Equity in Health Care Utilization of the elderly: Evidence from Kanchanaburi DSS, Thailand

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Introduction

In Thailand, there has been a big change in the population structure in the past 50 years. Declining fertility and mortality rates have affected the age structure of the Thai population. Three decades ago, the Thai population pyramid had a wide base that showed many children due to high fertility, but when the fertility rate declined, the base of the population pyramid become narrow. At the same time, the top part of the pyramid widened because of the longer life expectancy, which also indicated an increase in the elderly population.

This research focused on the elderly population whose major problems are related to ill-health, chronic illness, and disabilities. Therefore, increased healthcare services are necessary for the elderly. However, most elderly have faced difficulties in access to healthcare services such as limitations in mobility and insufficient social support. These barriers are unlikely to be equal across socio-economic groups. The elderly who had good education or financial support experienced fewer barriers to access than the less educated and lower income groups. These differences are likely to be reflected in inequity of healthcare services utilization use across education and income groups (Wongboonsin, 1998).

Studies of healthcare services utilization in the general population, often measured by self-reported use of services in surveys, tend to reveal similar findings. In Canada and Europe, studies of healthcare services use have found that, after controlling for health status or need, services use did not vary across socio-economic groups. However, there appear to be differences in the probability of specialist consultation and preventive care favoring higher income and educated groups (Roos and Mustard 1997; Whitehead 1992).

In Thailand, previous studies have found differences in health care utilization between different Thai population groups. A study on self-medication behavior found that the poor purchased more medicine than the rich. Pannarunothai (1997) stated that the poorest group living in urban areas was more likely to seek treatment from drugstores, private clinics and public services than from private hospitals. The results from the Health and Welfare Survey in 1999 have shown that the most common sources of healthcare in order of importance are public health centers, public hospitals and private clinics. It is also found that people who live in urban areas use health care services more frequently than those in rural areas. The poorest group in rural areas did not use any health care services when they got sick (Sermsri, 2003).

According to the 1999 Thailand's Declaration of the Elderly, article 5 (cited in Bureau of Empowerment for Older Persons, 2002), it is stated that the elderly should have knowledge about their health care. The elderly must have health security and the ability to equal access and utilize all levels of healthcare services, and have traditional care until the end of their lives. The Universal Health Care Coverage Scheme or "30 Baht for All Treatment Policy" is an important policy for achieving the declaration. Since 2001, the policy has been launched to enhance the efficiency of the health care system and achieve the goal of equity in health without obstruction from expenses, socio-economic status, and area of residence (The National Health Commission Office, 2001).

This paper examines the change in equity of health care utilization in the Kanchanaburi Demographic Surveillance System (KDSS) Site after the implementation of "Universal Health Care Coverage" policy in 2001, in order to answer a question of the transitional health policy: does health care reform improve the equity of health care in the KDSS? This paper measured inequity related to economic status, after controlling for differences in need of healthcare services utilization among the elderly in the KDSS during 2000 and 2004.

Data and Methods

The Kanchanaburi DSS data round 1 (2000) and round 5 (2004) were used. The KDSS was conducted by the Institute of Population and Social Research, Mahidol University with supported from the Wellcome Trust of the United Kingdom. The two

year panel data was used in this study and the samples included persons who were aged 60 and over. Only those who completed responses to both of the 2 surveys were included in the analysis. The elderly population in 2000 was 3,293 persons and 4,343 persons in 2004. The samples of this study included the same elderly who were aged 60 and over: 2,213 cases from 2 panel data sets of the year 2000 and 2004.

The variables included in the analysis were age, sex, wealth index, education, occupation, family size, area of residence, and health insurance. Age was categorized into 3 age groups: 60-69 years, 70-79 years, and 80 years and over. Level of education was divided into 2 groups: do not have education and have education. Occupation was divided into 3 groups: no occupation, agriculture, and non-agriculture. Area of residence was divided into urban and rural areas. This study analyzed the elderly who had the elderly card and 30 Baht card.

