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JAVKHLANBAYAR DORJDAGVA

SOCIOECONOMIC-RELATED HEALTH INEQUALITIES AND HEALTH CARE UTILIZATION IN MONGOLIA

Socioeconomic-related health inequalities and health care utilization in Mongolia

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ABSTRACT

After the socioeconomic transition, which occurred in 1990, Mongolia has implemented a number of reforms in its public sectors, including the health sector, to stimulate economic growth, expand social protection and maintain social stability. However, the country has been confronted with many major social issues and has been experiencing both demographic and epidemiological transitions. For this reason, it is important to assess the degree of socioeconomic inequity in both health and health care utilization, and to evaluate the financial protection in the health sector.

The aim of this thesis was to examine the degrees of inequities in health and health care utilization in Mongolia by analyzing national representative data with robust methods. The thesis also evaluated the incidence and extent of catastrophic health expenditure, and impoverishment due to out-of-pocket payments for health care.

The results of this thesis indicate that ill-health is concentrated among the worse-off in both urban and rural areas, even after need standardization. In rural areas, the main contributor to inequality in ill-health is education, whereas economic status is the main contributor in urban areas.

The findings also reveal that socioeconomic-related inequity in health care utilizations exists in the health system regardless of the provider types. Furthermore, utilizations of outpatient care at tertiary level hospitals and private hospitals, inpatient care at *soum* (district) health centers, and the total inpatient care have a pro-rich tendency, in contrast, a pro-poor inequity is observed in family health center utilization. All of these inequities are displaying an upward tendency.

This thesis found that about 5.5% of all households experienced catastrophic health expenditures, if one sets this threshold at 10% of the total household expenditure in the country. Furthermore, approximately 0.7% of the total population has been found to be pushed into poverty due to health care payments.

National Library of Medicine Classification: W 74, W 76, W 84, WA 380, WA 390
Medical Subject Headings: Delivery of Health Care; Healthcare Disparities; Primary Health Care/utilization; Socioeconomic Factors; Education; Income; Health; Rural Health; Urban Health; Health Expenditures; Poverty; Mongolia

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TIIVISTELMÄ

Mongolian vuoden 1990 suuren talousmuutoksen myötä julkista sektoria ja erityisesti terveydenhuoltoa uudistettiin. Tavoitteena oli talouskasvun turvaaminen, sosiaaliturvajärjestelmän laajentaminen sekä yhteiskunnallisen vakauden ylläpito. Uudistuksista huolimatta Mongoliassa on edelleen paljon sosiaalisia ongelmia. Maata ovat koetelleet myös väestörakenteen ja väestön terveystilan muutokset. Sen vuoksi on tärkeää arvioida Mongolian sosiaalisia terveyseroja sekä väestöryhmien välisiä eroja terveyspalvelujen käytössä, samoin kuin sosiaalisia ja taloudellisia tukitoimia terveydenhuollossa.

Tässä väitöskirjatyössä tarkasteltiin terveyden sekä terveyspalvelujen käytön sosiaalista epätasa-arvoa Mongoliassa. Tulosten yleistettävyyden vuoksi käytössä oli edustava väestöaineisto ja robustit tilastomenetelmät. Väitöskirjassa arvioitiin myös yksilön tai perheen kannalta katastrofaalisten terveysmenojen yleisyyttä ja intensiteettiä sekä terveyspalvelujen asiakasmaksujen mahdollisesti aiheuttamaa köyhtymistä.

Tulokset osoittivat, että tarvevakioitu terveysvaje keskittyy taloudellisesti heikompiosaiseen väestöön sekä kaupungeissa että maaseudulla. Maaseudulla pääasiallinen terveyden eriarvoisuutta selittävä tekijä oli koulutustaso, kaupunkialueilla puolestaan työllisyystilanne.

Tutkimuksessa havaittiin, että sosiaaliset terveyserot eivät riipu siitä, millä tavoin palvelut tuotettiin. Eriarvoisuus näkyi erityisesti hoitopaikan valinnassa. Avohoito erityistason erikoissairaanhoidon sairaaloissa ja yksityisissä sairaaloissa sekä vuodeosastohoito kaikkinensa ja varsinkin alueellisissa terveyskeskuksissa suosi taloudellisesti hyväosaisia. Alemmat sosiaaliset ryhmät käyttivät puolestaan useammin perusterveydenhuollon avopalveluja. Eriarvoisuus näyttää tutkimuksen mukaan olevan lisääntymässä.

Tulosten mukaan noin 5,5 % kotitalouksista oli kärsinyt katastrofaalisen suurista terveysmenoista, kun rajana pidettiin 10 prosenttia kotitalouden kaikista menoista. Noin 0.7 prosenttia väestöstä oli ajautunut köyhyyteen henkilökohtaisten terveydenhuollon menojen vuoksi.

Luokitus: W 74, W 76, W 84, WA 380, WA 390
Yleinen suomalainen asiasanasto: Terveydenhuolto; terveyspalvelut; käyttö; terveys; terveyserot; eriarvoisuus; sosioekonomiset tekijät; koulutus; tulot; tulotaso; maaseutu; kaupunkiseudut; terveydenhuoltomenot; köyhyys; Mongolia

To the memory of my father, Dorjdagva Yerentei

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Kuopio, May 2017

Javkhlanbayar Dorjdagva

List of the original publications

This dissertation is based on the following original publications:

I Dorjdagva, J., Batbaatar, E., Dorjsuren, B., & Kauhanen, J. Explaining differences in education-related inequalities in health between urban and rural areas in Mongolia. *International Journal for Equity in Health, 14(1), 1. 2015.*

II Dorjdagva, J., Batbaatar, E., Dorjsuren, B., & Kauhanen, J. Income-related inequalities in health care utilization in Mongolia, 2007/2008–2012. *International Journal for Equity in Health, 14(1), 1. 2015.*

III Dorjdagva, J., Batbaatar, E., Svensson, M., Dorjsuren, B., Batmunkh, B., & Kauhanen, J. Free and universal, but unequal utilization of primary health care in the rural and urban areas of Mongolia. *Accepted for publication in International Journal for Equity in Health on May 2, 2017.*

IV Dorjdagva, J., Batbaatar, E., Svensson, M., Dorjsuren, B., & Kauhanen, J. Catastrophic health expenditure and impoverishment in Mongolia. *International Journal for Equity in Health, 15(1), 105. 2016.*

Table of Contents

Abbreviations

EI	Erreygers' concentration index
FGP	Family group practices
FHC	Family health centers
GDP	Gross domestic product
HSES	Household Socio-Economic Survey
ISCED	International standard classification of education
MNT	The currency of Mongolia
MOH	Ministry of Health
NSO	National Statistical Office of Mongolia
OOP	Out-of-pocket payments
PHC	Primary health care
PPP	Purchasing power parity
SHI	Social health insurance
UHC	Universal health coverage
WHO	World Health Organization

1. Introduction

The United Nations declared that "*everyone has the right to a standard of living adequate for the health and well-being of himself and of his family…*" in the Universal Declaration of Human Rights adopted in 1948 (Assembly, 1948). In order that individuals can have this right, much effort has been expended. However, with respect to health, there are huge inequalities not only between countries but also between different socioeconomic groups in the same country. Life expectancy in Sierra Leone is 50.1 years, while it is more than 50% longer, i.e. 83.7 years, in Japan (World Health Organization, 2016). Around 99% of all maternal mortality occurs in the developing countries (Zahr & Wardlaw, 2004). Furthermore, only 2% of all global health expenditure is spent in low-income countries, which carry 56% of the global disease burden (Prinja & Kumar, 2009). Similar patterns of inequality exist at local and national levels all around the world. A lower socioeconomic status, such as being poor, less educated or unemployed, is associated with ill health and a higher mortality rate. Most importantly, the majority of these health inequalities are avoidable, preventable and morally unacceptable (Whitehead, 1992).

The avoidable inequalities in health, or, in other words, inequities in health, are rooted in "the conditions in which people grow, live, work, and age, and the systems put in place to deal with illness" (Marmot & Bell, 2012). Therefore, policies to combat health equity need to address the general inequities in societies through improving the conditions of daily life, tackling the inequitable distributions of power, money, and resources, as well as raising public awareness (WHO Commission on Social Determinants of Health & World Health Organization, 2008).

Reducing inequities in health across the population benefits not only individuals, but also the society as a whole. For instance, it was found that the economic costs of socioeconomic inequalities in health in Europe amount to as much as €980 billion per year (Mackenbach, Meerding, & Kunst, 2011).

"Access to timely, acceptable, and affordable health care of appropriate quality" is also recognised as a part of the right to health (WHO, 2015). In this sense, a key objective in any country's health policy should be to ensure horizontal equity in health care i.e. equal treatment for an equal medical need, regardless of individual characteristics, such as differences in income, race, etc. (O. A. O'Donnell & Wagstaff, 2008). Inequities in health care utilisation occur not only in developing countries, but also in the developed countries, even in those countries supposedly providing universal and comprehensive health coverage (Doorslaer, Koolman, & Jones, 2004).

Furthermore, about 150 million people suffer from catastrophic health expenditures and, globally, 100 million people are pushed below the poverty line every year due to their health care payments (Xu et al., 2007). A large number of people abstain from the use of health care services due to its high cost and their failure to obtain financial protection in the health sector (Preker et al., 2004).

The current globally accepted approach to tackle persistent inequities in health and to ensure financial protection of population against the cost of ill health is to develop and sustain universal health coverage (UHC)(Assembly, 2015). The aim of this approach is to guarantee that everyone has access to comprehensive health services of acceptable quality without incurring financial hardship (Kutzin, Witter, Jowett, Bayarsaikhan, & World Health Organization, 2017; World Health Organization, 2012a).

As in many other countries, in Mongolia, improving the health of the population and reducing socioeconomic-related inequalities in health and health care utilisation as well as

expanding financial protection have been priority issues for the health sector (J. MOH, JICWELS 2005). Most of the health reforms implemented in Mongolia have been guided by the concept of UHC, including the implementation of social health insurance (SHI), privatisation of the health sector, and the establishment of primary health care (PHC) services. The structure of the health system is described in detail in Chapter 2 of the present thesis.

Today, SHI coverage reaches 98.1% of the population and universal PHC is funded by the state budget. Nevertheless, recent research has revealed that the current health system in the country is far from UHC (Bayarsaikhan, Kwon, & Chimeddagva, 2015). There are a number of barriers in the system, including low system efficiency (World Health Organization, 2000), a weak referral system (Tsilaajav, Ser-Od, Baasai, Byambaa, & Shagdarsuren, 2013), a poorly regulated health sector (Asian Development Bank, 2008) and an excessively high out-of-pocket payment (OOP) share of the total health expenditure (Tsilaajav et al., 2013; WHO Representative Office of Mongolia, 2012). Moreover, it has been noted that the system is at a high risk of becoming a dual system in which those better-off individuals seek help from private hospitals and the worse-off use public hospitals (Asian Development Bank, 2008). There is a need to improve the health system to provide more equitable health services to the population regardless of their socioeconomic characteristics.

In addition, although the health system is recognised as one of the determinants of health, it is evident that its contribution is not the only contributing factor (Kirby & LeBreton, 2001; Schroeder, 2007). Indeed, one needs to consider these other determinants of health if one wishes to accomplish the goals of the health system throughout the country. As the country made the socioeconomic transition from a centralised economy to a market economy rather recently i.e. in 1990, it is important to examine the current social determinants of health and their contributions to health.

Nonetheless, as far as we are aware, only one study has been conducted on socioeconomic inequality in health using A Multiple Indicator Cluster Survey data 2005 and the Mongolian Household Socio-Economic Survey (HSES) data 2007/2008 (Bredenkamp et al., 2012). That study showed that unsatisfactory child health was concentrated among the poor; and it also revealed that there was moderate inequality in health care utilisation at different levels of the health care system. However, that study did not conclusively discern the total degree of inequality in health in the country (O. A. O'Donnell & Wagstaff, 2008).

Since the time when the study was conducted in Mongolia, both the national average income per household (NSO, 2016b) and the level of social protection have increased (MOH, 2016; Tsilaajav et al., 2013), while the poverty rate has decreased (NSO., 2015); however, the unemployment rate (NSO, 2016b) and urbanisation (NSO., 2015) are on the rise.

Furthermore, health inequalities have tended to increase between urban and rural areas as a result of the rapid urbanisation (NSO., 2015); there is poor availability of health care services in rural areas (Asian Development Bank, 2008), whereas health care providers in urban areas have an excessive workload (MOH, 2016), and there is now significant air pollution in Ulaanbaatar, the capital city (World Bank, 2011).

After the rapid socioeconomic changes, some voices have been raised about the existence of inequity in health and health care utilisation. Nevertheless, little corrective measures have been initiated, even though the inequalities in health and health care use are a key topic of concern in the country. For this reason, it is essential to conduct a systematic and comparative study with a robust methodology at the national level to elaborate how the overall situation has been changing.

These arguments form the basis for this thesis which is concerned with evaluating socioeconomic-related inequality in health and health care use as well as measurement of financial protection in health in Mongolia using the most recently available data.

The thesis consists of nine chapters. Chapter 2 provides information about the country, including the general health status of the population and the Mongolian health care system. Chapter 3 introduces the concepts of inequality and inequity in health and health care as well as financial protection. That chapter also describes the methods used to measure the concepts and existing empirical works. Chapter 4 presents research-specific aims, and is followed by chapter 5, which describes the methods utilized in this thesis. The results of the studies are provided in an abridged form in chapter 6. Chapter 7 briefly discusses the results of the thesis with reference to published works and estimates the strengths and limitations of the present study. Chapter 8 lists the conclusions emerging from this thesis as well as some final remarks followed by the policy implications and recommendations for future research in chapter 9. The original publications are appended at the end of the thesis.

2. Background

Mongolia is a lower-middle income country (World Bank, 2016a) located between Russia to the north and China to the south. At the end of 2015, the population of Mongolia was 3,057,700 (MOH, 2016); however, in terms of area, it is the nineteenth largest country in the world but one of the most sparsely populated countries with an overall population density of 1.7 per km^2.

Mongolia was a socialist country under the political control of the Soviet Union for about 70 years until there was a peaceful political and economic transition from a socialist and centralised planning system to a democratic and market-oriented system in 1990 (Tsilaajav et al., 2013). After the transition, Mongolia has become a multi-party parliamentary system country. The country ratified its new constitution in 1992. The President of Mongolia is the titular head of the country with limited and symbolic political power. The prime minister and the parliament have the most political power. The parliament has 76 seats and both the president and the parliament serve four-year terms (Tsilaajav et al., 2013).

Figure 1. A map of Mongolia

Source: (Wikipedia, 2016)

Mongolia has 21 provinces (*aimags*), which are further divided into districts (*soums*). There are a total of 338 *soums;* in rural areas, they are divided into 1,682 smallest administrative units, so-called *baghs*. The capital city is Ulaanbaatar and it consists of 9 districts. All of these districts are divided into 132 sub-districts (*khoroos*); these are the smallest administrative units in the capital. Each administrative unit enjoys self-governance to support decentralisation, but with a limited financial budgetary leeway, since the government provides a major amount of their revenue (Tsilaajav et al., 2013).

Table 1. Key development indicators in Mongolia

Key development indicators	Measure	Year
Total population, thousand	3057.7	2015
Urban population (%)	68.0%	2015
Rural population (%)	32.0%	2015
Life expectancy at birth	69.89 years	2015
Infant mortality rate per 1,000 live births	15.3	2015
Maternal mortality rate per 100,000 live births	26.0	2015
Expenditure of the Health and Sports sector as share of GDP	2.5%	2015
GDP per capita (current US$)	3,967.8	2015
Adult literacy rate, population 15+ years, both sexes (%)	98	2010
Poverty rate	27.4%	2012
Human development index	0.735	2014
Gini coefficient	36.5	2013

Sources: Health indicator 2015 (MOH, 2016); World Bank national accounts data (World Bank, 2016b); HSES 2012 (NSO, 2013); The Human Development Index 2013 (UNDP, 2016)

In addition to undergoing a socioeconomic transition, Mongolia has been experiencing demographic and epidemiological transitions over the past two decades. Internal migration from the provinces to the capital city started at the same time as the economic and political transition (Tsilaajav et al., 2013). There were many reasons for this migration; poor work opportunities in rural areas, loss of livestock as a result of natural disasters, and limited access to public services, combined with their poor quality (Azcona, 2009; Batbaatar, 2005). By the end of 2015, 45.6% of the total population were living in the capital city, while 68.5% live in urban areas (NSO, 2016a).

