) | (0.214) | (-0.166) |
| **Income3** | -- | 0.647 | 1.122 | 0.492 |
| | | (-0.435) | (0.115) | (-0.710) |
| **Education2** | -- | 0.409 | 0.681 | 1.566 |
| | | (-2.009) | (-0.384) | (0.449) |
| **Education3** | -- | 0.134* | 2.281 | 1.453 |
| | | (-0.894) | (0.825) | (0.374) |
| **Position2** | -- | 0.199** | 0.554 | 2.013 |
| | | (-1.616) | (-0.591) | (0.699) |
| **Position3** | -- | 0.527 | 1.403 | 1.837 |
| | | (-0.641) | (0.339) | (0.608) |
| **Chronic disease** | -- | 0.758 | 1.346 | 2.295** |
| | | (-0.277) | (0.297) | (0.831) |
| **Health3** | -- | 1.006 | 9.40E+14 | 1.935 |
| | | (0.006) | (34.477) | (0.660) |
| **Health4** | -- | 1.005 | 7.33E+14 | 1.222 |
| | | (0.005) | (34.229) | (0.200) |
| **Age 31-40** | -- | 0.918 | 0.935 | 1.527 |
| | | (-0.085) | (-0.068) | (0.423) |
| **Age 41-50** | -- | 2.567 | 1.330 | 2.605 |
| | | (0.943) | (0.285) | (0.957) |
| **Age above 51** | -- | 1.846 | 4.367 | 1.604 |
| | | (0.613) | (1.474) | (0.473) |
| **Female** | -- | 1.117 | 1.833 | 1.642 |
| | | (0.110) | (0.606) | (0.496) |
| **Years of tenure involved** | -- | 0.938 | 1.080 | 0.939 |
| | | (-0.064) | (0.077) | (-0.063) |
| **Hosmer and Lemeshow test:** | | | | |
| | | $Chi^2(8)$= 11.293 | $Chi^2(8)$= 2.267 | $Chi^2(8)$= 8.173 |
| | | Sig.= 0.186 | Sig.= 0.972 | Sig.= 0.417 |

*10% significance level; ** 5% significance level; *** 1% significance level.

Coefficients were translated into Odds ratio; and coefficients were showed in bracket.

**Table 8.3 Regression Results for Interaction of MSA and Position Levels**

| | Probability of visit: logistic model 2C | | | |
|---|---|---|---|---|
| | **Outpatient (n=226)** | **Emergency (n=226)** | **Inpatient (n=226)** | **Diagnosis (n=226)** |
| **MSA * Position1** | -- | 1.816 | 2.139 | 0.748 |
| | | (0.596) | (0.761) | (-0.291) |
| **MSA * Position2** | -- | 2.443 | 3.290 | 1.003 |
| | | (0.893) | (1.191) | (0.003) |
| **MSA * Position3** | -- | 9.905 | 2.551 | 0.341 |
| | | (2.293) | (0.937) | (-1.075) |
| **Income2** | -- | 0.671 | 1.215 | 0.860 |
| | | (-0.399) | (0.195) | (-0.151) |
| **Income3** | -- | 0.672 | 1.118 | 0.483 |
| | | (-0.398) | (0.111) | (-0.727) |
| **Education2** | -- | 0.261 | 1.792 | 0.979 |
| | | (-1.342) | (0.583) | (-0.021) |
| **Education3** | -- | 1.593 | 4.038 | 1.471 |
| | | (0.465) | (1.396) | (0.386) |
| **Position2** | -- | 0.097* | 0.173 | 2.188 |
| | | (-2.336) | (-1.754) | (0.783) |
| **Position3** | -- | 0.091* | 0.554 | 4.543 |
| | | (-2.396) | (-0.591) | (1.514) |
| **Chronic disease** | -- | 0.797 | 1.370 | 2.276** |
| | | (-0.227) | (0.315) | (0.822) |
| **Health3** | -- | 1.168 | 2.75E+15 | 2.000 |
| | | (0.156) | (35.550) | (0.693) |
| **Health4** | -- | 1.221 | 2.11E+15 | 1.271 |
| | | (0.200) | (35.284) | (0.240) |
| **Age 31-40** | -- | 0.943 | 0.964 | 1.444 |
| | | (-0.059) | (-0.037) | (0.367) |
| **Age 41-50** | -- | 2.403 | 1.380 | 2.490 |
| | | (0.877) | (0.322) | (0.912) |
| **Age above 51** | -- | 2.730 | 4.280 | 1.334 |
| | | (1.004) | (1.454) | (0.288) |
| **Female** | -- | 1.075 | 1.857 | 1.652 |
| | | (0.072) | (0.619) | (0.502) |
| **Years of tenure involved** | -- | 0.918 | 1.074 | 0.938 |
| | | (-0.086) | (0.072) | (-0.065) |
| **Hosmer and Lemeshow test:** | | | | |
| | | $Chi^2(8)$= 19.985 | $Chi^2(8)$= 4.189 | $Chi^2(8)$= 7.327 |
| | | Sig.= 0.010 | Sig.= 0.840 | Sig.= 0.502 |

*10% significance level; ** 5% significance level; *** 1% significance level.

Coefficients were translated into Odds ratio; and coefficients were showed in bracket.

### 6.2.3 Interaction of MSA Arrangement and Health Factors

#### *6.2.3.1 MSA and Chronic Disease Groups*

Results of the interaction effects of MSA and chronic disease on two levels (Hypotheses 10) are shown in Table 9.1. Compared with the informants under Bankuai MSA program, the Tongdao MSA arrangement decreased the probability of outpatient visit by 30% for the insured without chronic disease history, and decreased that by 59% for the chronic disease insured. The results show that compared to Bankuai MSA arrangement, Tongdao MSA arrangement doesn't benefit the disadvantage group and therefore enlarges the inequity in access to outpatient service among insured under Tongdao MSA program.

On the contrary, the Tongdao MSA arrangement increased the probability of emergency visit by 87% for the insured without chronic disease history, and 27.5% for the chronic disease insured. Tongdao MSA arrangement also benefits the advantage group most and enlarges the inequity in access to emergency service.

Inpatient visit estimation failed due to numerical problem with the same reasons.

And for diagnosis service, the Tongdao MSA arrangement increased the probability of visit by 21.5% for the insured without chronic disease, and decreased that by 22% for the chronic disease insured. It shows that compared to the Bankuai MSA arrangement, the Tongdao MSA arrangement enlarges the inequity in access to diagnosis service among insured covered by Tongdao MSA program.

Results of the Model 3A are consistent with expectation that, MSA program

arrangement moderates the relationship between chronic disease condition and access to health care. While at the required significant level, the null hypotheses of Hypotheses 10 can't be rejected. Hypotheses 10 were not supported.

#### *6.2.3.2 MSA and Self-Reported Health Groups*

Results of the interaction effects of MSA and self-reported health on three levels (Hypotheses 11) are shown in Table 9.2. Compared with the informants under Bankuai MSA program, the Tongdao MSA arrangement had slightly positive effect on the probability of outpatient visit for the good health insured, increased that by 34% for the common health insured, and 19% for the not good health insured. The results show that compared to Bankuai MSA arrangement, Tongdao MSA arrangement benefits disadvantaged group most and therefore improves the inequity in access to outpatient service among insured under Tongdao MSA program.

While for emergency service, the Tongdao MSA arrangement increased the probability of visit by 11.2% for the good health insured, and increased that by 1.25 times for the common health insured, 1.56 times for the not good health insured. Here, Tongdao MSA arrangement benefits the disadvantaged groups most and helps to improve the inequity in access to emergency service.

Compared with the informants under Bankuai MSA program, the Tongdao MSA arrangement increased the probability of inpatient visit by 60% for the non-managerial employee insured, and increased that by 3 times for the front-line manager insured,

24.4% for the middle and top manager insured. The results show that compared to Bankuai MSA arrangement, Tongdao MSA arrangement helps to improve the inequity in access to outpatient service among insured under Tongdao MSA program.

Finally, the Tongdao MSA arrangement decreased the probability of diagnosis visit by 34% for the good health insured, and decreased that by 7% for the common health insured, 16% for the not good health insured. It shows that compared to the Bankuai MSA arrangement, the Tongdao MSA arrangement helps to improve the inequity in access to diagnosis service among insured covered by Tongdao MSA program.

Results of the Model 3B are consistent with expectation that, MSA program arrangement moderates the relationship between self-reported health condition and access to health care. While at the required significant level, the null hypotheses of Hypotheses 11 can’t be rejected. Hypotheses 11 were not supported.

**Table 9.1 Regression Results for Interaction of MSA and Chronic Disease**

| | Probability of visit: logistic model 3A | | | |
|---|---|---|---|---|
| | **Outpatient (n=224)** | **Emergency (n=224)** | **Inpatient (n=224)** | **Diagnosis (n=224)** |
| **MSA * Non-chronic** | 0.700 | 1.866 | -- | 1.215 |
| | (-0.357) | (0.624) | | (0.195) |
| **MSA * Chronic** | 0.407 | 1.591 | -- | 0.779 |
| | (-0.899) | (0.465) | | (-0.250) |
| **Income2** | 1.849 | 0.687 | -- | 0.862 |
| | (0.615) | (-0.376) | | (-0.149) |
| **Income3** | 12.217*** | 0.720 | -- | 0.495 |
| | (2.503) | (-0.328) | | (-0.704) |
| **Education2** | 0.000 | 0.212 | -- | 1.107 |
| | (-35.449) | (-1.549) | | (0.102) |
| **Education3** | 0.000 | 1.336 | -- | 1.683 |
| | (-35.186) | (0.290) | | (0.520) |
| **Position2** | 0.188** | 0.176** | -- | 2.075 |
| | (-1.673) | (-1.735) | | (0.730) |
| **Position3** | 0.080*** | 0.430 | -- | 1.913 |
| | (-2.531) | (-0.844) | | (0.649) |
| **Chronic disease** | 1.273 | 0.754 | -- | 2.822* |
| | (0.241) | (-0.283) | | (1.037) |
| **Health3** | 1.580 | 0.922 | -- | 1.976 |
| | (0.457) | (-0.081) | | (0.681) |
| **Health4** | 0.775 | 0.843 | -- | 1.208 |
| | (-0.255) | (-0.171) | | (0.189) |
| **Age 31-40** | 0.663 | 0.954 | -- | 1.436 |
| | (-0.410) | (-0.048) | | (0.362) |
| **Age 41-50** | 2.364 | 2.580 | -- | 2.482 |
| | (0.861) | (0.948) | | (0.909) |
| **Age above 51** | 0.741 | 2.090 | -- | 1.597 |
| | (-0.299) | (0.737) | | (0.468) |
| **Female** | 2.866** | 1.118 | -- | 1.636 |
| | (1.053) | (0.111) | | (0.492) |
| **Years of tenure involved** | 1.116 | 0.971 | -- | 0.922 |
| | (0.110) | (-0.030) | | (-0.081) |
| **Hosmer and Lemeshow test:** | | | | |
| | $Chi^2(8)$= 3.504 | $Chi^2(8)$= 9.234 | | $Chi^2(8)$= 5.209 |
| | Sig.= 0.899 | Sig.= 0.323 | | Sig.= 0.735 |

*10% significance level; ** 5% significance level; *** 1% significance level.

Coefficients were translated into Odds ratio; and coefficients were showed in bracket.