Economic status in this research was measured by household wealth index, which was calculated from 23 household assets such as having television, radio, telephone, vehicles etc. To calculate this index, a statistical procedure of Principal Components Analysis (PCA) was adopted to determine the weights for an index of asset variables. PCA is a technique for extracting from a set of variables those few orthogonal linear combinations of the variables that capture the common information most successfully. Intuitively, the first principal component of a set of variables is the linear index of all the variables that capture the largest amount of information that is common to all of the variables

The probabilities of health care services utilization were predicted by using a multiple fixed effects logistic regression panel model. Most of the variables included within the models are categorical, thus bivariate or multivariate representations were created.

In order to measure equity in health care utilization, horizontal inequity index (HIwv) was calculated according to the methodology developed by Wagstaff and van Doorslaer (2002). There were three indices to measure.

First, ill-health concentration index (Cn) is the index of expected or need utilization. Cn is calculated as follows:

$$2\sigma r^2(mi^* \ / \ m^*) = \gamma + \beta_1 \, Ri + \varepsilon i$$

Where mi* comes from:

$$mi^* = \alpha + \beta_x Xi + \gamma_y \, Yi + \varepsilon i$$

Xi and Yi are confounding variables to be standardized. In this research, sex and gender are control variables. Estimate coefficient β_1 is Cn.

Second, the concentration index (Cm) has been assumed to be a crude utilization or the index of actual utilization as described below:

$$2\sigma r^2(mi \ / \ m) = \gamma + \beta_1 \, Ri + \varepsilon i$$

Where Mi was the actual utilization.

m is the sample mean of Mi.

Ri is the fraction ranking of household wealth index score from 0 to 1.

σr^2 is the variance of Ri. The index Cm was the estimate coefficient β_1

Third, horizontal inequity (HIwv) is used for measuring equity in health care utilization.

$$Hiwv = Cm - Cn$$

The index values are between -1 and 1. If the index is positive, there is pro-rich inequity, and if the index is negative, there is pro-poor inequity. Equity will occur if the value of index is zero. All analyses were conducted using the software package STATA version 9.

Results

Table 1 presents the basic demographic and socioeconomic characteristics of the elderly sample. The proportion of female elderly was greater than male (female 56%, male 44%). The average age of the elderly in this study increased from 68.5 years in 2000 to 71.8 years in 2004. The proportion of young-old elderly (aged 60-69 years) declined, the proportion of mid-old (aged 70-79 years) and the oldest old (aged 80 years and over) increased.

The socioeconomic characteristics show that household wealth of the elderly increased, particularly the richest group. One-third of the elderly did not attend school and did not change during the years 2000 and 2004, while the proportion of those who have no occupation increased and the elderly who work in the agricultural and non-agricultural sector declined. Because most of the elderly of this study were retired persons, some lived for pleasure and did not worry about employment, while some received support from their children.

Table 1:   Percentages distribution of the elderly classified by basic demographic, socioeconomic characteristics and health factors in 2000 and 2004.

Variables	2000	2004
Demographic Factors		
- Sex		
Male	43.9	44.0
Female	56.1	56.0
- Age	(Mean age = 68.5)	(Mean age = 71.8)
60 – 69 years	68.1	45.9
70 – 79 years	26.6	43.6
80 years and over	5.2	10.5
Socio-economic Factors		
- Index of household assets (Wealth Index)		
1(lowest/poorest)	19.2	17.6
2	25.2	23.8
3	21.2	18.3
4	17.9	17.3
5(highest/richest)	16.5	23.0
- Education		
Have no education	34.1	34.5
Have education	65.9	65.5
- Occupation		
No occupation	54.8	60.5
Agriculture	33.8	29.6
Non-agriculture	11.4	9.9
- Area of residence		
Urban	13.6	14.2
Rural	86.4	85.8
- Health insurance card		
Do not have	30.7	14.9
Have	69.3	85.1
- Health Status		
Do not have Chronic illness	60.8	34.2
Have Chronic illness	39.2	65.8
- Health Utilization		
Do not use	76.3	56.2
Use	23.7	43.8