The average life expectancy reached 69.89 years in 2015 (MOH, 2016), up from 60.00 in 1989 (World Bank, 2016c). In the meantime, the population increased by 27.7% (World Bank, 2016a) as a result of a decreased mortality rate and increased fertility (Tsilaajav et al., 2013). Furthermore, the proportion of population 60 years and older is expected to increase from 5.9% in 2010 to 12% in 2030 (WPRO, 2014) and further to 25% by 2050 (Mujahid, Banzragch, & Oyun-Erdene, 2010). Nonetheless, the proportion of the working age population is projected to remain high (Tsilaajav et al., 2013).

2.1 HEALTH STATUS

Since 1990, there has been an epidemiological transition in the leading causes of mortality and morbidity. Non-communicable and lifestyle-related diseases have become common causes of mortality and morbidity as a result of high coverage of immunisation and successful interventions for infectious diseases (Tsilaajav et al., 2013). Unhealthy diet as well as prevalent smoking and alcohol consumption, sedentary lifestyle, and obesity are common causes of premature death and chronic morbidity during productive age (Tsilaajav et al., 2013).

In 2014, the leading causes of death in Mongolia were diseases of the circulatory system (34.3%), neoplasms (24.3%), injuries, poisoning and certain other consequences of external causes (16.8%), diseases of the digestive system (7.7%) and diseases of the respiratory system (3.5%) (MOH, 2015). Diseases of the respiratory system, diseases of the digestive system, diseases of the genitourinary system, diseases of the circulatory system as well as injury, poisoning, and certain other consequences of external causes have been the leading causes of morbidity since 2003 (MOH, 2015). Additionally, incidences of behaviour and lifestyle-related communicable diseases, such as HIV/AIDS, tuberculosis, viral hepatitis and zoonotic diseases, are on the rise (Tsilaajav et al., 2013).

Mongolia is committed to attain 3 out of the 8 Millennium Development Goals; to reduce child mortality, to improve maternal health, and to limit and reduce HIV/AIDS and tuberculosis. By 2015, the country had achieved the goal of reducing infant and under-five mortality rates by 4 times. Furthermore, it is among the only 9 countries which had succeeded in reducing the maternal mortality ratio by at least 75% between 1990 and 2015 (MOH, 2015).

Mongolia is among the countries with the lowest HIV/AIDS prevalence with an approximate rate of 0.1% of the total population in 2014; however, the number of new incidences of HIV/AIDS has continued to increase over the years since the first case occurred in the country in 1992 (MOH, 2015).

Mongolia is one of the countries with the highest tuberculosis prevalence in the Western Pacific Region. As part of the scope of the Millennium Development Goals, the country reached its goal of reducing the mortality rate due to tuberculosis to 1.9 per 100,000 in 2014. While, the objective set for the morbidity rate has not been reached, the rate has been decreasing slowly from 146 per 100,000 after the Directly Observed Treatment, Short-Course strategy initiated in 1996 to 141 per 100,000 in 2015 (MOH, 2015; Tsilaajav et al., 2013).

2.2. HEALTH SYSTEM

The organisational structure of the health system

In Mongolia, the Ministry of Health (MOH) is the main administrative body which formulates the health policies; plans, regulates and supervises health-related activities; and ensures implementations through its institutions and agencies (Figure 2) (Tsilaajav et al., 2013). The vision of the ministry is "to strive to ensure the availability, accessibility, affordability and equity of quality health care services for all Mongolians (World Health Organization, 2012b). The mission of the ministry is "to build favourable living conditions for people by upgrading the quality of health care, public health services and health care preventive actions to international standards" (Tsilaajav et al., 2013).

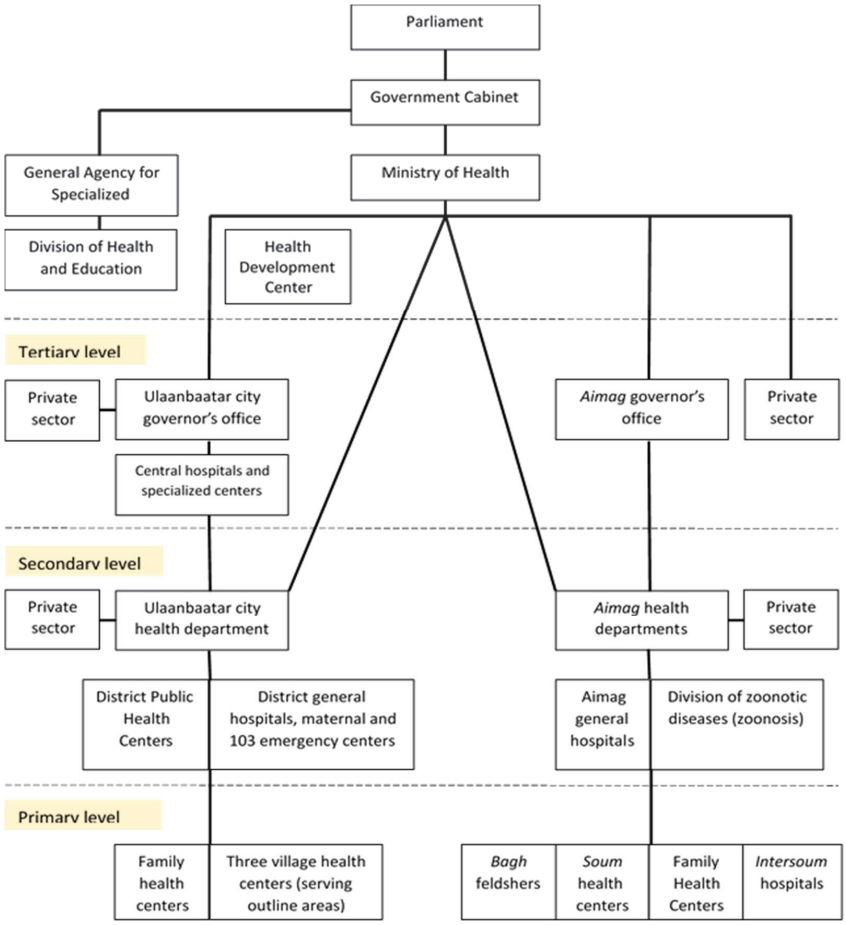

Figure 2. The organisational structure of the health system

Source: WHO (Dashzeveg C, Mathauer I, Enkhee E, Dorjsuren B, Tsilaajav T, Batbayar C, 2011; Tsilaajav et al., 2013)

Health service delivery

Health care is delivered at 3 levels primary, secondary and tertiary care: PHC is provided by family health centres (FHC) in urban areas; *soum* health centres and *intersoum* health centres (health centres, which serve populations of more than one *soum*) in rural areas; and *bagh* feldshers in remote rural areas.

Secondary health care is delivered by district hospitals in the capital city, *aimag* general hospitals in *aimag* centres and rural general hospitals in rural areas.

Tertiary health care is delivered through multispecialty central hospitals and specialised centres in Ulaanbaatar, and regional diagnostic treatment centres for the population outside Ulaanbaatar.

As of 2014, there were 218 FHCs, 12 district hospitals, 16 multispecialty and specialised hospitals in Ulaanbaatar; 271 *soum* health centres, and 39 *intersoum* health centres, 19 village health centres, 6 rural general hospitals and 16 *aimag* general hospitals in rural areas; and 5 regional diagnostic treatment centres delivering health services in rural and urban areas (MOH, 2015).

Despite the fact that hospitals at all levels are state-owned except for the FHC, some private hospitals also operate at the secondary and tertiary care level. In 2014, there were 1,171 registered private hospitals.

Figure 3 shows patient pathways to access health services in relation to their health conditions and needs in different geographical areas with official referral and unofficial self-referral methods.

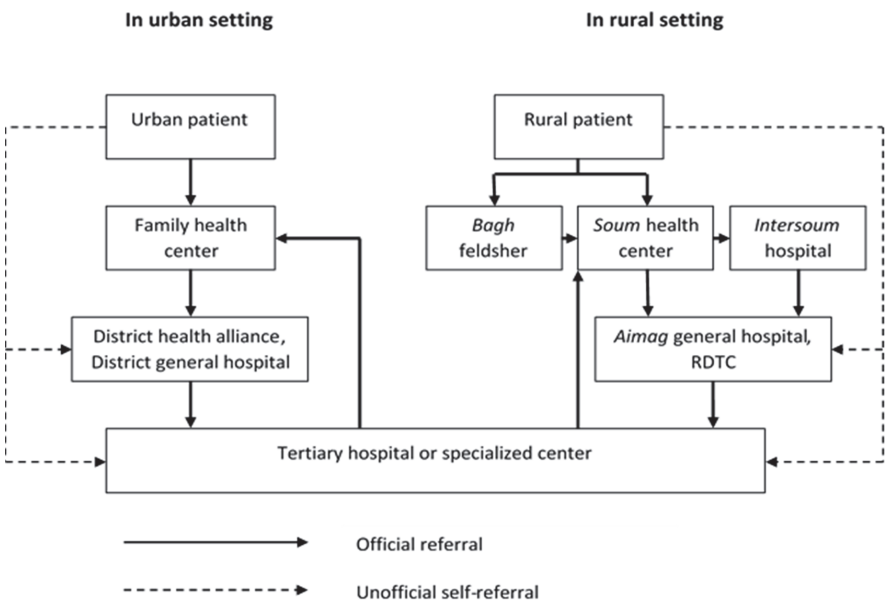

Figure 3. Patient pathways

Source: (Tsilaajav et al., 2013)

Health financing

The health sector of Mongolia is funded by the following main sources: central government revenue, the SHI contribution, and OOP. In addition, a small amount of revenue originates from the private health insurance contributions.

The expenditures for preventive care, public health services, primary care, maternal and child care, and treatment of chronic and infectious diseases such as diabetes, cancers, tuberculosis and HIV/AIDS are covered by state revenues. At the same time, SHI covers expenditures for individual clinical care, including outpatient and inpatient care. However, the state and SHI do not cover certain specific diagnostic services, and as a result, patients who access these particular services are charged by the hospital. In inpatient care, patients pay 10% of the total expenditures as co-payments of SHI revenue in secondary hospitals; this figure rises to 15% in tertiary level hospitals (Tsilaajav et al., 2013).

Since 2006, tertiary level hospitals have been charging for most of the outpatient diagnostic tests and treatments in order to increase their OOP revenue. As a consequence, only 5.5% of the total households are reportedly able to afford such a high OOP for health, while 3.8% of the households have experienced catastrophic health expenditures and about half of these (1.8%) households have become impoverished (Tsilaajav et al., 2013) owing to the high OOP and informal fees (Bolormaa et al., 2007).

In 2010, the total revenue of the health sector originated from the following sources: 32.3% from the state budget, 22.8% from the SHI contribution, 41.4% from OOP, and 3.5% from voluntary private health insurance and other sources. The share of OOP out of the total health expenditures has steadily increased from 2005 (15.8%) to 2010 (41.4%) and furthermore, it has been projected to increase in the coming years (Tsilaajav et al., 2013; WHO Representative Office of Mongolia, 2012).

The total health expenditure has been consistently low during the past two decades. In the Western Pacific Region, the average health expenditure as a share of GDP was 7.2% and health expenditure in US$ PPP per capita was 635 in 2010, while in Mongolia, these corresponding values were 5.4% and 218 US$ PPP per capita (Tsilaajav et al., 2013).

Human resources

Since 1990, the number of doctors per 1,000 population has remained stable; however, the number of nurses, physician assistants (*bagh* feldshers), and laboratory and X-ray technicians has declined. As of 2014, there were 22.0 doctors and 33.6 nurses per 10,000 population in rural areas, compared to 42.4 doctors and 40.9 nurses per 10,000 population in Ulaanbaatar. Statistically, the higher number of doctors in the capital city than in rural areas demonstrates the fact that rural areas lack access to specialised doctors (Bolormaa et al., 2007; Tsilaajav et al., 2013).

3. Literature review

3.1. INEQUALITY IN HEALTH AND HEALTH CARE UTILISATION, FINANCIAL PROTECTION AS A POLICY CONCERN

"Health" was defined by the World Health Organization (WHO) in 1948 as "*a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity*" (World Health Organization, 1948). In the same year, the right to health was recognised in the Universal Declaration of Human Rights as a fundamental part of human rights: *"the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition" (Assembly, 1948).*

The impacts of the establishment of the definitions of health and the right to health on health policy development, both at the national and international levels, are commonly accepted. During the past century, the health system changed extensively (World Health Organization, 2012a); however, ensuring the right to health has remained at the centre of the health policies at all levels.

In 1978, the right to health was strongly reaffirmed in the Declaration of Alma-Ata at the International Conference on Primary Health Care. The conference confirmed that "*the existing gross inequality in the health status of the people, particularly between developed and developing countries as well as within countries is politically, socially and economically unacceptable and is, therefore, of common concern to all countries*" (World Health Organization & World Health Organization, 1978).

In order to tackle the existing inequality problems, the conference issued the "Health for All by the year 2000" goal according to which health care services should be accessible and affordable to everyone; thus, PHC is the key to accomplishing the goal (World Health Organization & World Health Organization, 1978).

Subsequently, ensuring equity in health has become a priority of health policies, both at the local and international levels. In 1984, the WHO European Region defined 38 regional targets. The first of these targets was "*By the year 2000, the actual differences in health status between countries and between groups within countries should be reduced by at least 25%, by improving the level health of disadvantaged nations and groups*" (Whitehead, 1992). In 1995, a global initiative on Equity in Health and Health Care was launched by the WHO in Geneva in order to bring the issue of health inequality to the attention of governments and international agencies (Starfield, 2006).

In 2000, the World Health Report specifically addressed the issue of health system performance and used equity in health as one of its main indicators (World Health Organization, 2000). In 2005, the WHO launched the Commission on Social Determinants of Health. Later, in 2008, it released its final report entitled "Closing the gap in a generation: health equity through action on the social determinants of health" (Commission on Social Determinants of Health, 2008). This report emphasised that health inequity is a consequence of "a toxic combination of poor social policies …, unfair economic arrangements, and bad politics". Thus, the social determinants of health play a main role in health inequities as they comprise "… structural determinants and conditions of daily life." (Commission on Social Determinants of Health, 2008).

As one of the social determinants, the health system apparently plays an important role in equity in health, albeit a minor one. A study conducted by Steven A. Schroeder shows that health care explains only 10% of premature deaths in the USA (Schroeder, 2007). Moreover, the health care system was estimated to contribute only 25% to the health of the population in Canada (Kirby & LeBreton, 2001). However, these small numbers become significant when one considers the sick individual in need of medical care.

A large number of people suffer a lack of access to health care because of both financial and non-financial barriers in the health system. Furthermore, many people face catastrophic expenditure and are pushed into poverty owing to insufficient financial protection to combat health care costs (Xu et al., 2007).

Therefore, a right to medical care is constituted as a human right in most countries, including Mongolia (Parliament of Mongolia, 1992). Consequently, a fundamental objective in any viable health policy in a country should be to ensure equity in health care and protect people from high costs of health care (O. A. O'Donnell & Wagstaff, 2008).

It is recognised that this ambitious goal can be accomplished by attaining and sustaining UHC, which is one of the overarching health targets of the most recently approved global commitment, the Sustainable Development Goals by 2030, adopted by the United Nations General Assembly in September 2015 (Assembly, 2015). UHC is recognized as the best way of tackling the persistent inequalities in health worldwide (Assembly, 2015).

In summary, equity in health is known as a key indicator of the overall development of countries. Furthermore, it requires governments and the higher levels of political institutions to strengthen coherent, cross-sector policies to ensure equity in health with the collaboration of other relevant agencies. Moreover, the existing policy documents suggest that the governments and international organisations should introduce a national and cross-national health inequity surveillance system to monitor relevant situations, and to measure the policies and strategies in place to address health inequity and governmental performance (Commission on Social Determinants of Health, 2008).