**Table 9.2 Regression Results for Interaction of MSA and Self-Reported Health**

| | Probability of visit: logistic model 3B | | | |
|---|---|---|---|---|
| | **Outpatient (n=226)** | **Emergency (n=226)** | **Inpatient (n=226)** | **Diagnosis (n=226)** |
| **MSA * Health2** | 1.008 | 1.112 | 1.602 | 0.662 |
| | (0.008) | (0.107) | (0.471) | (-0.412) |
| **MSA * Health3** | 1.340 | 2.245 | 4.043* | 0.927 |
| | (0.293) | (0.809) | (1.397) | (-0.076) |
| **MSA * Health4** | 1.189 | 2.561 | 1.244 | 0.842 |
| | (0.173) | (0.940) | (0.219) | (-0.172) |
| **Income2** | 2.055 | 0.816 | 1.241 | 0.880 |
| | (0.720) | (-0.204) | (0.216) | (-0.128) |
| **Income3** | 11.298*** | 0.676 | 1.057 | 0.495 |
| | (2.425) | (-0.391) | (0.056) | (-0.703) |
| **Education2** | 0.000 | 0.258 | 1.724 | 1.080 |
| | (-34.465) | (-1.355) | (0.545) | (0.077) |
| **Education3** | 0.000 | 1.510 | 3.996 | 1.562 |
| | (-34.197) | (0.412) | (1.385) | (0.446) |
| **Position2** | 0.201* | 0.213** | 0.531 | 2.059 |
| | (-1.603) | (-1.545) | (-0.632) | (0.722) |
| **Position3** | 0.089*** | 0.573 | 1.289 | 1.967 |
| | (-2.421) | (-0.556) | (0.254) | (0.677) |
| **Chronic disease** | 0.886 | 0.741 | 1.380 | 2.245** |
| | (-0.121) | (-0.300) | (0.322) | (0.809) |
| **Health3** | 1.640 | 0.683 | 3.10E+13 | 1.955 |
| | (0.495) | (-0.381) | (31.066) | (0.670) |
| **Health4** | 0.972 | 0.664 | 4.89E+13 | 1.321 |
| | (-0.029) | (-0.409) | (31.520) | (0.278) |
| **Age 31-40** | 0.690 | 0.884 | 1.073 | 1.459 |
| | (-0.371) | (-0.123) | (0.070) | (0.378) |
| **Age 41-50** | 2.875 | 2.380 | 1.614 | 2.522 |
| | (1.056) | (0.867) | (0.479) | (0.925) |
| **Age above 51** | 1.240 | 1.900 | 4.768* | 1.685 |
| | (0.215) | (0.642) | (1.562) | (0.522) |
| **Female** | 2.920** | 1.080 | 1.782 | 1.606 |
| | (1.072) | (0.077) | (0.578) | (0.474) |
| **Years of tenure involved** | 1.066 | 0.940 | 1.080 | 0.930 |
| | (0.064) | (-0.062) | (0.077) | (-0.072) |
| **Hosmer and Lemeshow test:** | | | | |
| | $Chi^2(8)$= 11.084 | $Chi^2(8)$= 9.362 | $Chi^2(8)$= 3.580 | $Chi^2(8)$= 12.393 |
| | Sig.= 0.197 | Sig.= 0.313 | Sig.= 0.893 | Sig.= 0.134 |

*10% significance level; ** 5% significance level; *** 1% significance level.

Coefficients were translated into Odds ratio; and coefficients were showed in bracket.

**Table 10 Results of Hypotheses Testing**

| | Hypotheses | Results |
|---|---|---|
| **1 a.** | Insured's income is positively related to their probability of outpatient visiting. | Not Supported |
| **1 b.** | Insured's income is positively related to their probability of emergency visiting. | Not Supported |
| **1 c.** | Insured's income is positively related to their probability of inpatient visiting. | Not Supported |
| **1 d.** | Insured's income is positively related to their probability of diagnosis visiting. | Not Supported |
| **2 a.** | Insured's education background is positively related to their probability of outpatient visiting. | Not Supported |
| **2 b.** | Insured's education background is positively related to their probability of emergency visiting. | Not Supported |
| **2 c.** | Insured's education background is positively related to their probability of inpatient visiting. | Not Supported |
| **2 d.** | Insured's education background is positively related to their probability of diagnosis visiting. | Not Supported |
| **3 a.** | Insured's job status is positively related to their probability of outpatient visiting. | Not Supported |
| **3 b.** | Insured's job status is positively related to their probability of emergency visiting. | Not Supported |
| **3 c.** | Insured's job status is positively related to their probability of inpatient visiting. | Not Supported |
| **3 d.** | Insured's job status is positively related to their probability of diagnosis visiting. | Supported |
| **4 a.** | Insured that have chronic disease history tend to use more outpatient service. | Not Supported |
| **4 b.** | Insured that have chronic disease history tend to use more emergency service. | Not Supported |
| **4 c.** | Insured that have chronic disease history tend to use more inpatient service. | Not Supported |
| **4 d.** | Insured that have chronic disease history tend to use more diagnosis service. | Not Supported |
| **5 a.** | Insured that have better self-reported health status tend to use more outpatient service. | Not Supported |
| **5 b.** | Insured that have better self-reported health status tend to use more emergency service. | Supported |
| **5 c.** | Insured that have better self-reported health status tend to use more inpatient service. | Not Supported |
| **5 d.** | Insured that have better self-reported health status tend to use more diagnosis service. | Not Supported |
| **6 a.** | Under Tongdao MSA program, insured tend to use more outpatient service than that under Bankuai MSA program. | Not Supported |
| **6 b.** | Under Tongdao MSA program, insured tend to use more emergency service than that under Bankuai MSA program. | Supported |
| **6 c.** | Under Tongdao MSA program, insured tend to use less inpatient service than that under Bankuai MSA program. | Not Supported |
| **6 d.** | Under Tongdao MSA program, insured tend to use more diagnosis service than that under Bankuai MSA program. | Not Supported |

**Table 11 Results of Hypotheses Testing (continued)**

| | Hypotheses | Results |
|---|---|---|
| **7 a.** | MSA arrangement moderates the relationship between insured's income and their probability of outpatient visiting. | Not Supported |
| **7 b.** | MSA arrangement moderates the relationship between insured's income and their probability of emergency visiting. | Not Supported |
| **7 c.** | MSA arrangement moderates the relationship between insured's income and their probability of inpatient visiting. | Not Supported |
| **7 d.** | MSA arrangement moderates the relationship between insured's income and their probability of diagnosis visiting. | Not Supported |
| **8 a.** | MSA arrangement moderates the relationship between insured's education and their probability of outpatient visiting. | -- |
| **8 b.** | MSA arrangement moderates the relationship between insured's education and their probability of emergency visiting. | Supported |
| **8 c.** | MSA arrangement moderates the relationship between insured's education and their probability of inpatient visiting. | Not Supported |
| **8 d.** | MSA arrangement moderates the relationship between insured's education and their probability of diagnosis visiting. | Not Supported |
| **9 a.** | MSA arrangement moderates the relationship between insured's position and their probability of outpatient visiting. | -- |
| **9 b.** | MSA arrangement moderates the relationship between insured's position and their probability of emergency visiting. | Not Supported |
| **9 c.** | MSA arrangement moderates the relationship between insured's position and their probability of inpatient visiting. | Not Supported |
| **9 d.** | MSA arrangement moderates the relationship between insured's position and their probability of diagnosis visiting. | Not Supported |
| **10 a.** | MSA arrangement moderates the relationship between insured's chronic disease condition and their probability of outpatient visiting. | Not Supported |
| **10 b.** | MSA arrangement moderates the relationship between insured's chronic disease condition and their probability of emergency visiting. | Not Supported |
| **10 c.** | MSA arrangement moderates the relationship between insured's chronic disease condition and their probability of inpatient visiting. | -- |
| **10 d.** | MSA arrangement moderates the relationship between insured's chronic disease condition and their probability of diagnosis visiting. | Not Supported |
| **11 a.** | MSA arrangement moderates the relationship between insured's self-reported health condition and their probability of outpatient visiting. | Not Supported |
| **11 b.** | MSA arrangement moderates the relationship between insured's self-reported health condition and their probability of emergency visiting. | Not Supported |
| **11 c.** | MSA arrangement moderates the relationship between insured's self-reported health condition and their probability of inpatient visiting. | Not Supported |
| **11 d.** | MSA arrangement moderates the relationship between insured's self-reported health condition and their probability of diagnosis visiting. | Not Supported |

# CHAPTER VII DISCUSSION

## 7.1 Discussion of Findings

Parts of the primary objectives of expanding MSA social medical insurance program to urban population in China were to improve access to health services and to improve equitable access to health services for urban population. The advantage of pooling public health care expenditure in a city-based wide is easy definition. The disadvantage of this method, however, is that a city-based MSA program arrangement tends to engender different extents of health using behavior and further more may influence the access pattern to health care of the insured under different MSA programs. In this study, I provide an empirical assessment of the extent to which two MSA arrangements succeeded in improving access and in reducing the inequitable access to health services. This study is important, as there has been scant research using comparatively analysis to explain which MSA arrangement is well designed, but not whether or not we should adopt such kind of health care financing program. Two typical MSA arrangements, namely Tongdao MSA arrangement and Bankuai MSA arrangement are included to reflect the difference of access patterns in urban China. The design was particular important as these two programs have generally been investigated separately in the past. And the findings have illustrated the influence different MSA arrangement brings to access as well as equity in access to health care.

Based on the cross-city survey data from urban China's MSA social medical insurance program in Zhenjiang and Hefei cities, this study concludes that insured on higher position have more chance to use diagnosis service. Insured that report better health status have more chance to use emergency service. Under Tongdao MSA program, insured tend to use more emergency service than that under Bankuai program. And different MSA arrangements do have effect on the relationship between insured's education and their probability of emergency service visiting. Under Bankuai MSA program, access to emergency service is more equitable across education subgroup.

We also could see the tendencies that Bankuai MSA arrangement shows more equitable access to health care than the Tongdao MSA arrangement in general. While in some instance, especially for diagnosis using, the insured under Tongdao MSA arrangement report more equitable access pattern. Although it indicates that Tongdao MSA arrangement helps to improve access to outpatient service, emergency service, and inpatient service, it may induce overuse and even moral hazard transferring outpatient service to inpatient service based on the findings of equity improvement.

In the following sections, I shall discuss the nature of the relationships among different constructs. The direct relationships between the constructs will be discussed in the first step. And the moderating effects of MSA arrangement put on the relationships between socioeconomic factors/health factors and access to health care will also be elaborated.

### 7.1.1 Direct Effects of MSA on Access to Health Care

Our main finding confirmed that the different MSA arrangements do have impact on access to health care just as the socioeconomic and health factors. Many researchers have suggested that under the co-payment arrangement from both demand-side and public financing, MSAs is considered as a help to prevent consumer moral hazard and create proper incentives for wise health care purchasing decisions (Massaro and Wong, 1995; Song and Liu, 2001; Hanvoravongchai, 2002; Shortt, 2002) However, previous studies in Singapore and China provide compelling evidence about the increase demand of overall health services (Hsiao, 1995; Liu, et al, 1999; Hanvoravongchai, 2002). Phua (1997) once reported a dramatic shift in demand from government hospitals to the restructured and private hospitals, and a discernible upgrading from the lower- to higher- priced beds in Singapore. Lim (1997) also found that in a number of cases Medisave encouraged people to spend beyond their means by choosing higher-class wards than they could reasonably afford. Same overuse situation could also be observed in China (Hsiao, 1995; Yip and Hsiao, 1997; Song and Liu, 2001). Tongdao model, being tested in Zhenjiang and Jiujiang, tends to cause enrollees to consume their individual accounts as soon as possible so as to benefit from social fund. The more popular MSAs, Bankuai model leads to health resource wasting. Many outpatients try to have inpatient services. The pilot experiments as well as lots of empirical studies suggest this point to us.