For health status, the proportion of the elderly who had chronic illness increased. As this study used the same sample, the probability of illness increased when they become older. The proportion of the elderly who had an insurance card (called "elderly card" in 2000, and "30 baht card" in 2004) increased about 16 percent (from 69% to 85%) after implementing "30 Baht for All Treatment" policy. This showed the insurance card encouraged the elderly to use more healthcare services (health utilization increased from 24% to 44%) at health center, community and provincial hospitals rather than using traditional treatment or self-treatment, because the elderly did not have to worry about healthcare expenditures.

From table 2, there were more female than male elderly who had chronic illness and utilization more healthcare services. When comparing between the 2000 and 2004, it was found that, a higher proportion of both male and female elderly who had chronic illness in 2004 and utilized more healthcare than in 2000. When the elderly got older, they had a greater chance to have chronic illness, and they used more healthcare services. The older age has no barrier to use healthcare services, partly because of having health insurance card.

In 2000, nearly half of the rich elderly had chronic Illness, and increased to more than two-third (66-67%) in 2004. Considering healthcare services utilization, the poorest utilized less healthcare services compared to the richer in both years. Chronic illness had a positive relationship with education in 2000, which means that the higher education the more chronic illness, while the elderly having different education had no different of chronic illness prevalence in 2004. The highest proportion of the elderly who had non-agricultural occupations had chronic illness when compared with those who had no job and agricultural jobs. In 2004, the highest proportion of the elderly who had no job had chronic illness when compared with the elderly who had agricultural and non-agricultural jobs.

Table 2:   Percent of elderly who have chronic illness and utilize health care classified by demographic, socioeconomic and health factors in 2000 and 2004.

Variables	2000		2004	
	chronic	utilization	chronic	utilization
Demographic Factors				
- Sex				
Male	34.9	22.7	55.1	41.4
Female	42.5	26.1	70.7	45.4
Total	**39.2**	**23.7**	**65.8**	**43.8**
- Age				
60 – 69 years	38.5	24.4	61.0	42.0
70 – 79 years	41.3	24.7	67.0	45.3
80 years and over	37.1	30.2	69.7	50.2
Total	**39.2**	**23.7**	**65.8**	**43.8**
Socio-economic Factors				
- Index of household assets (Wealth Index)				
1(lowest/poorest)	26.4	17.9	63.2	39.8
2	36.1	27.4	64.2	45.1
3	39.1	27.9	66.6	47.9
4	48.7	23.3	66.5	40.0
5(highest/richest)	48.2	25.0	68.3	45.3
Total	**39.2**	**23.7**	**65.8**	**43.8**
- Education				
Have no education	32.3	23.8	67.2	49.2
Have education	42.7	24.8	65.5	41.3
Total	**39.2**	**23.7**	**65.8**	**43.8**
- Occupation				
No occupation	42.6	25.0	72.8	45.1
Agriculture	31.1	23.2	53.1	43.1
Non-agriculture	46.6	27.1	61.4	39.3
Total	**39.2**	**23.7**	**65.8**	**43.8**
- Area of residence				
Urban	57.2	26.6	70.4	43.0
Rural	37.1	24.4	65.1	44.0
Total	**39.2**	**23.7**	**65.8**	**43.8**
- Health insurance card				
Do not have	40.6	24.0	64.5	15.2
Have	39.3	24.8	66.1	49.1
Total	**39.2**	**23.7**	**65.8**	**43.8**

Regarding healthcare services utilization, in 2000, the highest proportion of the elderly who had non-agricultural occupations utilized healthcare services. In 2004, the highest proportion of the elderly who had no job utilized healthcare services. The elderly living in urban area had higher chronic illness than those who live in rural area,

but there was no different of health care utilization among these two groups. Nearly double of the elderly who had an insurance card utilized healthcare compared to those who had not.