3.2. SOCIOECONOMIC-RELATED INEQUALITY AND INEQUITY IN HEALTH AND HEALTH CARE

3.2.1. Defining inequality and inequity in health and health care utilisation

3.2.1.1. Terms inequality, inequity and disparity

In the literature concerned with health equity, the terms "inequality", "inequity" and "disparity" are used interchangeably; however, as dictionary definitions, these are not identical. In the Cambridge Dictionary, these terms are defined as follows:

- Inequality – the unfair situation in society when some people have more opportunities, money, etc. than other people (Cambridge Dictionary, 2016b)
- Inequity – the fact that a situation is not fair, or something that is not fair in a situation (Cambridge Dictionary, 2016c)
- Disparity - a lack of equality or similarity, especially in a way that is not fair (Cambridge Dictionary, 2016a)

Based on the above definitions, there are subtle differences in meaning between "disparity" and "inequality". However, when the terms are applied in the health literature, "disparity in health (or health care)"[1] and "inequality in health" are often used interchangeably. The term "disparity in health" is commonly applied in the USA, while the term "inequality in health" is widely applied in other countries (P. Braveman, 2006; Carter-Pokras & Baquet, 2002).

In this thesis, the terms "inequality in health" and "inequity in health" are used.

3.2.1.2. Definition of inequality and inequity in health

In some languages, both "inequality" and "inequity" can be expressed with the same word (Whitehead, 1992). This leads to some confusion when the terms are not interchangeable. As defined by Kawachi et al., "health inequality is the generic term used to designate differences, variations, and disparities in the health achievements of individuals and groups" and "… that need not imply moral judgement" (Kawachi, Subramanian, & Almeida-Filho, 2002).

In turn, inequity in health is health inequality that is unnecessary and avoidable and is derived from unfairness and injustice (P. A. Braveman et al., 2011; Kawachi et al., 2002; Whitehead, 1990; Whitehead, 1992) and impinges on morality (Whitehead, 1990; Whitehead, 1992). Health inequalities exist across different social groups; however, it can be difficult to distinguish whether they are unavoidable on the basis of related causes in different societies and times (Kawachi et al., 2002; Whitehead, 1992).

In early 1990s, Margaret Whitehead identified seven main determinants of health that might generally underlie the differences in health between societies (Whitehead, 1990; Whitehead, 1992).

1. "Natural, biological variation.
2. Health-damaging behaviour if freely chosen, such as participation in certain sports and pastimes.
3. The transient health advantage of one group over another when that group is first to adopt a health-promoting behaviour (as long as other groups have the means to catch up fairly soon).
4. Health-damaging behaviour where the degree of choice of lifestyles is severely restricted.
5. Exposure to unhealthy, stressful living and working conditions.

[1] Health outcome can be either a health variable or a health care utilisation variable

6. Inadequate access to essential health and other public health services.
7. Natural selection or health-related social mobility involving the tendency for sick people to move down the social scale".

In addition, Whitehead classified genetic and biological factors as well as factors that are out of one's control (categories, 1, 2, and 3) as unavoidable or fair, but still leading to inequalities in health. On the other hand, factors related to socioeconomic and environmental issues (categories 4, 5, 6, and 7) were determined as causes of health inequities, which are avoidable and therefore unfair. The causes that lead to inequities play a major role in health differences (Whitehead, 1990; Whitehead, 1992).

However, health differences emerging when people have a limited or no choice regarding their living and working conditions are likely to be unfair (Whitehead, 1992). Moreover, it has been argued that "…many genetic differences, exposure to different childhood conditions, differences in most health behaviours, as well as most environmental exposures are unfair." (Kawachi et al., 2002).

Whitehead (1992) has also pointed out in relation to the determinants of health, "equity in health implies that ideally everyone should have a fair opportunity to attain their full health potential and, more pragmatically, that none should be disadvantaged from achieving this potential, if it can be avoided" (Whitehead, 1992).

There are a number of definitions of inequality and inequity in health, proposed by different institutions and researchers often based on the same foundations as Whitehead's definition. Some of these definitions are presented in Table 2. Among these, Whitehead's definition is the most commonly used and cited in practice (P. Braveman, 2006). This is due to the fact that the definition enables policies to focus on eliminating the factors that cause avoidable and unfair differences in health rather than removing all health differences (Whitehead, 1992). Additionally, the intuitive definition is easy to use in communication between policy makers, non-professionals and the public (P. Braveman, 2006).

It must, however, be noted that the definition focuses on fairness and assumes that fairness is measurable. Fairness in health is complicated to measure as it is understood differently across cultural contexts (Starfield, 2006). For that reason, the International Society for Equity in Health elaborated on the definition by Whitehead with the purpose of researching and analysing health inequity and informing policy decisions as "Equity in health is the absence of systematic and potentially remediable differences in one or more aspects of health across socially, demographically, or geographically defined populations or population subgroups" (Starfield, 2006).

Table 2. Some definitions of equity in health

	Definitions	Sources
1	"Equity means that people's needs, rather than their social privileges, guide the distribution of opportunities for well-being. In virtually every society in the world, social privilege is reflected by differences in socioeconomic status, gender, geographical location, racial/ethnic/religious differences and age. Pursuing equity in health means trying to reduce avoidable gaps in health status and health services between groups with different levels of social privilege"	(P. Braveman, 2006; World Health Organization, 1996)
2	"Equity in health is operationally defined as minimizing avoidable disparities in health and its determinants-including but not limited to health care- between groups of people who have different levels of underlying social advantage"	(P. Braveman & World Health Organization, 1998)
3	"For the purposes of operationalization and measurement, equity in health can be defined as the absence of systematic disparities in health (or in the major social determinants of health) between social groups who have different levels of underlying social advantage/disadvantage—that is, different positions in a social hierarchy. Inequities in health systematically put groups of people who are already socially disadvantaged (for example, by virtue of being poor, female, and/or members of a disenfranchised racial, ethnic, or religious group) at further disadvantage with respect to their health; health is essential to wellbeing and to overcoming other effects of social disadvantage."	(P. Braveman & Gruskin, 2003)
4	Health inequalities are "systematic differences in the health of groups and communities occupying unequal positions in society"	(Graham, 2004)
5	"Disparity—The quantity that separates a group from a specified reference point on a particular measure of health that is expressed in terms of a rate, percentage, mean, or some other quantitative measure"	(Keppel et al., 2005)
6	"A health disparity/inequality is a particular type of difference in health or in the most important influences on health that could potentially be shaped by policies; it is a difference in which disadvantaged social groups (such as the poor, racial/ethnic minorities, women, or other groups that have persistently experienced social disadvantage or discrimination) systematically experience worse health or greater health risks than more advantaged groups"	(P. Braveman, 2006)

3.2.1.3. Definition of inequality and inequity in health care

Egalitarianism and libertarianism are two different philosophical concepts of justice that frequently appear in the current debate on equity in health and health care. In the egalitarian view, health care should be dominated by a public financing approach. In this approach, health care is also financed on the basis of ability to pay and distributed based on need. The concept emphasizes that everyone has the right to the same access to care and this should not be affected by individual characteristics, such as income. In contrast, libertarianism suggests that health care ought to be financed privately and favours the least possible government involvement. Based on this philosophy, health care should be distributed according to willingness to pay (Wagstaff & Van Doorslaer, 2000).

Mooney (1983) discussed seven definitions of different understandings of equity in health care, including "equality of expenditure per capita", "equality of inputs (resources) per capita", "equality of input for equal need", "equality of (opportunity of) access for equal need", "equality of utilisation for equal need", "equality of marginal met need", and "equality of health". Out of the definitions, "equality of access for equal need" and "equality of utilisation for equal need" are widely used in practice. The former is a function of supply, involving the same cost and time for those who have the same need, whilst the latter concerns both supply and demand of health services, and thus the use of health service is perceived to concern both access to, and the individual's perception of, the health benefit (Mooney, 1983). Furthermore, Whitehead proposed a working definition of equity in health care as equal access to available care for equal need, equal utilisation for equal need, and equal quality of care for all (Whitehead, 1992). Equal access affects equal utilisation and thus influences equal health (Wagstaff & Van Doorslaer, 2000).

However, equal access for equal need does not necessarily imply the presence of equal utilisation for equal need (Mooney, 1983). Individuals may have an equal opportunity to receive the same health services and thus to be in good health; however, their choices and preferences vary, which leads to unequal health with this being related to their freedom to choose.

The idea of equal access for equal need requires conditions where those who have equal needs are ensured to enjoy equal opportunities to access health care. On the other hand, those who have unequal needs have unequal opportunities to access to health care according to their needs.

Additionally, there are two principles of equity: the so-called horizontal, "equal treatment of equals", and vertical equities, "appropriate unequal treatment of unequals" (O. A. O'Donnell & Wagstaff, 2008; Oliver & Mossialos, 2004). Horizontal equity, is frequently measured when the aim is to ensure equitable services to provide access for those who have the same needs, while it is appropriate to measure vertical equity in the context of funding, e.g. progressivity, where financial contribution is the centre of concern (Wagstaff & Van Doorslaer, 2000).

3.2.2. Measuring socioeconomic-related inequality and inequity in health and health care utilisation

3.2.2.1. Measuring socioeconomic-related inequality in health and health care utilisation

This section is a review of the methods for analysing socioeconomic-related inequality and inequity in health and health care which have been developed and applied in the field of health economics.

Concentration index

Measuring socioeconomic-related inequality in health and health care in the field of health economics is a relatively new approach compared to measurements in public health and epidemiology. In public health and epidemiology, the range (odds ratio and relative risk ratio) and the index of dissimilarity are commonly applied in analysing inequality in health, whereas the concentration curve and index are standard tools in health economics (O. A. O'Donnell & Wagstaff, 2008; Wagstaff & Van Doorslaer, 2000).

In 1977, Kakwani developed the concentration index as a measurement of tax progressivity (N. Kakwani, Wagstaff, & van Doorslaer, 1997) and, later the method was adopted in the field of health economics (Wagstaff, Van Doorslaer, & Paci, 1989). It is worth emphasizing that the concentration index has a number of advantages in comparison with some of the other methods used to measure health inequality. Wagstaff *et al.* (1991) noted that the concentration index simultaneously meets the following minimal requirements of an inequality measure in health (Wagstaff, Paci, & Van Doorslaer, 1991):

1. The concentration index is sensitive to the socioeconomic dimension of inequalities in health;
2. The concentration index reflects the experience of the entire population (rather than comparing only the top and bottom socioeconomic groups);
3. The concentration index is sensitive to the changes in the distribution of population across the socioeconomic groups.

The index is directly linked to the concentration curve (Kakwani Nanak, 1980; N. C. Kakwani, 1977) . Therefore, understanding the concentration index starts with examining the concentration curve. The concentration curve represents the whole picture of how health varies across the full distribution of socioeconomic indicators (O. A. O'Donnell & Wagstaff, 2008). In addition to the health variable, the curve also can be used to analyse inequality in any health sector variables, including health care utilisation and payments for health care.

An example of the concentration curve is shown in Figure 4. In the curve, the cumulative percentage of the health variable is plotted on the y-axis, the cumulative percentage of the population, ranked by living standards, is plotted on the x-axis (O. A. O'Donnell & Wagstaff, 2008).

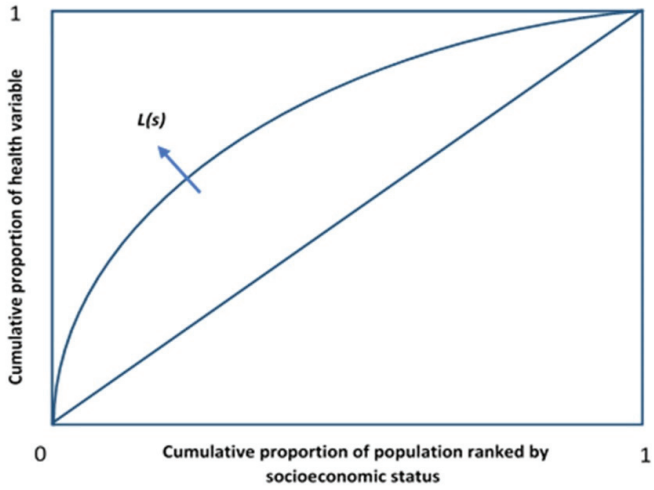

Figure 4. Concentration curve

The diagonal line apparent in Figure 4 is the equality line. If ill health is concentrated among the poor, the concentration curve will be above the equality line and below it, if ill health should be concentrated in the rich. When health is equally distributed across the socioeconomic groups, the concentration curve will lie on the equality line (O. A. O'Donnell & Wagstaff, 2008).

The concentration index provides a measure of the magnitude of socioeconomic-related inequality in a health variable (N. Kakwani et al., 1997). The index is simply estimated from the concentration curve. Twice the area between the concentration curve and the equality line is the concentration index, with its formula shown below:

$$C = 1 - 2\int_0^1 L_h(p)dp \qquad Equation\ 1$$

The margin of the concentration index is between -1 and +1. A zero index indicates that there is no socioeconomic-related inequality in health or health care utilisation. If a value of the concentration index is positive, it denotes that a health variable is higher among the rich. In contrast, a negative value of the concentration index shows that a health variable is being concentrated among the poor.

For a discrete socioeconomic variable (O. A. O'Donnell & Wagstaff, 2008), it can be defined as:

$$CI = \frac{2}{N\mu}\sum_{i=1}^{n} h_i r_i - 1 - \frac{1}{N} \qquad Equation\ 2$$

where h_i represents the health variable, μ indicates the mean of the health variable, and r_i is the fractional rank of an individual i in the living standard distribution.

A more convenient formula for the concentration index that indicates the covariance of a health variable and the fractional rank of a living standard distribution as (O. A. O'Donnell & Wagstaff, 2008) is presented below:

$$CI = \frac{2}{\mu} cov(h, r) \qquad Equation\ 3$$

This index is appropriate when a health outcome variable is ratio scaled, unbounded. However, health and health care utilisation are most commonly measured as categorical responses in national representative surveys conducted in countries. With categorical variables, it is not possible to compute the concentration index. Dichotomising the categorical variables is one partial solution.

However, Wagstaff (2005) demonstrated that the concentration index suffers from limitations when the health variable is binary. This indicates that as the mean increases, the index shrinks (Wagstaff, 2005).

In practice, several corrections have been proposed to the concentration index to address this limitation, with Erreygers' and Wagstaff's concentration indices being the most widely applied (Erreygers, 2009; Wagstaff, 2005). Table 3 shows properties of the rank-dependent indices.

Table 3. Properties of the rank-dependent indices

	Mirror	Transfer	Cardinal invariance	Level independence
EI	√	√	√	√
Wagstaff's concentration indices	√	√	√	
Concentration indices		√	[a]	
The related generalized health concentration indices	√	√		√

[a] Concentration indices satisfies cardinal invariance if modified as $C - [2/n^2(\mu_h - a_h)] \sum_{i=1}^{n} z_i h_i$

Sources: (Kjellsson & Gerdtham, 2013)

Erreygers' concentration index (EI) was used in the present thesis' analysis. EI is the only indicator in the family of techniques which meets the requirements of four key properties of the rank-dependent indices (Kjellsson & Gerdtham, 2013).[2]

[2] The following are the desirable four properties of the rank-dependent indices: "i) transfer – a small transfer of health from a richer (poorer) to a poorer (richer) individual translates into a pro-poor (pro-rich) change in the index; ii) mirror – the inequality indices of health and ill-health are mirror images of each other; that is, $I(h)$ is equal to the absolute value of $I(1-h)$, but has the opposite sign; iii) level independence - an equal increment of health for all individuals does not affect the index; that is, the index is invariant to scalar addition even when the bounds of the variable are kept constant; iv) cardinal invariance – a linear transformation of the health variable, h_i, does not affect the value of the index; that is, the measured degree of inequalities is the same, irrespective of the cardinal scale of the health variable (e.g. $I(h)$ of body temperature would be the same whether measured in Celsius or Fahrenheit)." (Kjellsson & Gerdtham, 2013)

It is formulated as follows:

$$E(h) = \frac{4\mu}{(b_n - a_n)}\, C(h) \qquad Equation\ 4$$

where *C(h)* shows the standard concentration index that is presented in equation 3. The μ refers to the mean of a health variable in population. b_n and a_n are the upper and lower bound of the health variable.