In present study, the evidences showed the detailed access patterns under the targeted two MSA arrangements. Compared with those under Bankuai MSA program, the

probability of visiting of outpatient service and inpatient service for enrolled under Tongdao MSA program is increased, and especially that of emergency service is significantly increased. However, the probability of visiting of diagnosis service is decreased. At the time of study, informants from Tongdao MSA program report approximately 30.5% more use of outpatient service, 1.46 times more use of emergency service, and 58.5% more use of inpatient service. This suggests that, compared with Bankuai MSA arrangement, Tongdao MSA arrangement improve access to healthcare, but may also induce overuse and even moral hazard transferring outpatient service to inpatient service. As the responsibilities of public and individuals in Tongdao MSA program are implicit in health care expenses, individual accounts just serve as the buffer of social insurance fund. Because individual burden at different payment levels varies a lot, patients have incentive to overspend and finally result in corroding social fund.

Concerning about the socioeconomic factors, the results are mixed. The higher income enrolled only use more outpatient service, but use less other three services. Those enrolled having better education background tend to use more emergency service and inpatient service. And those enrolled on higher position tend to use more inpatient service and diagnosis service. This suggests that horizontal inequities across socioeconomic groups in terms of probability of visiting exist to some extent here. Although the target informants have settled income relatively higher than average level, personal socioeconomic background such as income, education, job status, still have effects on their health care using. While, except for the effect income puts on probability of inpatient visiting and the effect position puts on probability of diagnosis visiting,

other effects being observed are not significant.

Our findings also confirmed that chronic disease history has increased the probabilities of visit in inpatient service and diagnosis service. Self-reported health has increased the probability of visit in all setting. This suggests that vertical equity is primarily satisfied in our target population. The people with the greatest needs are ensured relatively more utilization. Especially, the effect self-reported health puts on probability of emergency visiting being observed significantly.

### 7.1.2 Moderating Effects of MSA on Access to Health Care

With regard to the success of targeting the disadvantage population by the two MSA arrangements, the results are mixed. Based on the findings from comparative analysis, the access patterns of outpatient service and diagnosis service indicate significant difference across each subgroup under two MSA arrangements. In general, it shows more equitable horizontal access to outpatient service and emergency service under Bankuai MSA arrangement, and equitable horizontal access to diagnosis service under Tongdao MSA arrangement. The vertical access to diagnosis service across health groups is more equitable under Bankuai MSA arrangement. However the advantage of some MSA arrangement is not distinct in the distribution of vertical equity in other settings.

The regression results provide further evidences on access improvement of targeting the disadvantage population under the two MSA arrangements. Compared with those

covered by Bankuai MSA program, the highest income enrolled covered by Tongdao MSA program benefit most in terms of using outpatient service, emergency service, and inpatient service. And the poor income enrolled covered by Tongdao MSA program benefits most in terms of using diagnosis service. Without concerning outpatient service, the highest educated enrolled covered by Tongdao MSA program benefit most in emergency and inpatient visiting. Also cross position subgroups, enrolled on the lowest position covered by Tongdao MSA program don't benefit most in emergency and inpatient services using. All above suggest that Bankuai MSA arrangement contributes more to improve horizontal equity in access compare with Tongdao MSA arrangement. While for diagnosis service, Tongdao MSA arrangement indicates a more equitable access pattern in some instance.

What's more, the chronic disease group covered by Tongdao MSA program doesn't benefit most in all using without concerning inpatient service; the poor self-reported health group covered by Tongdao MSA program benefits most in all setting except inpatient service. Here we can't tell which MSA arrangement contributes more in improving vertical equity.

We have mentioned that the payment arrangement of Tongdao MSA program, which vertically based on the amount individuals spend on health care, has a broader risk pool of health service costs. Individual accounts not only pay for inpatient outlay, but also expenses of outpatient services. Therefore, for the patients in catastrophic and chronic diseases, they would benefit a lot from social fund with a lower out-of-pocket expense relatively. The findings just provide some evidence for this point.

Different from Tongdao MSA arrangement, Bankuai program's payment scope is horizontally divided by the treatment enrollees take as referred before. Expenditures in inpatient admissions and outpatient visits will be separately reimbursed through social insurance fund and individual accounts. Therefore, the payment risk for social fund is greatly reduced. Enrollees are also much more conscious about their cost containment. While the risk-pooling ability of social fund is relatively weak than Tongdao Model because the outpatient costs, which account for more than 60% total health expenditures are not under its payment scope. It has been argued that Bankuai MSA program tends to engender inequality problems in health care. However, the findings show that the access patterns are more equitable distributed under Bankuai MSA program in general. It means that the overuse Tongdao MSA program has induced doesn't benefit disadvantage population and therefore doesn't help to improve inequity.

In this section, I have discussed the results of the study based on the findings of previous related studies. As a whole, present study provide valuable empirical evidence on the equity issues of China's MSA program. It illustrates that restricted by the insurance scope and co-payment rate, the conservative Bankuai MSA arrangement doesn't seem to distort people's normal medical behaviour. Compared with another typical Tongdao MSA arrangement, Bankuai MSA arrangement doesn't initiates economizing insured's costs to pull back the pace of the rising individual health-care expenditure at the cost of health equity.

## 7.2 Limitations of the Study

There are several limitations in the present study.

Firstly, access and equity of access was measured based on utilization pattern.

As one of the important notions of China's health care reform is to improve equity in access to health care, we measure equity impact of MSA health financing program in the principle that whether or not it is organized to ensure equality of access. In review section, we have mentioned that equality in health care might be taken to mean that "the treatment of an individual depends on his medical condition and symptoms, not on his ability or willingness to pay". This notion provides practical foundation for empirical studies in many years. According to above, "access" pertains to the ability or capacity to do something, and not to whether it is actually done; it is independent of demand or utilization and can not be simply assessed by examining consumption patterns. Therefore in some studies, "access to care" is defined as one's ability to obtain health service when needed, which is contingent upon financial constraints or non-financial constraints (Yip and Berman, 2001; Liu et al. 2002). While MSA medical insurance program in China has a quite complex payment system, financial burden is not easy to measure based on individual's recalled spending information. Access and equity in access in terms of financial burden is not considered here.

In present study, equity was only assessed on the base of utilization. The probability of visiting was used to measure utilization but not the actual visit times (Duan et al, 1982, 1983; Manning, Newhouse, et al, 1987; Manning, Duan, et al, 1987; Wagstaff and

van Doorslaer, 2002). Even though, it still ignores that the insured holding zero visiting record doesn't mean they can't have health services; and the insured having higher utilization record may have strong ability or capacity to do that. So the probability of visiting is an indistinct while relatively eclectic index which is used to measure access. To some extend, it challenges the validity of the method.

Secondly, the sample size was too small.

As the informants were all from the branches of the targeted enterprise, the reported data was restricted within narrow limits which resulted in calculation problem. Therefore, the results of health care using were absent somewhere. Moreover, many relationships among variables were not significantly observed under the low power of statistical method. From the findings, we could see that most of the hypotheses were not supported. We could only get some possible tendencies.

Thirdly, the compatibility of the two study samples can't be assured.

It was designed in a comparative study to examine the differences in equity in access to health care across two different MSA social medical insurance programs. Limited to resource and time constraints, only two typical cities Zhenjiang and Hefei were involved in. However, conceptually the differences identified could also be attributed partly to some confounding factors such as regional characteristics, time difference, or health care seeking manners. In general, such a problem would exist with most two sites comparative studies. Nevertheless, the problem seems to be attenuated in present study via questionnaire development as well as research design. For example, we extended the

time span of health care using, achieved first-hand data on control groups. Further study can adopt a more sites design to ascertain the causal linkages of the different hypothesized relationships as postulated.

As the survey population was people in one type of enterprise, care should be excised in extrapolating the research results to populations to employees with a great diversity of backgrounds. The results obtained may not be generalized to other enterprises, in particular those in the traditional large- scale enterprises, who achieve low income, relatively elder and unhealthy. On the other hand, China economic is experiencing its fast growing era and many non-traditional enterprises have also been involved in social medical insurance program. Therefore, more research is needed to assess the present framework on other populations. However, the target population could be nicely viewed as a mediacy of general population, neither too poor nor too good. By setting this sort of enterprise as our target population, we also achieved more insightful and significant findings from the equity study.

## 7.3 Suggestions for Further Research

After discussing the results and their implications to researchers and policy makers, further studies on a number of aspects are discussed in this section.

### 7.3.1 Measurement of Access to Health Care

As the design of my research was comparative in nature, future studies can aim at studying equity in access not only in terms of non-financial access like probability of visiting, but also financial access like out-of-pocket expenditure patient afford. Equity study is needed to further explore the dynamics of the relationship between health care using under MSA insurance program. In doing this, the results are expected to gain a better understanding of the access pattern across different MSA insurance arrangements.

Tobin (1970) suggests that equality in health care might be taken to mean that “the treatment of an individual depends on his medical condition and symptoms, not on his ability or willingness to pay”. Access has been defined as “freedom or ability to obtain or make use of ” according to the dictionary. In health care area, “Access” pertains to the ability or capacity to do something, and not to whether it is actually done; it is independent of demand or utilization and can not be simply assessed by examining consumption patterns. Therefore in some equity studies, “access to care” is defined as one’s ability to obtain health service when needed, which is contingent upon financial constraints or non-financial constraints (Yip and Berman, 2001; Liu et al. 2002). And since the famous Rand Health Insurance Experiment in the beginning of 1980s, economists have tried to compare alternative models to test demand for medical care. However, several developed models still faces the estimation problem concerning about the distribution of medical expenses.

Under MSA insurance program arrangement, the financial reimbursement is more

complicated. Totally three bodies are involved here, out-of-pocket expenditure directly from patient, reasonable payment from individual account, and the payment from social fund. When talking about the financial burden, it is not easy to accurately measure here. Future studies are suggested to explore further in clarifying this issue.

### 7.3.2 MSAs Assessment

Based on several explorative studies on urban China's MSA program, the present study addresses equity issues in the context of access to care by analyzing the distribution differences in health care utilization propensity under two typical MSA programs. However, the assessment of the welfare implication of the MSA health care financing program is a huge work and our equity study just laid the first stone for it. Equity in access to is a distributional conception which stays on the delivery of health care. From a long run, how such kind of arrangement influence quality of health care as well as health status is another important issue future studies are encouraged to focus on.

## 7.4 Conclusion

Equity concerns fairness and justice, the idea of balancing legitimate, competing claims of individuals in society in a way that is seen as impartial or disinterested. Most theorists and policy makers have reached an agreement on the indication of health care justice that those in ill-health should receive treatment on the basis of their need for care,

not on the basis of non-health-related attributes. The main objective of China's health insurance system reform is just to establish an affordable basic medical insurance system in urban China, which features of "low level, big pool". All of the employees in urban areas should participate in citywide insurance program. Therefore, the improvement in access equity should be an important index used to assess China's MSA program at this stage.

The present research has achieved the following important objectives:

Firstly, based on a thorough review of the existing literature, I have proposed an integrated model of access impacts of MSAs that fits the comparative-natured equity assessment. Based on the individual characteristic-based view of equity in health care and the norm of access, a theoretical framework to explain equity in access under MSAs is postulated.