3.2.2.2. Measuring inequity in health and health care utilisation

Age-gender standardised inequality in health

As mentioned previously, inequalities in health (health care utilisation) are categorised as inequality and inequity (O. A. O'Donnell & Wagstaff, 2008). Since inequity in health/health care utilisation is recognized as unjust, avoidable and modifiable inequality (Whitehead, 1992), evaluating the degree of equity is a priority of health policy.

However, it is not easy to distinguish between fair and unfair health inequalities (Fleurbaey & Schokkaert, 2011). The common approach to draw the line between the two is based on reference to nature. In this approach, health inequalities due to demographics, including age and sex, are fair inequalities because these arise naturally, and are thus perceived as unavoidable. After removing health inequalities due to demographic characteristics from overall health inequality, only health inequalities due to socioeconomic factors, i.e. the so-called unfair inequalities remain. On the other hand, there is age-gender standardised inequality in health.

There are two main approaches of standardisation: direct and indirect. Both approaches can be easily applied with the means of the regression analysis (O. A. O'Donnell & Wagstaff, 2008).

Measuring horizontal inequity

As mentioned in the theoretical section, policy is more concerned with horizontal equity than vertical equity (O. A. O'Donnell & Wagstaff, 2008). Horizontal equity can be explained as "people who have equal health needs should be treated equally, regardless of their socioeconomic characteristics" (O. A. O'Donnell & Wagstaff, 2008). Therefore, measuring health care utilisations and health needs is a fundamental step in evaluating horizontal inequity.

Empirical studies on the degree of horizontal inequity have widely used health utilisations as an outcome variable (O. A. O'Donnell & Wagstaff, 2008). Common measurements of health care utilisations are based on a) whether individuals receive outpatient (or inpatient) care by visiting any public or private hospitals/clinics as well as PHC centres during the previous 1 month (or 12 months) and b) the number of visits to a medical specialist or the number of days of hospitalisation.

The existence of inequality in health care utilisation does not fully reflect the existence of inequity in health care. There is a need for standardisation to define the presence of inequity in health care use (O. A. O'Donnell & Wagstaff, 2008). Nonetheless, "need for health care" is an elusive concept that has been interpreted in several ways in the literature (Culyer, 1995; Culyer & Wagstaff, 1993; O. A. O'Donnell & Wagstaff, 2008).

In health economics studies, a set of variables consisting of demographics and health status (self-reported health, morbidity indicators, activity limitations, etc.) is often used as a proxy for

health need (O. A. O'Donnell & Wagstaff, 2008). The majority of national health surveys include questions about self-reported health, which although it is a subjective outcome measurement, is very convenient. It has been found that poor self-assessed health is a strong and independent predictor of subsequent mortality (Burstrom & Fredlund, 2001; Idler & Benyamini, 1997).

Similarly, as estimating age-sex standardised inequity in health, a degree of horizontal equity can be easily assessed by applying direct or indirect standardisation methods (O. A. O'Donnell & Wagstaff, 2008).

3.2.3. Empirical works on socioeconomic-related inequality in health and health care utilisation

3.2.3.1. Empirical works on socioeconomic-related inequality in health

Propper and Upward (1992) measured inequalities in health by applying the concentration index in the United Kingdom for the years 1974, 1982, 1985, and 1987 (Propper & Upward, 1992). They used four different health measurements as outcome variables and the equivalent household income as a ranking variable. Since the appearance of that study, the concentration index has been widely applied in the measurement of socioeconomic-related inequalities in health having been used with different health variables and ranking variables.

In the literature, the most commonly used health outcome indicators in measuring socioeconomic inequality in health are mortality rates (Wagstaff, 2000), life expectancy (Burström, Johannesson, & Diderichsen, 2005; Gerdtham & Johannesson, 2000; Tranvåg, Ali, & Norheim, 2013), anthropometric measures (Chen, Wu, & Coyte, 2014; Rabbani, Khan, Yusuf, & Adams, 2016; Wagstaff & Watanabe, 1999), and self-assessed health (Ataguba, Akazili, & McIntyre, 2011; Van Doorslaer et al., 1997; Yang & Kanavos, 2012), including generic health measures (Lee & Jones, 2007; McGrail, Van Doorslaer, Ross, & Sanmartin, 2009; van Doorslaer & Koolman, 2004).

Good health is concentrated among the rich with the poor experiencing ill health in both the developing (Ataguba et al., 2011; Ataguba, 2013; Chen et al., 2014; Rabbani et al., 2016; Tranvåg et al., 2013; Wagstaff & Watanabe, 1999; Yang & Kanavos, 2012) and developed countries (Burström et al., 2005; Gerdtham & Johannesson, 2000; Hong & Ahn, 2011; Lee & Jones, 2007; McGrail et al., 2009; Shmueli, 2014; Van Doorslaer et al., 1997; van Doorslaer & Koolman, 2004), regardless of what types of measurement are used.

Furthermore, many studies have been conducted to measure and compare the degree of socioeconomic-related inequality in health in different countries (Hernández-Quevedo, Jones, López-Nicolás, & Rice, 2006; McGrail et al., 2009; Van Doorslaer et al., 1997; van Doorslaer & Koolman, 2004; Wagstaff & Watanabe, 1999; Wagstaff, 2000), regions (Hong & Ahn, 2011; Lee & Jones, 2007; Yang & Kanavos, 2012) as well as time periods (Ataguba et al., 2011; Ataguba, 2013; Burström et al., 2005; Chen et al., 2014; Hernández-Quevedo et al., 2006; Rabbani et al., 2016; Tranvåg et al., 2013).

3.2.3.2. Empirical works on socioeconomic-related inequality in health care utilisation

The number of empirical studies on socioeconomic-related inequality in health care utilisation has dramatically increased at the international level since 1990 (O. A. O'Donnell & Wagstaff, 2008).

First, it is evident that there is horizontal inequity in health care utilisation in higher income countries, regardless of whether they provide universal and comprehensive health coverage. For example, a comparative study by Van Doorslaer et al. (2000) involving 9 European countries and the United States found that there were pro-rich inequities in visits to (outpatient) medical specialists after the standardisation of needs (Van Doorslaer et al., 2000). This finding indicated that people with higher incomes are more likely to use the medical specialist care services than the lower income groups.

In 2004, Van Doorslaer et al. conducted a similar comparative study covering 12 European Union countries based on the 1996 wave of the European Household Panel (van Doorslaer, Koolman, & Jones, 2004). The study observed little to no evidence of income-related inequity in general practitioner utilisation. However, the study also found that there was pro-rich inequity in specialist visits in all study countries. According to the study, the better-off have lower health needs; however, they are more likely to access specialist care than the worse-off. The researchers applied a "new method", namely the decomposition analysis, to analyse the sources of inequality in health care utilisation. The study reported that the main contributor to inequality in health care utilisation in all of the studied countries was income, regardless of the fact that universal and comprehensive health coverage was provided in the countries (van Doorslaer et al., 2004).

Similarly, despite universal health coverage, horizontal inequity in health care utilisation has been found in the Asian higher income countries. Lu et al. (2007) analysed horizontal inequity in Hong Kong, South Korea, and Taiwan and they found pro-rich inequity in the utilisation of licensed traditional medicine practitioners (Lu et al., 2007).

Second, in addition to the international comparative studies, many single-country analyses have been conducted to measure inequality in health care utilisation in connection with the type, level and ownership of the health provider; however, their results vary from country to country due to the different health system structures in the countries as well as the different financial barriers and many other social factors. For example, pro-rich inequity was found in the use of general practitioners in Chile (Vásquez, Paraje, & Estay, 2013), Canada (Allin, 2007), and Hong Kong (Lu et al., 2007), whilst pro-poor inequity was observed in Australia (Hajizadeh, Connelly, & Butler, 2012), and Ireland (Layte & Nolan, 2004). In the context of inpatient care utilisation, pro-rich inequity was reported in Hong Kong (Lu et al., 2007), and Mexico (Barraza-Lloréns, Panopoulou, & Díaz, 2013), while, in contrast, there was pro-poor inequity in Canada (Allin, 2007), Brazil (Macinko & Lima-Costa, 2012), and Chile (Vásquez et al., 2013). However, in the case of specialist care utilisation, pro-rich inequity tended to be observed across countries, including Belgium, the Netherlands (Van Doorslaer, Buytendijk, & Geurts, 2001), Chile (Vásquez et al., 2013), Australia (Hajizadeh et al., 2012) as well as in a study examining all the European countries (d'Uva, Jones, & Van Doorslaer, 2009; van Doorslaer et al., 2004).

In relation to the use of dental care, a similar pattern has been observed across countries. It has been found that the dental health care utilisation tends to be concentrated among the higher income population in Canada (Allin, 2007), Korea (Hosung & Hyun-Duck, 2006), all the OECD countries (Van Doorslaer & Masseria, 2004), Iran (Homaie Rad, Kavosi, & Arefnezhad, 2016), Chile (Vásquez et al., 2013), Australia (Hajizadeh et al., 2012), Brazil (Macinko & Lima-Costa, 2012), and Ireland (Layte & Nolan, 2004).

3.3. FINANCIAL PROTECTION IN HEALTH

3.3.1. Catastrophic health expenditure and impoverishment

It is evident that people can suffer a financial catastrophe and impoverishment as a consequence of the high OOP for health care in both the developed and developing countries (Xu et al., 2003; Xu et al., 2007). Additionally, a large number of people abstain from utilising health care resources simply because they cannot afford them (Preker et al., 2004). Without treatment, those affected by illness cannot work, and are thus at a high risk of facing financial hardship. In this sense, the fundamental goal of the health system is not only to improve the population's health and provide equitable and good-quality health care services, but also to ensure financial protection for the country's population against the cost of ill-health (World Health Organization, 2000).

In order to provide better financial protection in health, countries are recommended to provide UHC, which aims to ensure that everyone has access to comprehensive health services of acceptable quality without incurring financial hardship (World Health Organization, 2012a). Therefore, UHC is a key health target of the Sustainable Development Goals by 2030, which were approved by the United Nations General Assembly in 2015 (Assembly, 2015).

The catastrophic health expenditure and its impoverishing effect are the main concepts of financial protection in health.

Wyszewianski, L. (1986) has noted that high health care costs do not always lead to catastrophic health expenditure (Wyszewianski, 1986). For example, a person may or may not face financial hardship regarding his/her insurance status and the related benefit package. The two following different approaches can be applied for defining the concept of "catastrophic health expenditure" (Saksena, Hsu, & Evans, 2014):

When health care costs exceed a particular threshold of a household's resources: income, expenditure or consumption, it is recognized to be catastrophic health expenditure (O. A. O'Donnell & Wagstaff, 2008; Wagstaff & van Doorslaer, 2003).

However, there is a limitation in using total household expenditure as an indicator for household resources. The poor households tend to spend first on food and basic survival. In turn, a health care spending share of the total household expenditure could be lower, and it may not meet the threshold of catastrophic payment. Therefore, the incidence of catastrophic health expenditure could be underestimated. The partial solution to define catastrophic health expenditure is if OOP for health care expenditure exceeds the chosen threshold of a household's "non-food expenditure" (O. A. O'Donnell & Wagstaff, 2008). Researchers use household non-food expenditures under different names, either "non-discretionary expenditure" (Wagstaff & van Doorslaer, 2003) or "capacity to pay" (Xu et al., 2003).

In the current thesis, the term "capacity to pay" was used.

The incidence of impoverishment due to health care costs is not generally included in the national poverty measurement. However, it can be easily estimated by the difference between the poverty level before and after inclusion of health care payments (O. A. O'Donnell & Wagstaff, 2008).

3.3.2. Empirical works on financial protection in health

The incidence and intensity of catastrophic health expenditure and impoverishment due to health care payments have been well-documented worldwide.

Xu et al. (2007) conducted a study which involved 89 countries entitled "Protecting Households from Catastrophic Health Spending" (Xu et al., 2007). The study stated that 100 million people worldwide are forced into poverty and around 150 million people face catastrophic expenditure each year because of health care payments. They also observed a positive correlation between the incidence of financial catastrophe and the relative importance of OOP in the total health spending.

The study of Eddy Van Doorslaer et al. (2007) examining 14 Asian countries produced similar results. In that study, the highest incidences of catastrophic payments were found in Bangladesh, China, India, Nepal, and Vietnam, where the share of the OOP of the total national expenditure is also high (Van Doorslaer et al., 2007).

In the World Health Report 2010, Xu et al. reported that the higher the share of OOP, specifically when it is above 20% of a country's total national health expenditure, the more households suffer from catastrophic health expenditure (Figure 5) (Xu et al., 2010).

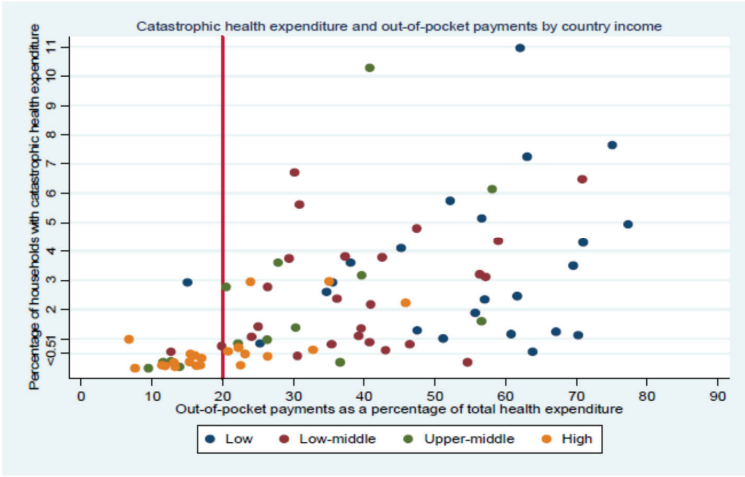

Figure 5. Percentage of households incurring catastrophic health expenditure against OOP as a share of the total health expenditure

Source: (Xu et al., 2010)

It is also observed that when OOP are more than 20% of the total health expenditure, then a higher the number of households will be impoverished (Figure 6). (Xu et al., 2010).

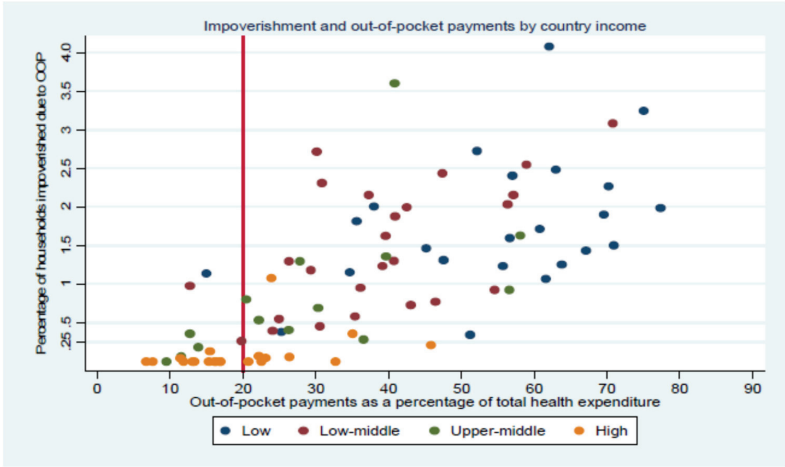

Figure 6. Percentage of households impoverished against OOP as a share of the total health expenditure

Source: (Xu et al., 2010)

Based on the results, a possible recommendation for protecting households from financial catastrophe is to reduce OOP and implement or expand the prepayment financing system, including SHI, tax-based financing of health care, or some mix of prepayment mechanisms (World Health Organization, 2005; World Health Organization, 2012a; Xu et al., 2007).

A good example of this policy can be found in Thailand, which launched the UHC policy in 2001 and achieved it in 2002 (Evans et al., 2012). For example, Limwattananon S et al. (2008) analysed and compared the incidences and intensity of catastrophic health expenditures, using data from pre-UHC (year 2000) and post-UHC (years 2002, 2004) (Limwattananon, Tangcharoensathien, & Prakongsai,). They found that both incidences of catastrophic health expenditure and impoverishment due to direct payments for health care were reduced after introducing UHC. Specifically, the incidences of catastrophic health expenditure were 5.4% in 2000, 3.3% in 2002 and 2.8% in 2004. The incidence of household impoverishment due to OOP for health care were 4.4% in 2000, 2.5% in 2002 and 1.8% in 2004. Similar results were also reported in further studies conducted on financial protection in health in Thailand (Limwattananon et al., 2011; Limwattananon, Tangcharoensathien, & Prakongsai, 2007).

In contrast, in countries where the prepayment financing mechanism is less developed, more people incur financial hardship. For instance, Jane Chuma et al. (2012) found that around 1.48 million people are impoverished every year owing to health care payments in Kenya (Chuma & Maina, 2012). In Uganda, 23% of the total households suffer from catastrophic health expenditure, and 4% of the population are pushed below the poverty line every year (Kwesiga, Zikusooka, & Ataguba, 2015).

3.4. EQUITY IN HEALTH AND HEALTH CARE, AND FINANCIAL PROTECTION IN MONGOLIA

3.4.1. Health policy on equity and financial protection

Ensuring equity in health and health care utilisation has been a priority of the health system in Mongolia for a long time. Before 1990, after 70 years of socialism, there was a centralised health system in the country (Bayarsaikhan, Kwon, & Ron, 2005; Bolormaa et al., 2007). The government was responsible for both health financing as well as health service delivery. There were no financial risks since all individuals theoretically had free access to the available health services.

In 1990, the country experienced a socioeconomic transition from a centrally planned economy to a market-based economy. After the transition, subsidies provided to the country by the Union of Soviet Socialist Republics stopped; these had amounted to around 30% of Mongolian GDP. Consequently, the Mongolian government was faced with difficulties in financing all areas of the social sectors, including health (Bolormaa et al., 2007).

Nonetheless, equitable distribution of health access and financial protection in health remained a central issue in the health system (Bayarsaikhan et al., 2005; Bayarsaikhan et al., 2015; Dorjdagva, 2007; Tsilaajav et al., 2013). Table 4 presents some policy documents published in the country related to inequity in health and health care utilisation, as well as financial protection.

Table 4. Summary of health reforms/policy changes regarding equity in health and financial protection

Years	Health reforms/ policy changes	Sources
1992	The constitution of Mongolia was adopted. In the constitution, the "right to the protection of health and medical care" was declared as one of the main rights and freedoms of the citizens of Mongolia.	(Parliament of Mongolia, 1992)
1994	The government introduced a SHI system to alleviate the burden of the state budget; to protect the population against financial hardships; and to ensure better quality and equitable health services.	(Bayarsaikhan et al., 2005; Tsilaajav et al., 2013)
2002	The PHC reform started with the assistance of the Asian Development Bank. The goal of the reform was not only to improve access to quality essential health services and ensure financial sustainability of the health system, but to improve the quality of health services.	(Tsilaajav et al., 2013)
2005	The Health Sector Strategic Master Plan 2006-2015 was approved by the government. The plan aimed to "improve the health status of all the people of Mongolia, especially mothers and children, through implementing sector wide approach and providing responsive and equitable pro-poor, client-centred and quality service."	(MOH, JICWELS, 2005)
2010	The National Strategy on Health Financing for 2010-2014 was approved. The main purpose of the strategy was "to deliver equitable and accessible quality health care services to the population and to protect them from health associated financial risks"	(The Government of Mongolia, 2010; WHO Representative Office of Mongolia, 2012)

3.4.2. Empirical works on socioeconomic related inequality in health and health care utilisation, and financial protection in Mongolia

The previous section highlighted that the equitable distribution of health and health care utilisation as well as financial protection in health have been well documented in the health strategies and policies of Mongolia. However, the topic has rarely been studied scientifically. In fact, as far as we are aware, only one study has focused on this issue.

In 2012, the World Bank published "Mongolia - Health equity and financial protection report", which provided the first glimpses of socioeconomic-related inequality in health and health care use as well as financial protection in the health sector of Mongolia (Bredenkamp et al., 2012).

In this report, Bredenkamp, C et al. (2012) analysed inequalities in health, health behaviour and health care utilisation as well as conducting a benefit incidence analysis, examining also financial protection, and the progressivity of health care financing using the ADepT software (Wagstaff, 2011).

This section will review only results that were concerned with the inequalities in health and health care utilisation as well as financial protection.

Inequalities in health

In the report, Bredenkamp, C et al. analysed inequalities in health using child health indicators, including stunting, underweight, diarrhoea and acute respiratory infection based on the "A Multiple Indicator Cluster Survey" conducted in 2005. It was found that all ill-health indicators were concentrated among the poor.

However, an analysis which is based only on child health indicators cannot reveal the whole picture of health inequality among the population (O. A. O'Donnell & Wagstaff, 2008).

Inequalities in health care utilisation

In the analysis of inequalities in health care utilisation, the HSES 2007/2008 was used. The findings indicated that the rich were more likely to use both outpatient and inpatient care services at secondary and tertiary level hospitals and private hospitals. Meanwhile, inpatient care use at *soum* hospital/ family group practices (FGP) was concentrated among the poor. Nonetheless, the study did not estimate the degree of horizontal inequity in health care utilisation.

Financial protection in health

The study, based on the HSES 2007/2008, found that approximately 10% of the total households incurred catastrophic health expenditure when the threshold was set at 10% of the total household consumption. Furthermore, people with higher incomes were more likely to suffer from catastrophic health expenditure. They also concluded that around 2.5% of the total population had been pushed below the national poverty line in 2007/2008.

4. Aims of the study

The general aim of the present study was to examine socioeconomic-related inequalities in health and health care utilisation as well as to evaluate financial protection in health in Mongolia.

The specific aims were:

I. To evaluate education-related inequalities in the health of the adult population in urban and rural areas of Mongolia in 2007/2008 (Study I)

II. To evaluate income-related inequalities in health care utilisation in Mongolia (Study II and III)

III. To estimate the incidence of catastrophic health expenditure and the rate of impoverishment due to OOP in Mongolia (Study IV)

5. Methods

This section provides information about the methods used in this thesis in an abridged form. The detailed methods are presented in the method sections of Studies I - IV.

5.1. DATA COLLECTION

The Mongolian HSES is a survey conducted every year by the National Statistical Office of Mongolia (NSO) to collect nationally representative data. The HSES was designed to "evaluate and monitor the income and expenditure of households, to provide the basis for the poverty monitoring system, poverty mapping and poverty reduction policies, to update the basket and the weights for the consumer price index, and to offer inputs to the national accounts". The HSES is conducted within three strata, including Ulaanbaatar (the capital city), province centres, and rural areas, covering all 21 provinces of Mongolia.

The HSES data contain an extensive range of information about households and their members on indicators such as demographics, income, expenditure, education, employment, social transfers, health, housing, education, etc. The third section of the HSES questionnaire addresses the respondents' health status, health care utilisations as well as direct and indirect health expenditures.

In this thesis, data of the HSES 2007/2008 and 2012 were used with the permission of the NSO. The HSES 2007/2008 involved 11,172 households with 44,510 individuals, whereas the HSES 2012 included 12,811 households with 47,908 individuals. The main inclusion criterion in the studies (Study I-IV) of this thesis was that individuals were aged 18 and above. In addition, there were the following exclusion criteria: respondents who were a) the head of household or any student member of a household who had been away from home for the previous 11 months or more; b) anyone else who had been away from home for the previous six months or longer.

Table 5. Summary of the study designs, subjects, dependent variables and independent variables of Studies I-IV

Specific aim	Study design	Study subjects	Dependent variables	Independent variables
Study I, The HSES 2007/2008 data	Cross-sectional	27,666 individuals	Physical limitation, Chronic disease	Age, gender, income, marital status, employment status, education, household size
Study II, The HSES 2007/2008 and 2012 data	Cross-sectional	In year 2007/2008: 27,681 individuals In year 2012: 30,567 individuals	Outpatient visit at tertiary level hospitals, outpatient visit at secondary level hospitals, outpatient visit at primary level hospitals, outpatient visit at private hospitals, hospitalisation	A set of need variables (age, gender, health variables), income, insurance, household size, marital status, employment status, education, location
Study III, The HSES 2012 data	Cross-sectional	30,547 individuals	FHC visit, outpatient visit at *soum* health centres, inpatient use at *soum* health centres	A set of need variables (age, gender, health variables), income, household size, marital status, employment status, education, distance to the nearest health care centre
Study IV, The HSES 2012 data	Cross-sectional	12,811 households	H^w, O^w, HP^{gross}, HP^{net}	Total household expenditure, capacity to pay, OOP for health care, per capita total expenditure and OOP of household

HSES, Household Socio-Economic Survey; FHC, family health centre; OOP, out-of-pocket payments; H^w, rank-weighted head count; O^w, rank-weighted overshoot; HP^{gross}, the gross of health payments, poverty head count, HP^{net}, the net of health payments, poverty head count

5.2. STATISTICAL ANALYSIS

Statistical analyses were executed using STATA MP 12.1 (Study I and II), and STATA IC 13 (Study III and IV).

5.2.1. Specific aim I: Education-related inequalities in health in urban and rural areas of Mongolia (Study I)

In Study I, the HSES 2007/2008 dataset was used. Physical limitation and chronic disease, which are self-perceived health indicators, were chosen as the health outcome variables. Both of the health outcome variables are so-called dummy variables. The socioeconomic status was measured as respondents' educational attainment levels (none or low education corresponds to the International Standard Classification of Education (ISCED) 0 to 1, lower secondary to ISCED 2, upper secondary to ISCED 3 to 4, and tertiary education to ISCED 5 to 6).

The other independent variables consist of marital status, economic activity status, household size, household income per equivalent as well as the dummy variables of age and gender which were included in the study. Since health outcome variables are binary, we applied the EI to estimate the degree of education-related inequality in physical limitation and chronic disease in urban and rural areas. Age-sex standardised inequities in physical limitation and chronic disease were found through the indirect standardisation method. We applied the decomposition analysis to estimate the contribution of each determinant to education-related inequality in health.

5.2.2. Specific aim II: To evaluate income related-inequalities in health care utilisation in Mongolia (Study II and III)

Studies II and III were conducted in order to achieve the specific aim II: evaluating income related-inequalities in health care utilisation in Mongolia. Study II measured income-related inequalities in health care utilisation in urban and rural areas and related changes between the years 2007/2008 and 2012. Study III measured income-related inequalities, specifically in PHC utilisation in the rural and urban areas of Mongolia in 2012.

In Study II, the degree of income-related inequalities in health care utilisation was analysed using the data sets of HSES 2007/2008 and 2012. In both of the surveys, the respondents were asked: *if you sought outpatient care during the previous one month period, where was the treatment provided?* The responses were categorised as central hospital/clinic, district/*aimag* hospital/clinic, FGP/*soum* hospital, and abroad. Based on this question, we generated four dummy variables for outpatient care utilisation at central hospital/clinic, district/*aimag*, hospital/clinic, FGP/*soum* hospital, and private hospital.

Respondents were also asked: *During the past 12 months, have you stayed in a hospital or clinic overnight* (yes/no)*?* A dummy variable for inpatient utilisation was generated in accordance with the question.

In this study, income was used as a living standard measurement. The EI and horizontal inequity were estimated for each health care utilisation variable. In order to estimate the contribution of each determinant to income-related inequality in health care utilisation, a decomposition analysis was undertaken. With the employment of the Oaxaca decomposition analysis, we were able to reveal a change of horizontal inequity between 2007/2008 and 2012.

In Study III, income-related inequalities in PHC utilisation in rural and urban areas of Mongolia were evaluated using the HSES 2012 data. In urban areas of Mongolia, PHC is delivered by FHCs. In rural areas, PHC is provided by *soum* health centres. *Soum* health centres also provide inpatient care. Based on the available data, we created three dummy

variables for PHC utilisation, consisting of a FHC visit, outpatient visit at a *soum* health centre, and inpatient visit at a *soum* health centre.

Household income per equivalent was used as a socioeconomic status variable (a ranking variable). The variables of age, sex, and self-perceived health were considered as a set of need variables.

Owing to the binary outcome variables, EI was applied in order to estimate the degree of income-related inequality in PHC utilisation in urban and rural areas.

Horizontal inequity in PHC utilisation was obtained using the indirect standardisation method. The decomposition analysis was used to observe the contribution of each factor to the total inequality.

5.2.3. Specific aim III: Catastrophic health expenditure and impoverishment in Mongolia (Study IV)

In Study IV, the HSES 2012 data were used to evaluate catastrophic health expenditure and impoverishment in Mongolia. Catastrophic health expenditures are defined as an excessive amount of OOP for health care at the 5%, 10%, 15% and 25% thresholds of the total household expenditure (15%, 25% and 40% thresholds for capacity to pay). Based on the thresholds, the incidence and intensity of catastrophic payments were measured.

The impoverishment effect of OOP for health care was estimated by the difference between a poverty level with the gross OOP (before health care payments) and a poverty level with the net OOP (after health care payments). In this analysis, two poverty lines were applied. First, the Mongolian national poverty line estimated by the NSO was determined as 118,668 Mongolian tugrik (MNT) per month ($ 201.02 PPP in 2011) in 2012. Second, the World Bank poverty line of $1.90 (PPP in 2011) per day per person was applied so that it would be possible to make international comparisons.

6. Results

The results shown below are presented in an abridged form. The full results are provided in this thesis in Studies I, II, III and IV which are appended.

6.1. SPECIFIC AIM I: EDUCATION-RELATED INEQUALITIES IN HEALTH IN URBAN AND RURAL AREAS OF MONGOLIA (STUDY I)

6.1.1. Descriptive statistics of the study population

Descriptive statistics of the study population are presented in Table 6. The extent of self-reported physical limitations was 2% among the rural population, whereas it was 1.8% among the urban population. The percentage of people with a chronic disease was significantly higher in rural areas than in urban areas. The urban population tended to have significantly higher income and better education.

Table 6. Descriptive statistics of the study population by regions, Mongolia, 2007/2008

Variables		Urban (*n*=15,996)	Rural (*n*=11,670)
		Percent	
Health variables	Physical limitation	1.8%	2.0%
	Chronic disease [a]	16.4%	19.7%
Gender	Male [a]	45.3%	48.6%
	Female [a]	54.7%	51.4%
Age	18-34 [a]	46.5%	48.4%
	35-64 [a]	46.6%	44.7%
	65<	6.9%	6.9%
Marital status	Married/living together [a, b]	57.8%	63.7%
	Divorced/separated	4.8%	1.7%
	Widowed	8.9%	8.1%
	Single/never married	28.5%	26.6%
Employment status	Employed [a, b]	38.7%	16.8%
	Herder [a]	1.7%	29.4%
	Self-employed [a]	14.2%	30.6%
	Inactive [a]	26.4%	13.5%
	Unemployed [a]	18.9%	9.6%
Education level	No schooling or lower education[a, b]	6.6%	26.3%
	Lower secondary [a]	13.7%	28.2%
	Upper secondary [a]	42.4%	29.8%
	Third-level education [a]	37.3%	15.8%
Household size. median (min, max)[a]		4 (1, 17)	4 (1, 16)
Log income per capita. Median (min, max) [a]		14.2 (9.2, 19.4)	13.7 (6.9, 18.6)

[a] Statistically significant difference ($p<0.05$) between rural and urban areas
[b] Reference group

The percentages of standardised physical limitation and chronic disease in association with education levels are presented below for both the urban and rural populations in Figures 7 and 8. People with higher education tended to report chronic disease and physical limitation less frequently.