Secondly, I conducted a field study using survey method and collected first-hand data from a control group informants working in a large-scale national enterprise in our targeted cities (Zhenjiang and Hefei, urban China). Based on the data collected, the proposed hypotheses were tested and the results analyzed. Responses were achieved from the demand side of health care on their probability of visiting of four kinds of health services (outpatient/ emergency/ inpatient/ diagnosis services). A number of procedures were carried out to test the multicollinearity and the research design assured that the common method bias should not cast big problems to the results of my study.

Thirdly, I have made a thorough discussion of potential implications of my findings that are of value to health care researchers as well as policy makers. Appropriate

suggestions have also been made so that whose may concern can channel the valuable resources of MSAs to improve insurance program arrangement and correct issues that can engender inequity in access to health care.

Most importantly, I believe my thesis makes the following contributions to the literature and practitioners:

Firstly, this framework takes into consideration the emphasis the typical two MSA program arrangements on equity in access in the context of urban China. I apply both the individual characteristic-based view of equity in health care and the norm of access (Wagstaff and van Doorslaer, 2000; Yip and Berman, 2001; Liu et al., 2002) as the theoretical base of my equity in access model to address the influence MSA program arrangements engender. MSA arrangement has seldom been considered to explain the equity issues. Therefore, this proposed framework should shed light on this area of research interest.

Secondly, this framework focuses on two dimensions of equity, namely horizontal equity and vertical equity. The present study should bring in new insights of how the different MSA arrangements affect these two dimensions of equity in access to.

Thirdly, one element of socioeconomic factors namely position and one element of health factors namely self-reported health condition are included in the proposed framework. Several previous studies (Yip and Hsiao, 1997; Liu et al., 1999; Liu et al., 2002) have mentioned the importance of job status in deciding health care seeking behavior in urban China. Moreover, Liu et al. (2002) questioned whether one's health status could be well controlled using chronic morbidity status. Studying the two

elements in the present research should shed light on the validity of the assessing framework and the important role of job status in Chinese culture.

Fourthly, health care financing problem has become a global issue many nations need to face. The search for solutions with regard to more equal access to health care involves both the formal and informal sectors of the economy. Efforts are aimed in particular at social health insurance. Although its disadvantage is obvious in discuss, MSAs may still an option for some nations when considering health care financing structure. Findings of the present study not only confirm Bankuai arrangement's superiority in equity improving, but also provide valuable evidences to support many issues about Tongdao MSA program which have been discussed theoretically for a long time. Policy makers can then properly structure and allocate health resources to assure a more equitable access among population.

Finally, the sample of the present study was a group of employees from the several branches of one rising large-scale enterprise. As the enterprise we focused on was under modern management mechanism and held little burdens many traditional Chinese enterprises had had, the target population was actually restricted to part urban enrollees who had assured income, relatively young and healthy. To some extent, the target population could be nicely viewed as a mediacy of general population, neither too poor nor too good. Therefore, we achieved insightful and significant findings from the equity study and the conclusions can be generalized to a larger population.

As a conclusion, I have established a framework to address two dimensions of equity in access to health care under different MSA program arrangements. Based on the

individual characteristic-based view of equity theory, three socioeconomic factors (income/ education/ position) and two health factors (chronic disease history/ self-reported health condition) were involved as the predictors of access. Moreover, they also served as the elements of equity measurement. Health services were categorized into four groups, outpatient, emergency, inpatient, and diagnosis. Studying these health care items can help researchers and policy makers understand the dynamic relations among health care using under different MSA insurance programs.

I believe results of the present study can serve as building blocks for future research study directions that I have suggested in the thesis. Through the tremendous work of researchers on MSAs and distributional equity of health care, policy makers should understand better the underlying factors that can create properly structured health security environment which in turn, can assure not only disadvantage groups more opportunity to access to health care, but also a favorable distribution of health in along run.

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# APPENDIX 1: QUESTIONNAIRE

## QUESTIONNAIRE

(Academic use only)

### Announcement

Employees from XXX branch, XXX Co.Ltd are the target population in this anonymous survey. Informants involved should have registered in local Social Medical Insurance Program before the end of 2004 and never divorce from that till now.

Please complete all the questions to the best of your ability as well as faithfulness based on your personal experiences. If you have query on questionnaire, please ask help for Human Resource Department. Your answers to the questions will be treated in strictest confidence.

## Part I Health Care Visiting in the Recall Period

*Please mark the proper answer*

| | Number of Visiting → | | | | | Others |
|---|---|---|---|---|---|---|
| 1. How many outpatient visits have you consumed in the latest 1-year recall period? | 0 | 1 | 2 | 3 | 4 | 5 ( ) |
| 2. How many emergency visits have you consumed in the latest 1-year recall period? | 0 | 1 | 2 | 3 | 4 | 5 ( ) |
| 3. How many inpatient admissions have you consumed in the latest 5-year recall period? | 0 | 1 | 2 | 3 | 4 | 5 ( ) |
| 4. How many diagnosis services have you consumed in the latest 5-year recall period? | 0 | 1 | 2 | 3 | 4 | 5 ( ) |

Diagnosis Items include:

1) CT, 2) MRJ, 3) ECT, 4) TCT, 5) color-doppler, 6) beta-ultrasound, 7) HOLTER, 8) PCR, 9) aetiology assay of allergy, 10) DSA, 11) cardiovascular examination, 12) cardiac electro-physiology, 13) electrophysiologic study picture, 14) UCG (ultrasonic cardiogram), 15) analysis of sound spectrography, 16) enzyme-linked immuno sorbent assay, 17) endoscopic ultrasonography, 18) electrogastroscope, 19) electrical sigmoid coloscope, 20) electrocoloscope, 21) electrocholedochofiberscopy, 22) electrobronchoscope, 23) electroenteroscopy. 24) Other specific medical examinations or treatments no less than RMB 300.

## Part II Background Information

*Please tick ( ✓) in the appropriate blank space.*

1. Gender: ☐ Female ☐ Male

2. Age: ☐ Under 30 ☐ 31-40 ☐ 41-50 ☐ Above 50

3. Education: ☐ Secondary Educated or Below

☐ Bachelor Degree

☐ Master Degree or Above

4. Income: _____ **(Note: The Average Mensal Income in the Latest One Year)**

5. Position: ☐ Non-Managerial Employee

☐ Front-line Manager

☐ Middle and Top Manager **(Note: Position You have Half A Year Ago)**

6. Chronic Disease History: ☐ Yes ☐ No

**(Note: here Chronic diseases include hypertension (except hypertensive cardiopathy), chronic gastroenteritis, rheumatic arthritis, chronic obstructive pulmonary disease, cerebrovascular disease, cholelithiasis and cholecystities, diabetes, intervertebral disk disease, ischemic heart disease, digestive ulcer, chronic bronchitis, coronary heart disease, hyperlipidemia, depression, chronic liver disease and hepatocirrhosis, renal disease, osteoarthritis, tumour, pharyngitis, laryngitis, tonsillitis, and trachitis, Trachoma, other diseases of the motor system, other diseases of the digestive system, and other cardiac diseases.)**

7. Self-reported Health: ☐Excellent ☐Good ☐Common ☐Not Good ☐Poor

8. Year Tenure under MSA: ☐1year ☐ 2year ☐3year ☐4year ☐ 5year

☐6year ☐ 7year ☐8year ☐ 9year ☐10year

Please return the completed questionnaire to the Department of Human Resource.

**THANK YOU VERY MUCH FOR YOUR TIME AND EFFORT!**

# 调 查 问 卷

（研究专用）

**在完成问卷前请注意以下事项**

1. **被调查者要求：**在 XX 公司 XX 分公司任职，于 2004 年底前加入本地含个人帐户在内的社会医疗保险且至今尚未退出的职员可参加此次匿名问卷调查。

2. **关键词说明：社会基本医疗保险**

   社会基本医疗保险指 98 年经国务院批准在中国城镇地区推广实行的社会医疗保险项目。它是政府发起，由相关社会保险机关执行管理、覆盖地区所有用人单位和职工、带有半强制性参与性质的社会保险项目。

   社会基本医疗保险包括两个组成部分：统筹基金和个人帐户，前者作为全市范围内的统筹基金实现风险分担功效，后者由相关机构代管但为参保者私人拥有，两项资金都将用于参保人群当前和未来的就医消费。

3. **回复：**问卷填写需时十分钟，请您务必根据个人经历详细填写问卷中的各项问题，在问卷完成中您有任何疑问请询问人力资源部相关人员。此次问卷采用匿名方式，您提供的所有信息将完全保密，只用于学术研究。

医疗服务使用

请回忆在过去的一段时间内您的就医情况

| *请圈出最合适的次数* | 就诊次数 → | | | | | | 其他 |
|---|---|---|---|---|---|---|---|
| 5. 在过去**一年**中，您曾接受过几次门诊服务? | 0 | 1 | 2 | 3 | 4 | 5 | ( ) |
| 6. 在过去**一年**中，您曾接受过几次急诊服务？ | 0 | 1 | 2 | 3 | 4 | 5 | ( ) |
| 7. 在过去**五年**中，您曾接受过几次住院服务? | 0 | 1 | 2 | 3 | 4 | 5 | ( ) |
| 8. 在过去**五年**中，您曾接受过几次下面的检查项目? | 0 | 1 | 2 | 3 | 4 | 5 | ( ) |

检查项目包括：

1) CT，即电子计算机 X 线断层扫描； 2) MRJ，即核磁共振成像； 3) ECT，即同位素检查；

4) TCT，即液基薄层细胞学检测； 5) Color-doppler，即彩色多普勒检查； 6) B 超；

7) HOLTER，即动态心电图； 8) PCR，即聚合酶链反应(限于乙肝、丙肝检查)；

9) 变态反应病原学测定； 10) DSA，即数字减影血管造影； 11) 心血管检查术；

12) 心脏电生理检查图； 13) UCG，即心脏彩超； 14) 电腭图，语图仪分析； 15) 免疫酶标；

16) 超声内镜、电子胃镜、电子乙结肠镜、电子全结肠镜、电子胆道镜、电子气管镜、电子小肠镜；

17) 其他单项化验、检查费用在 300 元人民币以上的项目。

背景资料 （*请于正确答案前的空白处划 √*）

1. **性别:** ☐ **男** ☐**女**

2. **年龄:** ☐ **30 岁以下** ☐**31 至 40 岁** ☐**41 至 50 岁** ☐**50 岁以上**

3. **教育程度:** ☐**高中专以下** ☐ **大学本科或同等专科** ☐**硕士研究生及以上**

4. **收入:** _____

**(注: 按最近一年的月平均总收入水平填写)**

5. **职位:** ☐**普通员工** ☐**一线管理人员** ☐**中层或高层管理人员**

**(注: 按半年前所在职位填写)**

6. **健康状况:** ☐ **曾确诊患有慢性病** ☐ **未确诊患有慢性病**

**(注: 这里的慢性病主要包括高血压, 慢性胃肠炎, 风湿性/类风湿性关节炎, 慢性阻塞肺病, 脑血管病, 胆结石和胆囊炎, 糖尿病, 椎间盘疾病, 缺血性心脏病, 消化性溃疡, 慢性支气管炎, 冠心病, 高血脂, 抑郁症, 慢性肝病及肝硬化, 肾脏疾病, 骨性关节炎, 癌肿, 咽炎、喉炎、扁桃腺炎, 砂眼, 以及其他慢性动力系统疾病, 消化系统疾病和心脏疾病。)**

7. **健康状况自我评估：**☐**极好** ☐**很好** ☐ **不错** ☐**一般** ☐ **较差**

8. **加入本地社会医疗保险的年限:** ☐**1 年** ☐**2 年** ☐**3 年** ☐**4 年** ☐**5 年**

☐ **6 年** ☐**7 年** ☐ **8 年** ☐ **9 年** ☐**10 年**

**— 结 束 —**

再次感谢您给予的大力协助与配合！请将完成后的问卷放入附带信封，并交给：

您所在分公司人力资源部 收

# APPENDIX 2: LOGIT REGRESSION OUTPUTS

## 2-1 Outputs of Outpatient Service

### 2-1-1 Predictor Variables and Outpatient Visiting

## Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 178 | 78.4 |
| | Missing Cases | 49 | 21.6 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 154.341 | .088 | .142 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 5.442 | 8 | .709 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MSA | .266 | .525 | .257 | 1 | .612 | 1.305 |
| | INC | .460 | .340 | 1.834 | 1 | .176 | 1.584 |
| | EDU | -.050 | .522 | .009 | 1 | .924 | .951 |
| | POSITION | -.396 | .334 | 1.407 | 1 | .236 | .673 |
| | HTHCON2 | -.038 | .485 | .006 | 1 | .937 | .962 |
| | SERPHTH | .177 | .300 | .349 | 1 | .555 | 1.194 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | AGE | .351 | .334 | 1.106 | 1 | .293 | 1.420 |
| | GENDER | 1.907 | .652 | 8.553 | 1 | .003 | 6.734 |
| | YEARINS | .050 | .098 | .263 | 1 | .608 | 1.052 |
| | Constant | -.612 | 1.790 | .117 | 1 | .733 | .543 |

a Variable(s) entered on step 1: MSA, INC, EDU, POSITION, HTHCON2, SERPHTH, AGE, GENDER, YEARINS.