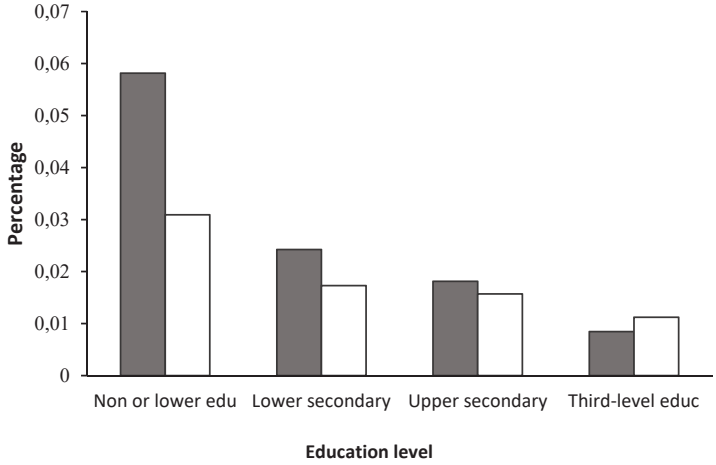

Figure 7. Standardised physical limitation by education levels in Mongolia, 2007/2008. The grey bars represent the standardised physical limitation among the urban population. The white bars represent the standardised physical limitation among the rural population.

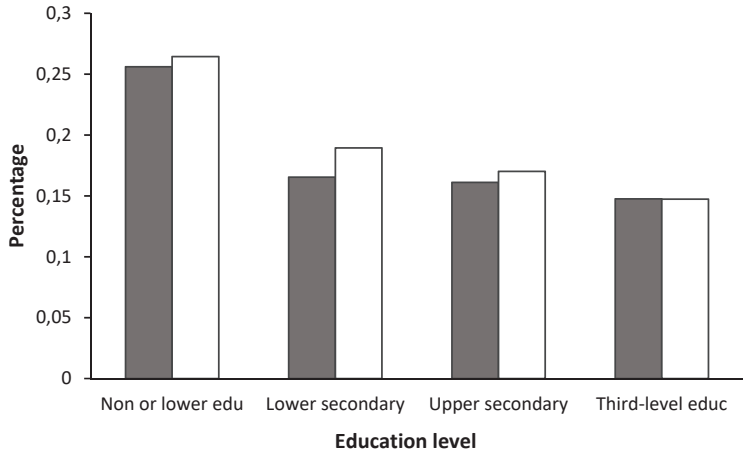

Figure 8. Standardised chronic disease by education levels in Mongolia, 2007/2008. The grey bars represent standardised chronic disease among the urban population. The white bars represent standardised chronic disease among the rural population.

6.1.2 Education-related inequalities in physical limitation and chronic disease

Table 7 shows education-related inequalities and inequities in physical limitation and chronic disease. The EIs for physical limitation were -0.0136 in urban areas and -0.0131 in rural areas ($p<0.01$). With respect to chronic disease in urban settlements, the EI was -0.0675 ($p<0.01$), while being -0.1397 in the rural ones. After controlling for demographic variables, non-demographic inequality (I^*) for physical limitation was determined as -0.0133 in rural areas and -0.0192 in urban areas. Non-demographic inequalities (I^*) for chronic disease were -0.0343 and -0.0831 in urban and rural areas, respectively.

Table 7. Erreygers' Concentration Indices for physical limitation and chronic disease

	Physical limitation		**Chronic disease**	
	Urban	**Rural**	**Urban**	**Rural**
EI	-0.0136	-0.0131	-0.0675	-0.1397
Se	0.0027	0.0031	0.0084	0.0111
$I^*=EI-C^*$	-0.0192	-0.0133	-0.0343	-0.0831
P value	0.00	0.00	0.00	0.00

I^*- Avoidable health inequality (health inequity)
C^*- Health inequality due to demographics

6.1.3 Decomposition analysis

The results of the decomposition analysis of concentration indices for physical limitation and chronic disease in urban and rural areas are presented in Table 8. The columns 5, 7, 9 and 11 indicate the contribution percentage of each determinant for the corresponding EI. Figure 9 shows the contributions of individual factors to the concentration indices of education-related inequality in physical limitation and chronic disease in both the urban and rural areas.

In urban and rural areas, if one excludes the contributions of age and sex, then the main contributions to education-related inequality in chronic disease were education, economic activity status, and income. In rural areas, inequality in physical limitation was largely attributable to education. In urban areas, the main contributors were economic activity status and education, if one excludes the roles of age and sex.

Table 8. Decomposition of concentration indices for physical limitation and chronic disease in urban and rural areas, Mongolia

	Concentration indices		**Physical limitation**				**Chronic disease**			
	Urban	Rural	Urban		Rural		Urban		Rural	
			Elasticities	Contribution	Elasticities	Contribution	Elasticities	Contribution	Elasticities	Contribution
Female 25-34	0.1975	0.0881	0.2410	-26.7 %	0.1604	-8.5 %	0.0493	-9.5 %	0.0468	-2.3 %
Female 35-44	0.0864	0.2043	0.3123	-15.1 %	0.2551	-31.4 %	0.1078	-9.1 %	0.1234	-14.3 %
Female 45-54	0.0388	-0.0019	0.2393	-5.2 %	0.1731	0.2 %	0.1339	-5.1 %	0.1215	0.1 %
Female 55-64	-0.0964	-0.2952	0.0302	1.6 %	0.0107	1.9 %	0.0989	9.3 %	0.0749	12.6 %
Female 65-74	-0.4330	-0.5493	-0.0009	-0.2 %	0.0263	8.7 %	0.0753	31.7 %	0.0535	16.7 %
Female 74<	-0.7018	-0.6348	0.0074	2.9 %	0.0042	1.6 %	0.0403	27.5 %	0.0302	10.9 %
Male 18-24	-0.1031	0.0064	0.0269	1.6 %	0.0491	-0.2 %	0.0009	0.1 %	0.0152	-0.1 %
Male 25-34	0.0166	-0.1155	0.2685	-2.5 %	0.2346	16.3 %	0.0521	-0.8 %	0.0421	2.8 %
Male 35-44	0.0011	0.0763	0.3042	-0.2 %	0.2717	-12.5 %	0.0836	-0.1 %	0.0836	-3.6 %
Male 45-54	-0.0157	-0.0434	0.2691	2.4 %	0.2194	5.7 %	0.0947	1.4 %	0.0964	2.4 %
Male 55-64	0.0260	0.1390	0.0961	-1.4 %	0.0884	7.4 %	0.0647	-1.6 %	0.0520	4.1 %
Male 65-74	-0.0037	-0.2958	0.0102	0.0 %	0.0402	7.2 %	0.0553	0.2 %	0.0462	7.8 %
Male 74<	-0.1993	-0.5087	0.0079	0.9 %	0.0072	2.2 %	0.0264	5.1 %	0.0123	3.6 %
Log income per capita	0.0097	0.0083	-0.5136	2.8 %	3.0979	-15.6 %	-0.5525	5.2 %	0.4390	-2.1 %
Divorced/separated	0.0385	0.0254	0.0021	0.0 %	0.0171	-0.3 %	0.0069	-0.3 %	-0.0001	0.0 %
Widowed	-0.2875	-0.3389	0.0079	1.3 %	-0.0231	-4.7 %	-0.0008	-0.2 %	0.0111	2.1 %
Single/never married	-0.0358	0.0634	0.1690	3.4 %	0.2596	-9.9 %	0.0314	1.1 %	0.0095	-0.3 %
Herder	-0.3153	-0.1912	0.0124	2.2 %	0.0189	2.2 %	0.0061	1.9 %	0.0369	4.0 %
Self-employed	-0.0382	-0.0318	0.0136	0.3 %	0.1778	3.4 %	0.0061	0.2 %	0.0622	1.1 %
Inactive	-0.1876	-0.0287	0.8098	85.1 %	0.3278	5.7 %	0.1266	23.1 %	0.0548	0.9 %
Unemployed	-0.0388	0.0987	0.2135	4.6 %	0.1367	-8.1 %	0.0701	2.6 %	0.0486	-2.7 %
Lower secondary	-0.7443	-0.2015	-0.0962	-40.1 %	-0.1406	-17.1 %	-0.0524	-37.9 %	-0.0874	-10.0 %
Upper secondary	-0.0658	0.4659	-0.5781	-21.3 %	-0.3611	101.5 %	-0.2247	-14.4 %	-0.1690	44.7 %
Third-level education	0.7409	0.9270	-0.2605	108.1 %	-0.0724	40.5 %	-0.1013	73.0 %	-0.0364	19.2 %
Household size	-0.0234	0.0145	-0.3319	-4.3 %	-0.4435	3.9 %	-0.1555	-3.5 %	-0.3134	2.6 %

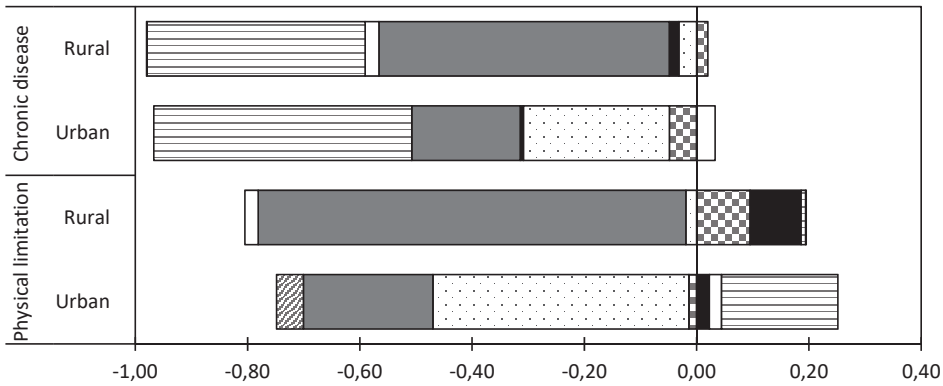

Figure 9. Decomposition analysis of inequalities in physical limitation and chronic disease in urban and rural areas of Mongolia, 2007/2008. The grey bars represent the contributions of education to EIs. The black bars represent the contributions of marital status to EIs. The white bars represent the contributions of household size to EIs. The bars with horizontal lines represent the contributions of age and sex to EIs. The bars with dots represent the contributions of economic activity status to EIs. The bars with checkers represent the contributions of income to EIs. The bars with diagonal lines represent residuals.

6.2. SPECIFIC AIM II: TO EVALUATE INCOME RELATED-INEQUALITIES IN HEALTH CARE UTILISATION IN MONGOLIA (STUDY II AND III)

6.2.1. Descriptive statistics of the study population (Study II)

Table 9 shows the descriptive statistics of the population in the two study years. In 2007/2008, about 1.4%, 2%, and 1.7 % of the total population reported that they had required outpatient care at tertiary, secondary and primary level hospitals, respectively, during the previous month. Between 2007/2008 and 2012, some differences in the utilisation of these types of outpatient care were observed; however, the differences were not statistically significant. The percentage of the total inpatient care utilisation during the previous 12 months had increased in all hospital levels from 12.3% to 13.3% between 2007/2008 and 2012 ($p<0.05$). Outpatient care utilisation at private hospitals during the previous one-month period had increased to 0.7% by 2012.

Table 9. Descriptive statistics of the study population, 2007/2008 and 2012

Variables		2007/2008 (n=27,681)	2012 (n=30,567)
		Percent	
Health variables	Chronic disease	17.8 %	NA
	Disability	5.3 %	5.5 %
	The number of work/school days. median (min, max)[a]	0 (0, 31)	0 (0, 31)
	Any health problems in the last month	7.5 %	7.3 %
Gender	Male	46.7%	47.1%
	Female	53.3%	52.9%
Age	18-34 [a]	47.3%	44.4%
	35-64 [a]	45.8%	48.9%
	65<	6.9%	6.7%
Marital status	Married/living together [a, b]	60.3 %	63.5 %
	Divorced/separated	3.5 %	3.4 %
	Widowed	8.6 %	8.4 %
	Single/never married[a]	27.7 %	24.7 %
Activity status	Employed [a, b]	29.5 %	38.0 %
	Herder [a]	13.4 %	15.5 %
	Self-employed [a]	21.1 %	7.6 %
	Inactive [a]	21.0 %	29.9 %
	Unemployed [a]	15.0 %	9.0 %
Education	No schooling or lower education [a, b]	14.9 %	12.3 %
	Secondary education [a]	56.9 %	55.4 %
	Vocational [a]	11.0 %	11.6 %
	Higher education [a]	17.2 %	20.7 %
Location	Urban [a, b]	57.8 %	56.8 %
	Rural [a]	42.2 %	43.2 %
Health care utilisation	Tertiary level health care outpatient visit	1.4%	1.5%
	Secondary level health care outpatient visit	2.0%	1.8%
	FGP/*soum* hospital outpatient visit	1.7%	1.8%
	Private hospital outpatient visit [a]	0.4%	0.7%
	Any hospitalisations [a]	12.3%	13.3%
Log income per capita. median (min, max)[a]		13.9 (6.9, 19.4)	14.9 (11.9, 21.4)
Insurance coverage [a]		89.6 %	90.6 %
Household size. median (min. max) [a]		4 (1, 17)	4 (1, 15)

[a] Statistically significant difference ($p<0.05$) between 2007/2008 and 2012

[b] Reference group

6.2.2. Descriptive statistics of the study population (Study III)

The results of the t-test demonstrated that the adults in the rural areas used outpatient care at *soum* health centres/FHCs to a significantly greater extent than those living in urban areas. Approximately 5.97% of the rural population had required inpatient care at *soum* health centres during the reference year. The rural inhabitants reported significantly more disabilities. The percentage of those who had been afflicted by health problems over the previous month was significantly higher in the urban areas (Table 10).

Table 10. Descriptive statistics of the population

Variables		Urban N=17,354	Rural N=13,193
Health variables	Disability [a]	5.2 %	5.9 %
	A number of missed work/ school days in the previous month, median (min, max)	0 (0, 31)	0 (0, 30)
	Any health problems in the last month [a]	7.8 %	6.7 %
Gender	Male [a]	46%	48.6%
	Female [a]	54%	51.4%
Age	18-34	44.6%	44.3%
	35-64	48.5%	49.3%
	65<	6.9%	6.4%
Marital status	Married/living together [a, b]	62.9 %	64.3 %
	Divorced/separated [a]	4.1 %	2.3 %
	Widowed	8.4 %	8.5 %
	Single/never married	24.5 %	24.9 %
Employment status	Employed [a, b]	44.7 %	29.1 %
	Herder [a]	2.0 %	33.3 %
	Self-employed [a]	9.6 %	5.1 %
	Inactive [a]	34.4 %	24.0 %
	Unemployed [a]	9.3 %	8.6 %
Education level	No schooling or lower education [a, b]	6.4 %	20.2 %
	Lower secondary [a]	12.3 %	28.0 %
	Upper secondary [a]	53.8 %	40.3 %
	Third-level education	27.6 %	11.6 %
Health care utilisation	FHC/Outpatient care at *soum* health centre	1.1 %	2.7 %
	Inpatient care at *soum* health centre	NA	5.9 %
Log income per capita, median (min, max)		15.2 (11.9, 21.4)	14.7 (11.9, 18.3)
Household size, median (min, max)		4 (1, 15)	4(1, 14)
Log distance to the nearest health care centre, median (min, max)		0.0(-4.60, 3.47)	0.18 (-3.91, 5.07)

[a] Statistically significant difference ($p<0.05$) between rural and urban areas
[b] Reference group

6.2.3. Inequalities and inequities in health care utilisation in the study years (Study II)

In 2007/2008, the EIs of inpatient care use and outpatient visits at tertiary, primary level hospitals and private hospitals were 0.0159, 0.0159, -0.0052, and 0.0060 ($p<0.01$), respectively. After accounting for the need variables, horizontal inequity indices of inpatient care use, outpatient visits at tertiary, primary level hospitals and private hospitals were 0.0212, 0.0055, -0.0053, and 0.0060 ($p<0.01$), respectively. Neither EI nor HI of outpatient visits to secondary level hospitals were statistically significant.

Table 11. Erreygers' Concentration Indices and Horizontal Inequities by years

Health care utilisations	2007/2008		2012	
	EI	**HI**	**EI**	**HI**
Tertiary level hospital outpatient visit	**0.0056**	**0.0055**	**0.0078**	**0.0077**
(confidence interval)	(0.0019, 0.0092)	(0.0019, 0.0089)	(0.0034, 0.0121)	(0.0040, 0.0111)
Secondary level hospital outpatient visit	-0.0005	-0.0003	**-0.0050**	**-0.0054**
(confidence interval)	(-0.0048, 0.0039)	(-0.0040, 0.0035)	(-0.0088,-0.0013)	(-0.0087, -0.0021)
FGP/*soum* hospital outpatient visit	**-0.0052**	**-0.0053**	**-0.0082**	**-0.0088**
(confidence interval)	(-0.0089, -0.0015)	(-0.0085, -0.0019)	(-0.0116, -0.0048)	(-0.0120, -0.0055)
Private hospital outpatient visit	**0.0060**	**0.0060**	**0.0079**	**0.0074**
(confidence interval)	(0.0037, 0.0082)	(0.0037, 0.0082)	(0.0050, 0.0106)	(0.0048, 0.0100)
Hospitalisation	**0.0159**	**0.0212**	**0.0169**	**0.0207**
(confidence interval)	(0.0049, 0.0269)	(0.0110, 0.0312)	(0.0061, 0.0275)	(0.0099, 0.0294)

Note: EI denotes Erreygers' Concentration Index, HI represents Horizontal Inequity. Significant indices are in bold, at the significance level of 0.01.

6.2.4. Decomposition analysis (Study II)

Figure 10 shows the main contributions to the income-related inequalities in health care utilisations and their changes between 2007/2008 and 2012. During the study years, the concentration indices for tertiary level hospital outpatient visits, FGP/*soum* hospital outpatient visits, private hospital outpatient visits, and inpatient service use changed by 0.0022, -0.0003, 0.0019, and 0.0009, respectively.

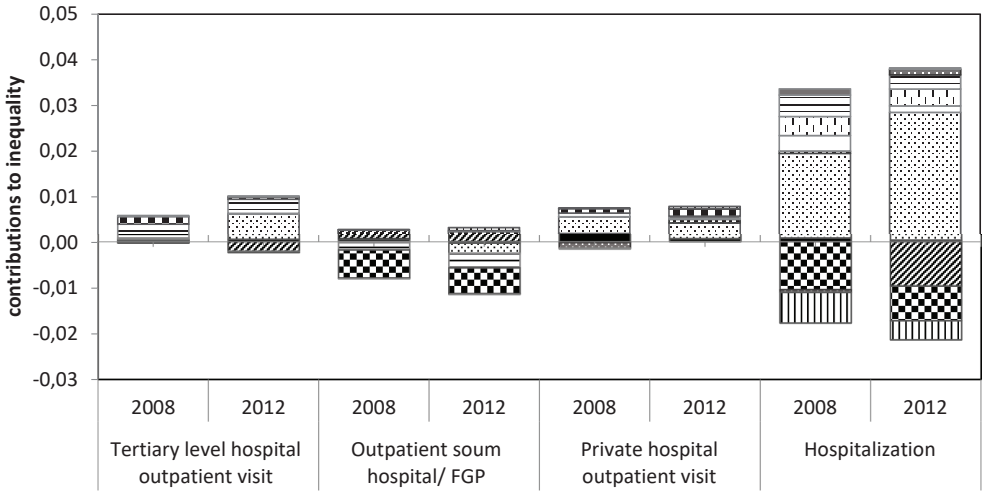

Figure 10. Decomposition analysis of inequalities in health care utilisations, Mongolia, 2007/2008–2012. Health care utilisations are outpatient care visit at the tertiary, secondary and primary level hospitals, private hospitals, and also include inpatient care utilisation. The grey bars represent contributions of age-sex to EIs. The bars with horizontal lines represent the contributions of education to EIs. The bars with dashed vertical lines represent the contributions of insurance to EIs. The white bars represent the contributions of marital status to EIs. The bars with diagonal lines represent the contributions of economic activity status. The bars with dots represent the contributions of income to EIs. The black bars represent residuals. The bars with checkers represent the contributions of location to EIs. The bars with white dots represent the contributions of household size to EIs. The bars with vertical lines represent the contributions of health variables to EIs.

6.2.5. Inequalities and inequities in PHC utilisation in Mongolia (Study III)

Table 12 highlights the inequalities and inequities in PHC utilisation in urban and rural areas of Mongolia. The EIs for FHC, outpatient and inpatient care utilisations at *soum* health centre were -0.0069 ($p<0.05$), 0.0023 ($p>0.05$), 0.0127 ($p<0.05$), respectively. After controlling for need variables, HI indices for FHC, outpatient and inpatient care utilisations at *soum* health centre were -0.0057 ($p<0.05$), -0.0035 ($p>0.05$), 0.0063 ($p>0.05$), respectively.

Table 12. Inequalities and inequities in PHC utilisation in Mongolia

Health care use	EI	HI
FHC	**-0.0069**	**-0.0057**
(confidence interval)	(-0.0104, -0.0034)	(-0.0092, -0.0023)
Outpatient care at *soum* health centre	0,0023	-0,0035
(confidence interval)	(-0.0044, 0.0090)	(-0.0089, 0.0021)
Inpatient care at *soum* health centre	**0.0127**	0,0063
(confidence interval)	(0.0027, 0.0227)	(-0.0031, 0.0158)

EI denotes Erreygers' Concentration Index, *HI* refers to the Horizontal Inequity. Significant indices are displayed in bold at the significance level of 0.05.

6.2.6. Decomposition analysis (Study III)

The main contributions to income-related inequality in FHC utilisation were income (33.25%), education level (38.13%) and need variables (16.75%). Approximately half (50.2%) of the income-related inequality in inpatient care utilisation at *soum* health centres was caused by the need variables. Other major contributions included income (24.36%), distance to the nearest health care centre (20.74%), economic activity status (7.86%) and education level (-28.32).

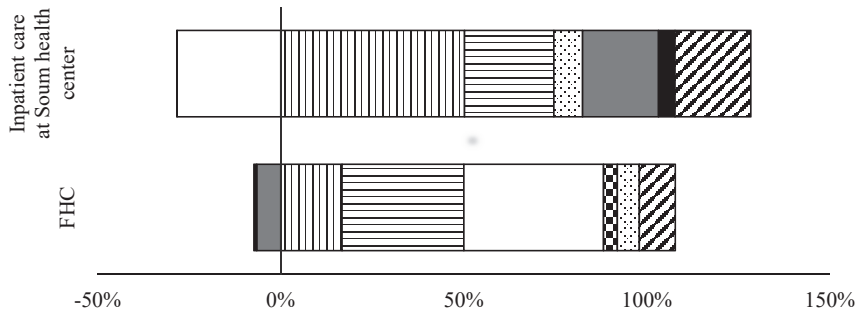

Figure 11. Decomposition analysis of income-related inequalities in FHC and inpatient care at *soum* health centres in Mongolia, 2012. The white bars represent the contributions of education to EIs. The bars with vertical lines represent the contributions of needs to EIs. The bars with horizontal lines denote the contributions of income to EIs. The bars with dots indicate the contributions of economic activity status to EIs. The grey bars represent the contributions of distance to the nearest health centre to EIs. The black bars show the contributions of household size to EIs. The bars with checkers denote the contributions of marital status to EIs. The bars with diagonal lines represent residuals.

6.3. SPECIFIC AIM III: CATASTROPHIC HEALTH EXPENDITURE AND IMPOVERISHMENT IN MONGOLIA (STUDY IV)

6.3.1. Distributions of inpatient and outpatient care utilisation

Approximately 29.6% of the total households reported that at least one member of the household had been hospitalized during the previous year. Around 15.6% of the total households had used outpatient services at least once during the previous month. The higher income households had used both outpatient and inpatient health services significantly more often than the lower income households ($p<0.01$) (Table 13).

The higher income households reported higher OOP for health care (Figure 12).

Table 13. Distribution of health service utilisation by expenditure quintile

	Outpatient (N=2,097)		Inpatient (N=4,062)	
All	15.6 %		29.6 %	
Quintiles				
1	11.2 %		23.2 %	
2	13.9 %		26.8 %	
3	16.9 %	P<0.01	30.3 %	P<0.01
4	16.9 %		32.2 %	
5	19.2 %		35.6 %	
Urban	17.0 %	P<0.01	29.8 %	P = 0.07
Rural	12.9 %		29.3 %	

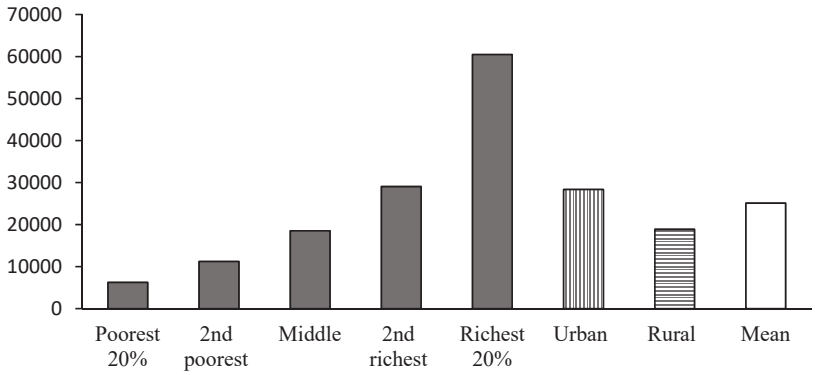

Figure 12. Distribution of OOP health payments (MNT) across quintiles

6.3.2. The incidence and intensity of catastrophic health expenditure

Table 14 represents the incidence and intensity of catastrophic health expenditure. As the threshold is increased, the incidence of catastrophic head count declines, but the mean positive overshoot increases. The higher income households were more likely to suffer from catastrophic health expenditure (C_E>0).

Table 14. The incidence and intensity of catastrophic health expenditure in Mongolia, 2012

	Out-of-pocket health spending as share of total expenditure				**As share of non-food expenditure**		
Thresholds	**5 %**	**10 %**	**15 %**	**25 %**	**15 %**	**25 %**	**40 %**
Head count	12.1 %	5.5%	3.3 %	1.2 %	7.0 %	3.4 %	1.1 %
Concentration index, C_E	0.03	0.09	0.17	0.32	0.00	0.08	0.29
Rank-weighted head count, H_W	11.7 %	5.0 %	2.7 %	0.9 %	7.0 %	3.1 %	0.8 %
Mean overshoot	0.99 %	0.58 %	0.37 %	0.16 %	0.96 %	0.47 %	0.17 %
Concentration index, C_O	0.17	0.25	0.33	0.46	0.14	0.24	0.39
Rank-weighted overshoot, O_W	0.95 %	0.53 %	0.31 %	0.11 %	0.96 %	0.43 %	0.12 %
Mean positive overshoot	8.13 %	10.61 %	11.32 %	12.97 %	13.68 %	14.07 %	15.05 %

6.3.3. Health care payments and poverty

Table 15 demonstrates the poverty measures corresponding to household expenditures both before and after health payments. After accounting for OOP for health care, the poverty head account increased by 0.78% when using the Mongolian national poverty line.

Table 15. Measures of poverty based on the gross and net of health payments, Mongolia, 2012

	Gross of health payments	Net of health payments	Absolute change	Relative change
The national poverty line = 118,668 MNT per month				
Poverty head count	22.26 %	23.04 %	0.78 %	3.51 %
Poverty gap (MNT)	6953.57	7284.22	330.65	4.76 %
Normalised poverty gap	5.86 %	6.14 %	0.28 %	4.76 %
Normalised mean positive gap	26.33 %	26.64 %	0.32 %	1.20 %
The World Bank poverty line 1.90 USD (PPP) per day				
Poverty head count	0.22 %	0.25 %	0.03 %	15.21 %
Poverty gap (MNT)	16.56	20.13	3.57	21.55 %
Normalised poverty gap	0.05 %	0.06 %	0.01 %	21.57 %
Normalised mean positive gap	22.07 %	23.29 %	1.22 %	5.51 %

7. Discussion

This doctoral thesis investigated socioeconomic-related inequalities in health and health care utilisation as well as financial protection in health in Mongolia by conducting cross sectional studies of education-related inequalities in health (Study I), income-related inequalities in health care utilisations (Studies II and III), and financial protection (Study IV).

7.1. SPECIFIC AIM I: EDUCATION-RELATED INEQUALITIES IN HEALTH IN URBAN AND RURAL AREAS OF MONGOLIA (STUDY I)

In this cross-sectional study, inequalities in health among the adult population of Mongolia were measured by using the education level as an indicator of SES. The study results revealed that self-perceived health, including chronic diseases and physical limitations, were unequally distributed across the population and geographic locations. Chronic disease was reported to be significantly more prevalent in the rural areas. The rural population also reported more physical limitations; however, this finding was statistically insignificant. These differences in health status between the urban and rural areas of Mongolia have been documented in earlier studies. A report by the MOH also supports the fact that the leading causes of mortality and morbidity are different in the rural and urban areas of Mongolia (MOH, 2016).

Our data further suggested that a low education level was associated with self-perceived poor health. This finding is in keeping with the earlier study published by Gan-Yadam et al., which examined 500 respondents from the capital city and concluded that the worse-off tended to assess their health as poor (Gan-Yadam et al., 2012).

The present study, as far as we are aware, was the first to analyse socioeconomic-related inequalities in the health of the adult population and to measure inequities in health in Mongolia.

The findings of the present study exhibited negative concentration indices of physical limitation and chronic disease in both rural and urban areas of Mongolia, indicating that ill health was concentrated among the lower socioeconomic group in the areas. A previous study by Bredenkamp et al. using the "Multiple Indicator Cluster Survey 2005" applied the concentration index to measure inequality in child health in Mongolia. They also found that all of the ill-health indicators of children, including stunting, underweight, diarrhoea and acute respiratory infections were concentrated among the poor (Bredenkamp et al., 2012).

International studies have measured socioeconomic-related inequalities in health by applying different health measures, including child mortality rates (Wagstaff, 2000), life expectancy (Burström et al., 2005; Gerdtham & Johannesson, 2000; Tranvåg et al., 2013) anthropometric measures (Chen et al., 2014; Rabbani et al., 2016; Wagstaff & Watanabe, 1999) and self-assessed health (Ataguba et al., 2011; Van Doorslaer et al., 1997; Yang & Kanavos, 2012), as well as generic health measures (Lee & Jones, 2007; McGrail et al., 2009; van Doorslaer & Koolman, 2004). The results of these studies have also demonstrated that ill health is concentrated among the poor while the rich enjoy better health.

The present study revealed that the concentration indices of physical limitation in both areas were very similar. Nevertheless, after age-sex standardisation, a larger degree of avoidable inequality was found in urban areas. The degree of inequality related to chronic disease was

higher in rural areas than in urban regions; however, this difference shrank after age-sex standardisation.

Furthermore, the results of the decomposition analysis suggested that, once the contributions of age and sex had been removed, the education-related inequalities in physical limitation and chronic disease were mainly attributable to education, economic activity status and income. These results were similar with the findings in a number of studies conducted in both developing and developed countries (Lee & Jones, 2007; van Doorslaer & Koolman, 2004; Yang & Kanavos, 2012).

The findings of the current study also reveal that the contribution of education is more extensive than that of economic activity status to socioeconomic-related inequalities in health in rural areas, while this was reversed in urban areas. The greater contribution of education in the rural areas could be explained by the education level and health behaviour in these areas. Previous studies have suggested that the rural population consumes more salt and less fruit (World Health Organization, 2009), and also has poor health knowledge, particularly about diabetes and hypertension (Demaio, Otgontuya, de Courten, Bygbjerg, Enkhtuya, Oyunbileg et al., 2013; Demaio, Otgontuya, de Courten, Bygbjerg, Enkhtuya, Meyrowitsch et al., 2013).

Improving population health through ensuring equitable and affordable health care services has been a priority of the Government of Mongolia. Consequently, every citizen has free access to PHC, which is funded by the state budget (MOH, 2016; Tsilaajav et al., 2013). In addition, SHI coverage achieves nearly universal coverage throughout the country (Bayarsaikhan et al., 2015; MOH, 2016).

Despite the government effort, our study found that there are persistent inequalities in health care utilisations. Furthermore, our decomposition analysis indicated that it is not possible to eliminate health inequalities in Mongolia solely by concentrating on the activities of the health system. It might be more beneficial to target measures to decrease inequality in education, employment, income, and access to health care. This concept is supported by the Marmot Review (2010), which noted that *"inequalities in health arise because of inequalities in society – in the conditions in which people are born, grow, live, work and age"* (Strategic Review of Health Inequalities In England Post-2010 (Great Britain) & Marmot, 2010).