## 2-1-2 Interactions of MSA and Income in Outpatient Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 225 | 99.1 |
| | Missing Cases | 2 | .9 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 180.527 | .125 | .206 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 14.680 | 8 | .066 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MINC1 | -.405 | .973 | .173 | 1 | .678 | .667 |
| | MINC2 | -.065 | .765 | .007 | 1 | .932 | .937 |
| | MINC3 | 37.752 | 77339734.448 | .000 | 1 | 1.000 | 24857628840661160.000 |
| | INCOME3 | 1.614 | .961 | 2.817 | 1 | .093 | 5.021 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | INCOME2 | .813 | .698 | 1.355 | 1 | .244 | 2.254 |
| | INCOME1 | 1.461 | 1.050 | 1.934 | 1 | .164 | 4.309 |
| | MASTER | -34.138 | 16867280.072 | .000 | 1 | 1.000 | .000 |
| | BACHELOR | -34.275 | 16867280.072 | .000 | 1 | 1.000 | .000 |
| | SECOND | -34.571 | 16867280.072 | .000 | 1 | 1.000 | .000 |
| | POS3 | -2.482 | .943 | 6.923 | 1 | .009 | .084 |
| | POS2 | -1.670 | .828 | 4.070 | 1 | .044 | .188 |
| | POS1 | -1.534 | .774 | 3.923 | 1 | .048 | .216 |
| | HTHCON2 | -.057 | .473 | .014 | 1 | .905 | .945 |
| | HEALTH4 | .491 | 1.445 | .116 | 1 | .734 | 1.634 |
| | HEALTH3 | 1.016 | 1.450 | .491 | 1 | .483 | 2.762 |
| | HEALTH2 | .039 | 1.502 | .001 | 1 | .979 | 1.040 |
| | AGE4 | .380 | 1.031 | .136 | 1 | .713 | 1.462 |
| | AGE3 | 1.190 | .985 | 1.460 | 1 | .227 | 3.286 |
| | AGE2 | -.302 | .487 | .383 | 1 | .536 | .740 |
| | GENDER | 1.002 | .493 | 4.125 | 1 | .042 | 2.725 |
| | YEARINS | .060 | .093 | .420 | 1 | .517 | 1.062 |
| | Constant | 35.209 | 16867280.072 | .000 | 1 | 1.000 | 19551551618 72938.000 |

a Variable(s) entered on step 1: MINC1, MINC2, MINC3, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, SECOND, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

## 2-1-3 Interactions of MSA and Education in Outpatient Visiting

# Logistic Regression

**Warnings**

| |
|---|
| Estimation failed due to numerical problem. Possible reasons are: (1) at least one of the convergence criteria LCON, BCON is zero or too small, or (2) the value of EPS is too small (if not specified, the default value that is used may be too small for this data set). |

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 226 | 99.6 |

| | | | |
|---|---|---|---|
| | Missing Cases | 1 | .4 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

## 2-1-4 Interactions of MSA and Position in Outpatient Visiting

# Logistic Regression

**Warnings**

| |
|---|
| Estimation failed due to numerical problem. Possible reasons are: (1) at least one of the convergence criteria LCON, BCON is zero or too small, or (2) the value of EPS is too small (if not specified, the default value that is used may be too small for this data set). |

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 226 | 99.6 |
| | Missing Cases | 1 | .4 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

## 2-1-5 Interactions of MSA and Chronic Disease in Outpatient Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 224 | 98.7 |
| | Missing Cases | 3 | 1.3 |

| | | |
|---|---|---|
| Total | 227 | 100.0 |
| Unselected Cases | 0 | .0 |
| Total | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 179.553 | .116 | .192 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 3.504 | 8 | .899 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MCH1 | -.357 | .514 | .481 | 1 | .488 | .700 |
| | MCH2 | -.899 | .896 | 1.007 | 1 | .316 | .407 |
| | INCOME3 | 2.503 | .925 | 7.325 | 1 | .007 | 12.217 |
| | INCOME2 | .615 | .654 | .884 | 1 | .347 | 1.849 |
| | INCOME1 | 1.187 | .708 | 2.808 | 1 | .094 | 3.277 |
| | MASTER | -35.186 | 17162989.104 | .000 | 1 | 1.000 | .000 |
| | BACHELOR | -35.449 | 17162989.104 | .000 | 1 | 1.000 | .000 |
| | SECOND | -35.569 | 17162989.104 | .000 | 1 | 1.000 | .000 |
| | POS3 | -2.531 | .949 | 7.112 | 1 | .008 | .080 |
| | POS2 | -1.673 | .841 | 3.954 | 1 | .047 | .188 |
| | POS1 | -1.490 | .789 | 3.569 | 1 | .059 | .225 |
| | HTHCON2 | .241 | .735 | .108 | 1 | .743 | 1.273 |
| | HEALTH4 | -.255 | 1.370 | .035 | 1 | .852 | .775 |
| | HEALTH3 | .457 | 1.374 | .111 | 1 | .739 | 1.580 |
| | HEALTH2 | -.589 | 1.436 | .168 | 1 | .682 | .555 |
| | AGE4 | -.299 | 1.109 | .073 | 1 | .787 | .741 |
| | AGE3 | .861 | 1.004 | .735 | 1 | .391 | 2.364 |
| | AGE2 | -.410 | .496 | .686 | 1 | .408 | .663 |
| | GENDER | 1.053 | .501 | 4.421 | 1 | .036 | 2.866 |
| | YEARINS | .110 | .104 | 1.115 | 1 | .291 | 1.116 |
| | Constant | 37.047 | 17162989.10 | .000 | 1 | 1.000 | 12278497402 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | 4 | | | | 065830.000 |

a Variable(s) entered on step 1: MCH1, MCH2, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, SECOND, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

## 2-1-6 Interactions of MSA and Self-report Health in Outpatient Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 226 | 99.6 |
| | Missing Cases | 1 | .4 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 185.732 | .106 | .174 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 11.084 | 8 | .197 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MHEALTH2 | .008 | .931 | .000 | 1 | .993 | 1.008 |
| | MHEALTH3 | .293 | .743 | .155 | 1 | .694 | 1.340 |
| | MHEALTH4 | .173 | .846 | .042 | 1 | .838 | 1.189 |
| | INCOME3 | 2.425 | .922 | 6.909 | 1 | .009 | 11.298 |
| | INCOME2 | .720 | .654 | 1.212 | 1 | .271 | 2.055 |
| | INCOME1 | .939 | .700 | 1.798 | 1 | .180 | 2.557 |
| | MASTER | -34.197 | 14154627.05 | .000 | 1 | 1.000 | .000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | 8 | | | | |
| | BACHELOR | -34.465 | 14154627.058 | .000 | 1 | 1.000 | .000 |
| | SECOND | -34.696 | 14154627.058 | .000 | 1 | 1.000 | .000 |
| | POS3 | -2.421 | .938 | 6.658 | 1 | .010 | .089 |
| | POS2 | -1.603 | .832 | 3.715 | 1 | .054 | .201 |
| | POS1 | -1.346 | .806 | 2.788 | 1 | .095 | .260 |
| | HTHCON2 | -.121 | .471 | .066 | 1 | .797 | .886 |
| | HEALTH4 | -.029 | 1.342 | .000 | 1 | .983 | .972 |
| | HEALTH3 | .495 | 1.349 | .135 | 1 | .714 | 1.640 |
| | HEALTH2 | -.264 | 1.505 | .031 | 1 | .861 | .768 |
| | AGE4 | .215 | 1.031 | .044 | 1 | .834 | 1.240 |
| | AGE3 | 1.056 | .979 | 1.164 | 1 | .281 | 2.875 |
| | AGE2 | -.371 | .499 | .552 | 1 | .457 | .690 |
| | GENDER | 1.072 | .496 | 4.671 | 1 | .031 | 2.920 |
| | YEARINS | .064 | .099 | .416 | 1 | .519 | 1.066 |
| | Constant | 35.786 | 14154627.058 | .000 | 1 | 1.000 | 34790187084 06734.000 |

a Variable(s) entered on step 1: MHEALTH2, MHEALTH3, MHEALTH4, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, SECOND, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

## 2-2 Outputs of Emergency Service

### 2-2-1 Predictor Variables and Emergency Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 178 | 78.4 |
| | Missing Cases | 49 | 21.6 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 167.315 | .050 | .080 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 3.864 | 8 | .869 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MSA | .900 | .504 | 3.193 | 1 | .074 | 2.459 |
| | INC | -.450 | .316 | 2.035 | 1 | .154 | .637 |
| | EDU | .275 | .513 | .287 | 1 | .592 | 1.316 |
| | POSITION | -.175 | .326 | .289 | 1 | .591 | .839 |
| | HTHCON2 | -.136 | .465 | .086 | 1 | .770 | .873 |
| | SERPHTH | .571 | .290 | 3.872 | 1 | .049 | 1.770 |
| | AGE | .541 | .311 | 3.028 | 1 | .082 | 1.717 |
| | GENDER | .056 | .435 | .017 | 1 | .897 | 1.058 |
| | YEARINS | -.105 | .092 | 1.294 | 1 | .255 | .900 |
| | Constant | -3.662 | 1.756 | 4.351 | 1 | .037 | .026 |

a Variable(s) entered on step 1: MSA, INC, EDU, POSITION, HTHCON2, SERPHTH, AGE, GENDER, YEARINS.

## 2-2-2 Interactions of MSA and Income in Emergency Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 225 | 99.1 |
| | Missing Cases | 2 | .9 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 205.371 | .136 | .209 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 21.649 | 8 | .006 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MINC1 | 1.167 | .906 | 1.659 | 1 | .198 | 3.212 |
| | MINC2 | .316 | .827 | .146 | 1 | .702 | 1.372 |
| | MINC3 | 1.633 | 1.040 | 2.465 | 1 | .116 | 5.118 |
| | INCOME3 | -1.578 | 1.063 | 2.203 | 1 | .138 | .206 |
| | INCOME2 | -.778 | .683 | 1.295 | 1 | .255 | .459 |
| | INCOME1 | -.929 | .981 | .897 | 1 | .344 | .395 |
| | MASTER | .539 | 1.305 | .170 | 1 | .680 | 1.714 |
| | BACHELOR | -1.443 | 1.135 | 1.618 | 1 | .203 | .236 |
| | SECOND | -.490 | 1.223 | .160 | 1 | .689 | .613 |
| | POS3 | -.577 | .757 | .580 | 1 | .446 | .562 |
| | POS2 | -1.627 | .701 | 5.382 | 1 | .020 | .196 |
| | POS1 | -.720 | .593 | 1.471 | 1 | .225 | .487 |
| | HTHCON2 | -.316 | .435 | .529 | 1 | .467 | .729 |
| | HEALTH4 | -.660 | 1.555 | .180 | 1 | .671 | .517 |
| | HEALTH3 | -.714 | 1.564 | .208 | 1 | .648 | .490 |
| | HEALTH2 | -1.795 | 1.633 | 1.208 | 1 | .272 | .166 |
| | AGE4 | .781 | 1.015 | .592 | 1 | .441 | 2.185 |
| | AGE3 | .847 | .694 | 1.487 | 1 | .223 | 2.332 |
| | AGE2 | -.189 | .486 | .152 | 1 | .697 | .828 |
| | GENDER | .078 | .415 | .035 | 1 | .851 | 1.081 |
| | YEARINS | -.062 | .093 | .444 | 1 | .505 | .940 |
| | Constant | 2.210 | 2.101 | 1.106 | 1 | .293 | 9.114 |

a Variable(s) entered on step 1: MINC1, MINC2, MINC3, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, SECOND, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

## 2-2-3 Interactions of MSA and Education in Emergency Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 226 | 99.6 |
| | Missing Cases | 1 | .4 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 205.142 | .139 | .212 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 11.293 | 8 | .186 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MEDU1 | -.319 | 1.228 | .068 | 1 | .795 | .727 |
| | MEDU2 | .554 | .557 | .990 | 1 | .320 | 1.740 |
| | MEDU3 | 2.744 | 1.419 | 3.740 | 1 | .053 | 15.542 |
| | INCOME3 | -.435 | .749 | .337 | 1 | .562 | .647 |
| | INCOME2 | -.271 | .663 | .167 | 1 | .683 | .763 |
| | INCOME1 | .072 | .666 | .012 | 1 | .914 | 1.075 |
| | MASTER | -.894 | 1.390 | .414 | 1 | .520 | .409 |
| | BACHELOR | -2.009 | 1.217 | 2.726 | 1 | .099 | .134 |
| | POS3 | -.641 | .781 | .674 | 1 | .412 | .527 |
| | POS2 | -1.616 | .737 | 4.812 | 1 | .028 | .199 |
| | POS1 | -.660 | .633 | 1.088 | 1 | .297 | .517 |
| | HTHCON2 | -.277 | .429 | .417 | 1 | .519 | .758 |
| | HEALTH4 | .005 | 1.396 | .000 | 1 | .997 | 1.005 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | HEALTH3 | .006 | 1.401 | .000 | 1 | .996 | 1.006 |
| | HEALTH2 | -1.097 | 1.480 | .549 | 1 | .459 | .334 |
| | AGE4 | .613 | 1.007 | .370 | 1 | .543 | 1.846 |
| | AGE3 | .943 | .688 | 1.879 | 1 | .170 | 2.567 |
| | AGE2 | -.085 | .480 | .031 | 1 | .859 | .918 |
| | GENDER | .110 | .410 | .073 | 1 | .788 | 1.117 |
| | YEARINS | -.064 | .095 | .456 | 1 | .499 | .938 |
| | Constant | 1.478 | 1.966 | .565 | 1 | .452 | 4.384 |

a Variable(s) entered on step 1: MEDU1, MEDU2, MEDU3, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

## 2-2-4 Interactions of MSA and Position in Emergency Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 226 | 99.6 |
| | Missing Cases | 1 | .4 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 206.230 | .134 | .206 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 19.985 | 8 | .010 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MPOS1 | .596 | .580 | 1.058 | 1 | .304 | 1.816 |
| | MPOS2 | .893 | 1.266 | .498 | 1 | .481 | 2.443 |
| | MPOS3 | 2.293 | 1.416 | 2.623 | 1 | .105 | 9.905 |
| | INCOME3 | -.398 | .739 | .290 | 1 | .590 | .672 |
| | INCOME2 | -.399 | .667 | .358 | 1 | .550 | .671 |
| | INCOME1 | -.079 | .650 | .015 | 1 | .903 | .924 |
| | MASTER | .465 | 1.303 | .128 | 1 | .721 | 1.593 |
| | BACHELOR | -1.342 | 1.150 | 1.360 | 1 | .243 | .261 |
| | SECOND | -.279 | 1.241 | .051 | 1 | .822 | .757 |
| | POS3 | -2.396 | 1.344 | 3.176 | 1 | .075 | .091 |
| | POS2 | -2.336 | 1.253 | 3.479 | 1 | .062 | .097 |
| | POS1 | -1.306 | .693 | 3.554 | 1 | .059 | .271 |
| | HTHCON2 | -.227 | .431 | .277 | 1 | .599 | .797 |
| | HEALTH4 | .200 | 1.437 | .019 | 1 | .890 | 1.221 |
| | HEALTH3 | .156 | 1.444 | .012 | 1 | .914 | 1.168 |
| | HEALTH2 | -.934 | 1.510 | .383 | 1 | .536 | .393 |
| | AGE4 | 1.004 | 1.051 | .913 | 1 | .339 | 2.730 |
| | AGE3 | .877 | .698 | 1.577 | 1 | .209 | 2.403 |
| | AGE2 | -.059 | .477 | .015 | 1 | .902 | .943 |
| | GENDER | .072 | .412 | .031 | 1 | .861 | 1.075 |
| | YEARINS | -.086 | .096 | .798 | 1 | .372 | .918 |
| | Constant | 1.426 | 1.976 | .521 | 1 | .470 | 4.162 |

a Variable(s) entered on step 1: MPOS1, MPOS2, MPOS3, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, SECOND, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

## 2-2-5 Interactions of MSA and Chronic Disease in Emergency Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 224 | 98.7 |
| | Missing Cases | 3 | 1.3 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 203.928 | .131 | .201 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 9.234 | 8 | .323 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MCH1 | .624 | .465 | 1.796 | 1 | .180 | 1.866 |
| | MCH2 | .465 | .800 | .337 | 1 | .561 | 1.591 |
| | INCOME3 | -.328 | .742 | .196 | 1 | .658 | .720 |
| | INCOME2 | -.376 | .671 | .314 | 1 | .575 | .687 |
| | INCOME1 | .042 | .654 | .004 | 1 | .948 | 1.043 |
| | MASTER | .290 | 1.283 | .051 | 1 | .821 | 1.336 |
| | BACHELOR | -1.549 | 1.136 | 1.859 | 1 | .173 | .212 |
| | SECOND | -.399 | 1.228 | .106 | 1 | .745 | .671 |
| | POS3 | -.844 | .771 | 1.197 | 1 | .274 | .430 |
| | POS2 | -1.735 | .721 | 5.797 | 1 | .016 | .176 |
| | POS1 | -.846 | .600 | 1.985 | 1 | .159 | .429 |
| | HTHCON2 | -.283 | .681 | .172 | 1 | .678 | .754 |
| | HEALTH4 | -.171 | 1.412 | .015 | 1 | .903 | .843 |
| | HEALTH3 | -.081 | 1.416 | .003 | 1 | .954 | .922 |
| | HEALTH2 | -1.103 | 1.491 | .548 | 1 | .459 | .332 |
| | AGE4 | .737 | 1.071 | .474 | 1 | .491 | 2.090 |
| | AGE3 | .948 | .695 | 1.861 | 1 | .173 | 2.580 |
| | AGE2 | -.048 | .486 | .010 | 1 | .922 | .954 |
| | GENDER | .111 | .415 | .072 | 1 | .789 | 1.118 |
| | YEARINS | -.030 | .090 | .110 | 1 | .740 | .971 |
| | Constant | 1.110 | 1.959 | .321 | 1 | .571 | 3.033 |

a Variable(s) entered on step 1: MCH1, MCH2, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, SECOND, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

2-2-6 Interactions of MSA and Self-report Health in Emergency Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 226 | 99.6 |
| | Missing Cases | 1 | .4 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 207.756 | .129 | .197 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 9.362 | 8 | .313 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MHEALTH2 | .107 | 1.017 | .011 | 1 | .917 | 1.112 |
| | MHEALTH3 | .809 | .651 | 1.545 | 1 | .214 | 2.245 |
| | MHEALTH4 | .940 | .735 | 1.637 | 1 | .201 | 2.561 |
| | INCOME3 | -.391 | .741 | .278 | 1 | .598 | .676 |
| | INCOME2 | -.204 | .669 | .093 | 1 | .760 | .816 |
| | INCOME1 | -.046 | .651 | .005 | 1 | .944 | .955 |
| | MASTER | .412 | 1.294 | .101 | 1 | .750 | 1.510 |
| | BACHELOR | -1.355 | 1.148 | 1.395 | 1 | .238 | .258 |
| | SECOND | -.238 | 1.235 | .037 | 1 | .847 | .788 |
| | POS3 | -.556 | .776 | .513 | 1 | .474 | .573 |
| | POS2 | -1.545 | .724 | 4.549 | 1 | .033 | .213 |
| | POS1 | -.663 | .628 | 1.113 | 1 | .291 | .515 |
| | HTHCON2 | -.300 | .430 | .487 | 1 | .485 | .741 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | HEALTH4 | -.409 | 1.399 | .085 | 1 | .770 | .664 |
| | HEALTH3 | -.381 | 1.401 | .074 | 1 | .786 | .683 |
| | HEALTH2 | -.874 | 1.602 | .297 | 1 | .586 | .417 |
| | AGE4 | .642 | 1.012 | .402 | 1 | .526 | 1.900 |
| | AGE3 | .867 | .701 | 1.528 | 1 | .216 | 2.380 |
| | AGE2 | -.123 | .478 | .067 | 1 | .796 | .884 |
| | GENDER | .077 | .415 | .035 | 1 | .852 | 1.080 |
| | YEARINS | -.062 | .094 | .439 | 1 | .508 | .940 |
| | Constant | 1.080 | 1.929 | .314 | 1 | .575 | 2.945 |

a Variable(s) entered on step 1: MHEALTH2, MHEALTH3, MHEALTH4, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, SECOND, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

## 2-3 Outputs of Inpatient Service

### 2-3-1 Predictor Variables and Inpatient Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 178 | 78.4 |
| | Missing Cases | 49 | 21.6 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 155.687 | .081 | .131 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 7.794 | 8 | .454 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MSA | .460 | .564 | .667 | 1 | .414 | 1.585 |
| | INC | -.563 | .338 | 2.781 | 1 | .095 | .569 |
| | EDU | .370 | .553 | .447 | 1 | .504 | 1.448 |
| | POSITION | .272 | .316 | .742 | 1 | .389 | 1.313 |
| | HTHCON2 | .157 | .479 | .107 | 1 | .744 | 1.170 |
| | SERPHTH | .275 | .297 | .857 | 1 | .355 | 1.317 |
| | AGE | .667 | .321 | 4.321 | 1 | .038 | 1.948 |
| | GENDER | .685 | .441 | 2.406 | 1 | .121 | 1.983 |
| | YEARINS | .026 | .095 | .072 | 1 | .788 | 1.026 |
| | Constant | -4.550 | 1.862 | 5.973 | 1 | .015 | .011 |

a Variable(s) entered on step 1: MSA, INC, EDU, POSITION, HTHCON2, SERPHTH, AGE, GENDER, YEARINS.