7.2. SPECIFIC AIM II: INCOME-RELATED INEQUALITIES IN HEALTH CARE UTILIZATION IN MONGOLIA (STUDY II AND III)

In Study II, income-related inequalities in health care utilisation in Mongolia were analysed using the HSES 2007/2008 and 2012 datasets. It was found that outpatient visits at tertiary level hospitals and private hospitals, and the total inpatient utilisations were concentrated among the rich, while the use of the outpatient care provided by FGP/*soum* hospitals was concentrated among the poor during both study years.

Bredenkamp et al. analysed inequalities in outpatient and inpatient care utilisations at *soum* hospitals/FGP, *aimag*/central hospitals, and private hospitals using the HSES 2007/2008. They found that all outpatient and inpatient care use at private and public hospitals, with exception of the care provided at FGP/*soum* hospitals, was concentrated among the better-off; they however, did not analyse inequity in health care utilisations.

As far as we are aware, this study (Study II) was the first to analyse horizontal inequity in health care utilisation in Mongolia. The present study further indicated, after need standardisation, an increase in pro-rich inequities in outpatient care in tertiary level hospitals and private hospitals as well as in the total inpatient hospital use between 2007/2008 and 2012. Moreover, FGP/*soum* hospital use became more pro-poor between the study periods.

These results are supported by the MOH and the Asian Development Bank report of 2010 that suggested that the poor population was more likely to use PHC than their richer counterparts (Ministry of Health, Asian Development Bank, 2010). A possible explanation for the higher incidence of PHC use among the poor can be that fact that everyone has free access to PHC in Mongolia.

The decomposition analysis in Study II demonstrated that income was the main contributor to the pro-rich inpatient care. The previous study had found that inpatient care is expensive owing to the direct payments by user, which include, for instance, transportation costs and other expenditures (Dorjdagva J, Batbaatar E, Lkhagvaa U, Purevdorj T., 2010). Furthermore, the study of Nanzad et al. reported that 85% and 40% of the inpatients attending secondary level hospitals received a meal from their home every day and had to purchase their drugs and infusions (Nanzad et al., 2011). Similar results of the income contributions to pro-rich inequity in inpatient care have been documented in the developing countries (O. O'Donnell, 2007)

We observed the positive contribution of insurance to pro-rich inequity in inpatient care. This can be explained by insurance co-payments, amounting to 10% and 15% at the secondary and tertiary level hospitals; these represent financial barriers for lower-income people.

In terms of outpatient visits at tertiary level hospitals, the pro-rich inequity is mainly accounted for by the location. It is worth mentioning that all tertiary level hospitals are located in the capital city. Indeed, income was the main contributor to pro-rich inequity in outpatient care at private hospitals.

At the international level, income related-inequalities in health care utilisations have been well-documented. However, the results vary from country to country. A study by Van Doorslaer et al., covering 12 European nations showed that the horizontal inequity index in the probability of making general practitioner visits in all countries was very small, ranging between -0.016 and 0.012 (van Doorslaer et al., 2004). Compared to our results, the pro-poor degrees were less concentrated in 10 out of 12 countries than in Mongolia (van Doorslaer et al., 2004).

Van Doorslaer et al. have also (2000) evaluated equity in general practitioner, specialist, and inpatient services in Europe and the US. They observed that there was pro-poor inequity in inpatient services in 11 out of 12 countries (van Doorslaer et al., 2000). In contrast, our study demonstrated pro-rich inequity.

Lu et al. (2007) analysed inequity in inpatient care in three higher income Asian countries. They concluded that there was pro-poor inequity in inpatient services in South Korea (-0.0627) and Taiwan (-0.038); and pro-rich inequity in Hong Kong (0.0638) (Lu et al., 2007).

A number of studies have been conducted as single-country analyses on inequity in inpatient care, e.g. in Mexico (0.0269) (Barraza-Lloréns et al., 2013), Chile (0.015) (Vásquez et al., 2013), and Brazil (-0.0127) (Macinko & Lima-Costa, 2012).

Furthermore, similar to the situation in many other countries, ensuring equitable access to health care is a key priority of the health policies in Mongolia. However, our study showed that all types of health services, regardless of whether they are publicly or privately owned, have become more inequitable between the two study years. This could be due to the current weak referral system in PHC (Tsilaajav et al., 2013) and the poorly regulated private health sector (Asian Development Bank, 2008).

In Study II, when estimating income-related inequalities in outpatient visits at the PHC level, we used the combined variable of FGP and *soum* hospital (FGP/*soum* hospital). Likewise, the previous study by Bredenkamp et al. applied the same variable in their analysis (Bredenkamp et al., 2012).

Despite the fact that the health system, FGP and the *soum* hospitals provide PHC in both urban and rural areas, there is an enormous difference between these units regarding their settings, ownerships and functions (MOH, 2016). However, Study II did not consider the differences between PHC in urban and rural areas.

Therefore, we carried out different analyses, particularly on income-related inequalities in PHC in urban and rural areas (Study III). We generated three dummy variables, consisting of FHC (PHC in urban areas), and outpatient and inpatient care visits at *soum* health centres.

Study III found that FHC utilisations were concentrated among the worse-off. Nevertheless, outpatient care at *soum* health centres tended to be concentrated among the better-off, although this finding was not statistically significant. The previous studies conducted in Mongolia have suggested that the combined indicator was concentrated among the poor. Furthermore, there are international studies claiming that the poor are more likely to use PHC, regardless of their varied payment methods and referral systems (Doorslaer et al., 2004; Yiengprugsawan, Carmichael, Lim, Seubsman, & Sleigh, 2011).

This higher utilisation among the poor in Mongolia can be a result of the government policies that are i) ensuring that everyone has free access to PHC (Tsilaajav et al., 2013); and ii) applying risk-adjusted capitation payment method to PHC (the rate for the poor and vulnerable groups is higher than for the other groups of population) (Tsilaajav et al., 2013).

Study III further showed that inpatient care at *soum* health centres was concentrated among the rich even though everyone has free access to the centres. This indicates that ensuring free access to health services in remote areas does not guarantee equitable health care distribution, unless transportation and communication infrastructures are improved.

7.3. SPECIFIC AIM III: CATASTROPHIC HEALTH EXPENDITURE AND IMPOVERISHMENT IN MONGOLIA (STUDY IV)

In Study IV, the incidence and intensity of catastrophic health expenditure were analysed with the use of the total household expenditure and capacity to pay as living standard indicators. The study concluded that in 2012, 5.5% and 1.1% of the total households suffered from catastrophic health expenditure when the threshold was set at 10% of the total household expenditure and 40% of the capacity to pay, respectively.

A previous similar study by Bredenkamp et al. which used the indicators of total household consumption and capacity to pay based on the HSES 2007/2008 data, reported that the incidence of catastrophic health expenditure was 10% and 3.3% at the threshold of 10% of the total household expenditure and 40% of the capacity to pay. It seems likely that the incidence of catastrophic health expenditure declined between 2007/2008 and 2012; however, applications of different living standard indicators in the studies make it difficult to make a valid direct comparison between the results.

Nonetheless, it is worth noting that financial protection, specifically among poor and vulnerable groups, was extended by the increase in SHI coverage (Bayarsaikhan et al., 2015) as a result of efforts by the Mongolian government (Tsilaajav et al. 2013).

The present study also found that the intensity of catastrophic health payments was relatively as low as 0.58% and 0.17% at the threshold of 10% of the total household expenditure and 40% of the capacity to pay. This is in line with the findings of the earlier study of Bredenkamp et al (Bredenkamp et al., 2012).

Additionally, Eddy van Doorslaer et al. (2007) analysed the magnitude and distribution of OOP for health care in 14 Asian countries (Van Doorslaer et al., 2007). When comparing the present results with those originating from these developing countries, the incidence of catastrophic health expenditure in Mongolia at the threshold of 10% of the total household expenditure (5.5%) is lower than it is in Bangladesh (15.57%), China (12.61%), Hong Kong (5.86%), India (10.84%), Korea REP (10.36), Kyrgyz REP (5.84%), Nepal (5.90%), Taiwan (6.35%), and Vietnam (15.11%); but higher than in Indonesia (4.43%), Malaysia (2.01%), Philippines (4.6%), Sri Lanka (2.98%), and Thailand (3.52%).

The intensity of catastrophic health expenditure at 10% of the total household expenditure threshold in Mongolia (0.58%) is lower than it is in Bangladesh (2.02%), China (1.28%), India (0.92%), Korea REP (1.16), Nepal (0.64%), Vietnam (1.39%); and higher than in Hong Kong (0.55%), Indonesia (0.51%), Malaysia (0.17%), Kyrgyz REP (0.35), Taiwan (0.47%), Philippines (0.5%), Sri Lanka (0.27%), and Thailand (0.33%).

Our study revealed that the richer households (or households with a higher capacity to pay) tended to suffer from catastrophic health payments. This result is supported by the findings from our previous study (Study II) which revealed that utilisations of expensive health care were concentrated among the rich. Additionally, according to the Asian Development Bank report (2008), there is a risk in having a dual system (the worse-off use public facilities and the better-off use private facilities) in the health sector (Asian Development Bank, 2008).

On the other hand, the poor were more likely to choose the free PHC and tended to avoid visiting the higher level hospitals owing to both direct costs, including co-payments, medicines and consultations as well as indirect costs, such as transport and meals (Nanzad et al., 2011; Tsilaajav et al., 2013), regardless of their SHI coverage.

We further found that 0.78% of the total population of Mongolia were forced into poverty due to OOP for health care. A similar study reported that in 2007/2008, the increase in poverty head count due to OOP was 2.5%.

Nonetheless, the impoverishment effect of OOP for health expenditures in Mongolia is lower in comparison with other countries where financial protection in health is less developed (Chuma & Maina, 2012; Kwesiga et al., 2015; Van Doorslaer et al., 2007; Wagstaff & Doorslaer, 2003).

The authors emphasised that despite the lower degrees of incidence of catastrophic health expenditure, the OOP share of the total health expenditures is still 41%, which may lead to an increase in poverty in the future. A well-aligned strategy for health financing reform is needed in the country, which would also play a crucial role to sustain UHC (Kutzin et al., 2017).

Furthermore, strengthening the prepaid health financing mechanism, such as SHI, is not the only way to ensure financial protection in the country. It would be beneficial to improve the efficiency of the health system by strengthening the current gatekeeping system at PHC, and enhancing the regulation of the private health sector, including hospitals and pharmacies as well as decreasing unnecessary treatments and admissions throughout the health sector.

7.4. STRENGTHS AND LIMITATIONS OF THE STUDY

The present study has the following strengths. First, the HSES, a nationally representative data source, was used. The third section of the HSES data contains information about individuals' health status, health care utilisations and health care payments, and this made it possible to conduct a complex study that would cover socioeconomic-related inequalities in health and health care utilisation as well as financial protection in health in Mongolia.

Second, in Study I, socioeconomic-related inequality in health was estimated and evaluated using adult health indicators in order to make geographical comparisons. Although an earlier study had analysed socioeconomic-related inequality in child health indicators, such as stunting, underweight, diarrhoea and acute respiratory infection; it could, however, not provide a whole picture of inequality in health among the entire population (O. A. O'Donnell & Wagstaff, 2008).

Third, as far as we are aware, Studies II and III were the first to analyse horizontal inequity in outpatient care in primary, secondary and tertiary level hospitals, private hospitals, and inpatient care in Mongolia. Fourth, Study IV provided and updated the incidence of catastrophic health expenditure and the rate of impoverishment with the recent available data in Mongolia.

This study also has some weaknesses. Since the primary purpose of HSES is to measure poverty and assess the living standards of the population, the data base contains less information on health status and health care utilisation compared to Demographic and Health Surveys, which have been more commonly used in similar studies in developed countries. Important behavioural risk factors for individuals, including physical activity, smoking, and alcohol consumption were not included in the study (Study I, II, III).

Furthermore, it is worth mentioning that the observed inequalities in health care utilisations in this study do not necessarily translate into the existence of inequalities in the outcome of health care services. Last but not least, in Study IV, the total household expenditure was used as the living standard indicator. In this case, the intensity of catastrophic health expenditure may be slightly higher than when it is estimated by taking into account of the total household consumption.

8. Conclusions

Based on the findings from Studies I, II, III and IV, the following conclusions were deduced:

1. Socioeconomic-related inequalities and inequities in health exist in Mongolia, and the degrees vary across geographical locations. In both rural and urban areas, education and economic activity status are the main contributors to pro-poor inequities in ill-health. Interestingly, in rural areas, the contribution of education is significantly higher than that of the economic activity status; however, the opposite is the case in urban areas.

2. We discovered the presence of socioeconomic-related inequities in health care utilisation regardless of the provider type in Mongolia. The utilisations of outpatient care at tertiary level hospitals and private hospitals, inpatient use at *soum* health centres, and the total inpatient care are all pro-rich, while pro-poor inequity was observed in FHC use. Furthermore, the degrees of all of these inequities showed a tendency to increase.

3. The intensity and incidence of catastrophic health expenditure was found to be relatively low in Mongolia; however, it pushes approximately 0.7% of the total population into poverty. The current high share of OOP in the total health expenditure is a concern that could lead to an increase in the measures of financial protection.

9. Recommendations

Based on this study applying a complex analysis on inequality in health, health care utilisation and financial protection in the health sector of Mongolia, we propose the following policy initiatives to tackle the inequities and improve financial protection as well as some recommendations for future practice.

9.1. POLICY IMPLICATIONS

- Improving the health of the general population, including reducing avoidable inequity in health across all socioeconomic groups and geographical areas, is the ultimate goal of the health system. However, the health system does not play an exclusive or a major role in the accomplishment of the goal. In order to accomplish this goal, policies to resolve social problems, including poverty, education inequality, unemployment, immigration as well as environmental hazards, should be closely linked to health policies. For example, the currently high level of air pollution in the capital city is a public health emergency. This problem would lead to a dramatic increase in preventable mortality and widen the degree of inequity in health between the better-off and the worse-off sections of society or between populations in rural and urban areas in the coming years.

- All health care utilisations, regardless of the provider's type, have become more unequitable in the country, indicating that the current health system is not meeting the people's needs and expectations. Therefore, strengthening the effective and strong referral system in PHC is crucial. This might require more funding at the primary care level; nonetheless, it would eliminate many of the current inefficiencies, and would further prevent future cost escalation and resource waste in the health system.

- In order to make more equitable utilisation at the higher-level hospitals, there is a need for reducing financial and non-financial access barriers for certain sections of the population, specifically among the poor and vulnerable groups who have higher health needs but have no access to the higher level hospitals. Reducing SHI co-payments for these groups would be an option, but it cannot guarantee the equitable utilisation unless other indirect costs are eliminated.

- On its own, the current high SHI coverage is not sufficient for sustaining UHC. In addition to keeping the SHI coverage at a reasonable level, there is a need to improve the efficiency of the health care system through strengthening its gatekeeping procedures, removing all barriers to health services, and improving regulations of the private health sector to enhance the health-related financial protections for the whole population. Conducting particular studies on a regular basis and applying the results to the policy implications would play a significant role in moving towards UHC.

9.2. RECOMMENDATIONS FOR FUTURE RESEARCH

- In this study, child health and health care utilisation were not studied. Therefore, there is a need for future research to analyse avoidable inequalities in child health and health care utilisation.

- Persistent, avoidable inequalities in health were identified in this study. There is thus a need for further research to explore economic costs of health inequalities in the country.

- The total inpatient utilisation was used in this study. Future studies could estimate horizontal inequities in inpatient care utilisations subdivided by types and levels of hospitals.

- The study analysed the distribution or structure of catastrophic health expenditures and their poverty-inducing impact at the national level. Further studies will be necessary to explore the incidence and intensity of catastrophic health expenditure and the impoverishment effect in different regions of the country in order to improve local policies.

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The equitable distribution of health and health care utilisation as well as financial protection in health have been well documented in the health strategies and policies of Mongolia. However, this study showed that ill-health is concentrated among the worse-off in both urban and rural areas, even after need standardization; and the degree of inequity in delivery of health services has a tendency to increase in Mongolia.

Furthermore, despite the high coverage of social health insurance, a significant proportion of the population incurred catastrophic health expenditures and was forced into poverty due to out-of-pocket payments for health care.

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