## 2-3-2 Interactions of MSA and Income in Inpatient Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 225 | 99.1 |
| | Missing Cases | 2 | .9 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 199.149 | .087 | .139 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 1 | 8.375 | 8 | .398 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MINC1 | .707 | .939 | .566 | 1 | .452 | 2.028 |
| | MINC2 | .391 | .814 | .231 | 1 | .631 | 1.479 |
| | MINC3 | .794 | .995 | .636 | 1 | .425 | 2.212 |
| | INCOME3 | -.452 | 1.048 | .186 | 1 | .666 | .636 |
| | INCOME2 | -.233 | .760 | .094 | 1 | .760 | .792 |
| | INCOME1 | .053 | 1.054 | .003 | 1 | .960 | 1.055 |
| | MASTER | 1.345 | 1.451 | .859 | 1 | .354 | 3.838 |
| | BACHELOR | .487 | 1.243 | .153 | 1 | .695 | 1.627 |
| | SECOND | -.110 | 1.360 | .007 | 1 | .935 | .896 |
| | POS3 | .237 | .742 | .102 | 1 | .749 | 1.268 |
| | POS2 | -.720 | .650 | 1.226 | 1 | .268 | .487 |
| | POS1 | -.693 | .617 | 1.262 | 1 | .261 | .500 |
| | HTHCON2 | .287 | .425 | .456 | 1 | .499 | 1.333 |
| | HEALTH4 | 33.134 | 7791484.948 | .000 | 1 | 1.000 | 24535859681 8261.400 |
| | HEALTH3 | 33.407 | 7791484.948 | .000 | 1 | 1.000 | 32241486722 4251.000 |
| | HEALTH2 | 32.421 | 7791484.948 | .000 | 1 | 1.000 | 12031244364 9743.000 |
| | AGE4 | 1.343 | .914 | 2.160 | 1 | .142 | 3.832 |
| | AGE3 | .198 | .729 | .074 | 1 | .786 | 1.219 |
| | AGE2 | -.103 | .518 | .039 | 1 | .842 | .902 |
| | GENDER | .615 | .409 | 2.269 | 1 | .132 | 1.850 |
| | YEARINS | .104 | .095 | 1.206 | 1 | .272 | 1.110 |
| | Constant | -35.711 | 7791484.948 | .000 | 1 | 1.000 | .000 |

a Variable(s) entered on step 1: MINC1, MINC2, MINC3, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, SECOND, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

## 2-3-3 Interactions of MSA and Education in Inpatient Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 226 | 99.6 |
| | Missing Cases | 1 | .4 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 197.628 | .094 | .151 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 2.267 | 8 | .972 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MEDU1 | -.019 | 1.359 | .000 | 1 | .989 | .982 |
| | MEDU2 | .974 | .594 | 2.687 | 1 | .101 | 2.648 |
| | MEDU3 | .036 | 1.410 | .001 | 1 | .979 | 1.037 |
| | INCOME3 | .115 | .793 | .021 | 1 | .884 | 1.122 |
| | INCOME2 | .214 | .736 | .084 | 1 | .772 | 1.238 |
| | INCOME1 | .537 | .702 | .585 | 1 | .444 | 1.710 |
| | MASTER | .825 | 1.533 | .289 | 1 | .591 | 2.281 |
| | BACHELOR | -.384 | 1.328 | .084 | 1 | .772 | .681 |
| | POS3 | .339 | .746 | .206 | 1 | .650 | 1.403 |
| | POS2 | -.591 | .661 | .798 | 1 | .372 | .554 |
| | POS1 | -.499 | .635 | .618 | 1 | .432 | .607 |
| | HTHCON2 | .297 | .424 | .490 | 1 | .484 | 1.346 |
| | HEALTH4 | 34.229 | 6617831.116 | .000 | 1 | 1.000 | 73332343246 7417.000 |
| | HEALTH3 | 34.477 | 6617831.116 | .000 | 1 | 1.000 | 93976511093 9254.000 |
| | HEALTH2 | 33.510 | 6617831.116 | .000 | 1 | 1.000 | 35749914642 6722.000 |
| | AGE4 | 1.474 | .903 | 2.663 | 1 | .103 | 4.367 |
| | AGE3 | .285 | .735 | .150 | 1 | .698 | 1.330 |
| | AGE2 | -.068 | .507 | .018 | 1 | .894 | .935 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | GENDER | .606 | .409 | 2.189 | 1 | .139 | 1.833 |
| | YEARINS | .077 | .094 | .672 | 1 | .412 | 1.080 |
| | Constant | -36.619 | 6617831.116 | .000 | 1 | 1.000 | .000 |

a Variable(s) entered on step 1: MEDU1, MEDU2, MEDU3, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

## 2-3-4 Interactions of MSA and Position in Inpatient Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 226 | 99.6 |
| | Missing Cases | 1 | .4 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 197.922 | .093 | .149 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 4.189 | 8 | .840 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MPOS1 | .761 | .635 | 1.433 | 1 | .231 | 2.139 |
| | MPOS2 | 1.191 | 1.251 | .907 | 1 | .341 | 3.290 |
| | MPOS3 | .937 | 1.172 | .639 | 1 | .424 | 2.551 |
| | INCOME3 | .111 | .794 | .020 | 1 | .888 | 1.118 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | INCOME2 | .195 | .742 | .069 | 1 | .793 | 1.215 |
| | INCOME1 | .573 | .698 | .673 | 1 | .412 | 1.773 |
| | MASTER | 1.396 | 1.449 | .928 | 1 | .335 | 4.038 |
| | BACHELOR | .583 | 1.246 | .219 | 1 | .640 | 1.792 |
| | SECOND | .009 | 1.363 | .000 | 1 | .995 | 1.009 |
| | POS3 | -.591 | 1.104 | .287 | 1 | .592 | .554 |
| | POS2 | -1.754 | 1.277 | 1.886 | 1 | .170 | .173 |
| | POS1 | -1.345 | .748 | 3.234 | 1 | .072 | .261 |
| | HTHCON2 | .315 | .426 | .546 | 1 | .460 | 1.370 |
| | HEALTH4 | 35.284 | 14000300.578 | .000 | 1 | 1.000 | 2107200059700089.000 |
| | HEALTH3 | 35.550 | 14000300.578 | .000 | 1 | 1.000 | 2748400292390175.000 |
| | HEALTH2 | 34.573 | 14000300.578 | .000 | 1 | 1.000 | 1034897218450931.000 |
| | AGE4 | 1.454 | .948 | 2.352 | 1 | .125 | 4.280 |
| | AGE3 | .322 | .745 | .187 | 1 | .665 | 1.380 |
| | AGE2 | -.037 | .508 | .005 | 1 | .942 | .964 |
| | GENDER | .619 | .409 | 2.288 | 1 | .130 | 1.857 |
| | YEARINS | .072 | .102 | .491 | 1 | .483 | 1.074 |
| | Constant | -37.702 | 14000300.578 | .000 | 1 | 1.000 | .000 |

a Variable(s) entered on step 1: MPOS1, MPOS2, MPOS3, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, SECOND, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

## 2-3-5 Interactions of MSA and Chronic Disease in Inpatient Visiting

# Logistic Regression

**Warnings**

Estimation failed due to numerical problem. Possible reasons are: (1) at least one of the convergence criteria LCON, BCON is zero or too small, or (2) the value of EPS is too small (if not specified, the default value that is used may be too small for this data set).

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 224 | 98.7 |

| | | | |
|---|---|---|---|
| | Missing Cases | 3 | 1.3 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

## 2-3-6 Interactions of MSA and Self-report Health in Inpatient Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 226 | 99.6 |
| | Missing Cases | 1 | .4 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 196.140 | .100 | .161 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 3.580 | 8 | .893 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MHEALTH2 | .471 | 1.208 | .152 | 1 | .697 | 1.602 |
| | MHEALTH3 | 1.397 | .718 | 3.787 | 1 | .052 | 4.043 |
| | MHEALTH4 | .219 | .775 | .080 | 1 | .778 | 1.244 |
| | INCOME3 | .056 | .812 | .005 | 1 | .945 | 1.057 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | INCOME2 | .216 | .751 | .083 | 1 | .774 | 1.241 |
| | INCOME1 | .582 | .709 | .674 | 1 | .412 | 1.790 |
| | MASTER | 1.385 | 1.458 | .903 | 1 | .342 | 3.996 |
| | BACHELOR | .545 | 1.258 | .187 | 1 | .665 | 1.724 |
| | SECOND | .010 | 1.372 | .000 | 1 | .994 | 1.010 |
| | POS3 | .254 | .762 | .111 | 1 | .739 | 1.289 |
| | POS2 | -.632 | .668 | .897 | 1 | .344 | .531 |
| | POS1 | -.540 | .646 | .698 | 1 | .403 | .583 |
| | HTHCON2 | .322 | .427 | .570 | 1 | .450 | 1.380 |
| | HEALTH4 | 31.520 | 9917215.470 | .000 | 1 | 1.000 | 48867516947239.600 |
| | HEALTH3 | 31.066 | 9917215.470 | .000 | 1 | 1.000 | 31032883239917.870 |
| | HEALTH2 | 30.797 | 9917215.470 | .000 | 1 | 1.000 | 23723599299255.970 |
| | AGE4 | 1.562 | .922 | 2.868 | 1 | .090 | 4.768 |
| | AGE3 | .479 | .759 | .398 | 1 | .528 | 1.614 |
| | AGE2 | .070 | .519 | .018 | 1 | .892 | 1.073 |
| | GENDER | .578 | .411 | 1.973 | 1 | .160 | 1.782 |
| | YEARINS | .077 | .096 | .632 | 1 | .427 | 1.080 |
| | Constant | -34.504 | 9917215.470 | .000 | 1 | 1.000 | .000 |

a Variable(s) entered on step 1: MHEALTH2, MHEALTH3, MHEALTH4, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, SECOND, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

## 2-4 Outputs of Diagnosis Service

### 2-4-1 Predictor Variables and Diagnosis Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 178 | 78.4 |
| | Missing Cases | 49 | 21.6 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |

| | | |
|---|---|---|
| Total | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 211.098 | .066 | .092 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 4.854 | 8 | .773 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MSA | -.308 | .417 | .544 | 1 | .461 | .735 |
| | INC | -.236 | .264 | .798 | 1 | .372 | .790 |
| | EDU | -.149 | .454 | .108 | 1 | .742 | .861 |
| | POSITION | .533 | .307 | 3.017 | 1 | .082 | 1.704 |
| | HTHCON2 | .459 | .412 | 1.241 | 1 | .265 | 1.582 |
| | SERPHTH | .064 | .245 | .069 | 1 | .792 | 1.067 |
| | AGE | .465 | .291 | 2.554 | 1 | .110 | 1.592 |
| | GENDER | .173 | .376 | .211 | 1 | .646 | 1.188 |
| | YEARINS | -.024 | .081 | .085 | 1 | .771 | .977 |
| | Constant | -.272 | 1.455 | .035 | 1 | .852 | .762 |

a Variable(s) entered on step 1: MSA, INC, EDU, POSITION, HTHCON2, SERPHTH, AGE, GENDER, YEARINS.

## 2-4-2 Interactions of MSA and Income in Diagnosis Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 225 | 99.1 |
| | Missing Cases | 2 | .9 |

| | | |
|---|---|---|
| Total | 227 | 100.0 |
| Unselected Cases | 0 | .0 |
| Total | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 257.358 | .110 | .154 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 9.083 | 8 | .335 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MINC1 | .023 | .701 | .001 | 1 | .974 | 1.023 |
| | MINC2 | -.227 | .671 | .114 | 1 | .736 | .797 |
| | MINC3 | -.385 | .790 | .238 | 1 | .626 | .680 |
| | INCOME3 | -.405 | .803 | .254 | 1 | .614 | .667 |
| | INCOME2 | .108 | .617 | .031 | 1 | .861 | 1.114 |
| | INCOME1 | -.244 | .806 | .091 | 1 | .762 | .784 |
| | MASTER | .497 | 1.408 | .125 | 1 | .724 | 1.644 |
| | BACHELOR | .056 | 1.265 | .002 | 1 | .965 | 1.057 |
| | SECOND | 1.039 | 1.399 | .551 | 1 | .458 | 2.825 |
| | POS3 | .699 | .734 | .907 | 1 | .341 | 2.012 |
| | POS2 | .759 | .594 | 1.630 | 1 | .202 | 2.135 |
| | POS1 | -.339 | .535 | .400 | 1 | .527 | .713 |
| | HTHCON2 | .893 | .410 | 4.753 | 1 | .029 | 2.443 |
| | HEALTH4 | 1.144 | 1.415 | .654 | 1 | .419 | 3.141 |
| | HEALTH3 | 1.616 | 1.434 | 1.270 | 1 | .260 | 5.034 |
| | HEALTH2 | .988 | 1.474 | .450 | 1 | .503 | 2.686 |
| | AGE4 | .376 | .950 | .157 | 1 | .692 | 1.457 |
| | AGE3 | .907 | .689 | 1.729 | 1 | .188 | 2.476 |
| | AGE2 | .334 | .401 | .691 | 1 | .406 | 1.396 |
| | GENDER | .483 | .364 | 1.757 | 1 | .185 | 1.621 |
| | YEARINS | -.074 | .080 | .856 | 1 | .355 | .929 |
| | Constant | -.824 | 2.020 | .167 | 1 | .683 | .439 |

a Variable(s) entered on step 1: MINC1, MINC2, MINC3, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, SECOND, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

## 2-4-3 Interactions of MSA and Education in Diagnosis Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 226 | 99.6 |
| | Missing Cases | 1 | .4 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 257.694 | .111 | .155 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 8.173 | 8 | .417 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MEDU1 | .987 | 1.393 | .502 | 1 | .479 | 2.684 |
| | MEDU2 | -.463 | .462 | 1.001 | 1 | .317 | .630 |
| | MEDU3 | .934 | 1.334 | .491 | 1 | .484 | 2.545 |
| | INCOME3 | -.710 | .659 | 1.160 | 1 | .282 | .492 |
| | INCOME2 | -.166 | .580 | .082 | 1 | .774 | .847 |
| | INCOME1 | -.181 | .584 | .096 | 1 | .757 | .834 |
| | MASTER | .374 | 1.449 | .067 | 1 | .796 | 1.453 |
| | BACHELOR | .449 | 1.307 | .118 | 1 | .731 | 1.566 |
| | POS3 | .608 | .738 | .679 | 1 | .410 | 1.837 |
| | POS2 | .699 | .597 | 1.373 | 1 | .241 | 2.013 |
| | POS1 | -.410 | .555 | .548 | 1 | .459 | .663 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | HTHCON2 | .831 | .402 | 4.267 | 1 | .039 | 2.295 |
| | HEALTH4 | .200 | 1.281 | .024 | 1 | .876 | 1.222 |
| | HEALTH3 | .660 | 1.296 | .259 | 1 | .611 | 1.935 |
| | HEALTH2 | .021 | 1.341 | .000 | 1 | .987 | 1.022 |
| | AGE4 | .473 | .939 | .253 | 1 | .615 | 1.604 |
| | AGE3 | .957 | .688 | 1.936 | 1 | .164 | 2.605 |
| | AGE2 | .423 | .392 | 1.167 | 1 | .280 | 1.527 |
| | GENDER | .496 | .360 | 1.898 | 1 | .168 | 1.642 |
| | YEARINS | -.063 | .080 | .624 | 1 | .430 | .939 |
| | Constant | .022 | 1.895 | .000 | 1 | .991 | 1.022 |

a Variable(s) entered on step 1: MEDU1, MEDU2, MEDU3, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

## 2-4-4 Interactions of MSA and Position in Diagnosis Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 226 | 99.6 |
| | Missing Cases | 1 | .4 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 258.341 | .109 | .152 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 7.327 | 8 | .502 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MPOS1 | -.291 | .489 | .354 | 1 | .552 | .748 |
| | MPOS2 | .003 | .976 | .000 | 1 | .997 | 1.003 |
| | MPOS3 | -1.075 | 1.334 | .649 | 1 | .420 | .341 |
| | INCOME3 | -.727 | .660 | 1.212 | 1 | .271 | .483 |
| | INCOME2 | -.151 | .582 | .067 | 1 | .795 | .860 |
| | INCOME1 | -.280 | .581 | .233 | 1 | .630 | .756 |
| | MASTER | .386 | 1.396 | .076 | 1 | .782 | 1.471 |
| | BACHELOR | -.021 | 1.264 | .000 | 1 | .987 | .979 |
| | SECOND | .986 | 1.394 | .500 | 1 | .479 | 2.680 |
| | POS3 | 1.514 | 1.264 | 1.433 | 1 | .231 | 4.543 |
| | POS2 | .783 | .976 | .644 | 1 | .422 | 2.188 |
| | POS1 | -.080 | .594 | .018 | 1 | .893 | .923 |
| | HTHCON2 | .822 | .402 | 4.192 | 1 | .041 | 2.276 |
| | HEALTH4 | .240 | 1.286 | .035 | 1 | .852 | 1.271 |
| | HEALTH3 | .693 | 1.302 | .284 | 1 | .594 | 2.000 |
| | HEALTH2 | .080 | 1.345 | .004 | 1 | .952 | 1.084 |
| | AGE4 | .288 | .974 | .087 | 1 | .767 | 1.334 |
| | AGE3 | .912 | .684 | 1.777 | 1 | .182 | 2.490 |
| | AGE2 | .367 | .391 | .881 | 1 | .348 | 1.444 |
| | GENDER | .502 | .361 | 1.935 | 1 | .164 | 1.652 |
| | YEARINS | -.065 | .081 | .633 | 1 | .426 | .938 |
| | Constant | .113 | 1.897 | .004 | 1 | .953 | 1.119 |

a Variable(s) entered on step 1: MPOS1, MPOS2, MPOS3, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, SECOND, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

## 2-4-5 Interactions of MSA and Chronic Disease in Diagnosis Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 224 | 98.7 |
| | Missing Cases | 3 | 1.3 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |

| | | |
|---|---|---|
| Total | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 256.026 | .107 | .149 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 5.209 | 8 | .735 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MCH1 | .195 | .394 | .245 | 1 | .621 | 1.215 |
| | MCH2 | -.250 | .726 | .119 | 1 | .730 | .779 |
| | INCOME3 | -.704 | .657 | 1.146 | 1 | .284 | .495 |
| | INCOME2 | -.149 | .580 | .066 | 1 | .797 | .862 |
| | INCOME1 | -.292 | .578 | .256 | 1 | .613 | .746 |
| | MASTER | .520 | 1.389 | .140 | 1 | .708 | 1.683 |
| | BACHELOR | .102 | 1.257 | .007 | 1 | .935 | 1.107 |
| | SECOND | 1.058 | 1.396 | .574 | 1 | .449 | 2.880 |
| | POS3 | .649 | .739 | .769 | 1 | .380 | 1.913 |
| | POS2 | .730 | .595 | 1.504 | 1 | .220 | 2.075 |
| | POS1 | -.277 | .529 | .274 | 1 | .601 | .758 |
| | HTHCON2 | 1.037 | .591 | 3.081 | 1 | .079 | 2.822 |
| | HEALTH4 | .189 | 1.293 | .021 | 1 | .884 | 1.208 |
| | HEALTH3 | .681 | 1.309 | .271 | 1 | .603 | 1.976 |
| | HEALTH2 | -.023 | 1.352 | .000 | 1 | .987 | .978 |
| | AGE4 | .468 | .983 | .227 | 1 | .634 | 1.597 |
| | AGE3 | .909 | .687 | 1.750 | 1 | .186 | 2.482 |
| | AGE2 | .362 | .395 | .837 | 1 | .360 | 1.436 |
| | GENDER | .492 | .363 | 1.836 | 1 | .175 | 1.636 |
| | YEARINS | -.081 | .077 | 1.101 | 1 | .294 | .922 |
| | Constant | .142 | 1.900 | .006 | 1 | .941 | 1.152 |

a Variable(s) entered on step 1: MCH1, MCH2, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, SECOND, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.

2-4-6 Interactions of MSA and Self-report Health in Diagnosis Visiting

# Logistic Regression

**Case Processing Summary**

| Unweighted Cases(a) | | N | Percent |
|---|---|---|---|
| Selected Cases | Included in Analysis | 226 | 99.6 |
| | Missing Cases | 1 | .4 |
| | Total | 227 | 100.0 |
| Unselected Cases | | 0 | .0 |
| Total | | 227 | 100.0 |

a If weight is in effect, see classification table for the total number of cases.

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 259.052 | .106 | .148 |

**Hosmer and Lemeshow Test**

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 12.393 | 8 | .134 |

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1(a) | MHEALTH2 | -.412 | .771 | .285 | 1 | .593 | .662 |
| | MHEALTH3 | -.076 | .569 | .018 | 1 | .894 | .927 |
| | MHEALTH4 | -.172 | .657 | .069 | 1 | .793 | .842 |
| | INCOME3 | -.703 | .658 | 1.144 | 1 | .285 | .495 |
| | INCOME2 | -.128 | .587 | .047 | 1 | .828 | .880 |
| | INCOME1 | -.271 | .580 | .218 | 1 | .640 | .763 |
| | MASTER | .446 | 1.392 | .103 | 1 | .749 | 1.562 |
| | BACHELOR | .077 | 1.264 | .004 | 1 | .952 | 1.080 |
| | SECOND | 1.036 | 1.398 | .549 | 1 | .459 | 2.817 |
| | POS3 | .677 | .737 | .842 | 1 | .359 | 1.967 |
| | POS2 | .722 | .601 | 1.445 | 1 | .229 | 2.059 |
| | POS1 | -.348 | .556 | .391 | 1 | .532 | .706 |
| | HTHCON2 | .809 | .404 | 4.011 | 1 | .045 | 2.245 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | HEALTH4 | .278 | 1.319 | .045 | 1 | .833 | 1.321 |
| | HEALTH3 | .670 | 1.341 | .250 | 1 | .617 | 1.955 |
| | HEALTH2 | .251 | 1.434 | .031 | 1 | .861 | 1.286 |
| | AGE4 | .522 | .940 | .308 | 1 | .579 | 1.685 |
| | AGE3 | .925 | .684 | 1.829 | 1 | .176 | 2.522 |
| | AGE2 | .378 | .391 | .933 | 1 | .334 | 1.459 |
| | GENDER | .474 | .363 | 1.706 | 1 | .192 | 1.606 |
| | YEARINS | -.072 | .080 | .810 | 1 | .368 | .930 |
| | Constant | .239 | 1.914 | .016 | 1 | .901 | 1.270 |

a Variable(s) entered on step 1: MHEALTH2, MHEALTH3, MHEALTH4, INCOME3, INCOME2, INCOME1, MASTER, BACHELOR, SECOND, POS3, POS2, POS1, HTHCON2, HEALTH4, HEALTH3, HEALTH2, AGE4, AGE3, AGE2, GENDER, YEARINS.