Factors Affected Health Care Service Utilization

The panel data analysis of factors that affected healthcare service utilization used fixed effects logistic regression analysis with two period panel data. The simple regression equation was likely to suffer from omitted factor problems. Although the multiple regressions was a solution to control the factors, it was hard to control every factor that affected the dependent variable. However, the two-year data set could be used to analyze and estimate causal effects and control unobserved variables. The time variable added into model to reflect the effect of time change as controlled variable. The advantages of panel data, by blending the inter-individual differences and intra-individual dynamics, over cross-sectional data were ; first, panel data or pooled cross-sectional data was to increase the sample size and contained more degrees of freedom and more sample variability than cross-sectional data, hence getting more precise estimators and test statistics with more power. Second, panel data could be very useful for evaluating the effectiveness of a certain policy (e.g.30 Baht policy), it would allow the possibility of observing the before - and affect-effects on individual of decriminalization as well as providing the possibility of isolating the effects of policy from other factors effecting the outcome (health utilization). Third, panel data could overcome the potential selection biases due to selective loss to follow-up and endogeneity of participation in a certain event or policy. (Hsiao, 2006).

Table 3:   Odds ratios of demographic, socio-economic, health insurance and time factors associated with healthcare service utilization.

Variables	Exp(B) Health services utilization
Demographic Factors	
- Sex (ref. = male)	
Female	**1.194***
- Age (ref. = 60 – 69 years)	
70 – 79 years	**1.142****
80 years and over	**1.157***

Table 3:   (Continued)

Variables	Exp(B) Health services utilization
Socio and Economic Factors	
- Index of household assets (ref. wealth index level/the poorest = 1)	
2	1.116
3	1.209
4	**1.388****
5(highest/richest)	**1.658*****
- Education (ref. = no education)	
Have education	0.951
- Occupation (ref. = no occupation)	
Agriculture	1.366
Non-agriculture	1.026
- Area of residence (ref. = urban)	
Rural	**1.402***
Health insurance	
- Elderly having 30 baht card (ref. = no 30 baht card)	**3.947*****
- Chronic illness (ref. = no chronic illness)	**1.563*****
- Year 2004(ref. = year 2000)	**1.184*****
- 2 log likelihood	**1552.098**

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Based on the result from the Fixed Effect Logistic Regression model, Table 3 shows that female elderly had 1.2 times more likely to utilize health care service than a male counterpart (odd ratio=1.19).The mid-old and oldest elderly had 1.1 and 1.2 times higher odds of healthcare services utilization than younger age elderly. The elderly living in the richest household (wealth index level 5) were 1.7 times more likely to utilize healthcare service than elderly living in the poorest household (wealth index level 1and odd ratio=1.658). The elderly who lived in rural areas were 1.4 times more likely to use healthcare services than those who lived in urban areas. Those who had an elderly card or 30 Baht card were nearly 4 times more likely to use healthcare services than elderly who did not have an elderly/30 Baht card (odd ratio=3.947), When the time change, the elderly had 1.2 times more likely to use healthcare services in 2004 than in 2000, when the 30 Baht policy was not implemented. The policy encouraged people to use healthcare services so it reduced the influence of socio-economic factors such as education and occupation because these two factors are not statistically significant.

Moreover, the rich and richest significantly used health care services more than the poorer.

Inequity in Healthcare Utilization

This part aimed to determine whether or not the Universal Healthcare Coverage policy lead to equity in healthcare services utilization. Because of limitations of data, this study used only elderly data in 2004. The indicators used in this study were the horizontal inequity index (HIwv) which represented horizontal inequity, ill-health concentration index (Cn) which represented expected utilization or need of healthcare, and the concentration index (Cm) which represented the actual healthcare utilization of the elderly.

Table 4 presents the actual health care service utilization, need of health care service, and health inequity index (HI). The index range between -1 to 1, if 0 means there is equity among the rich and the poor in health care service utilization. A negative value indicates there is inequity in health care service favoring the poorer, while a positive value indicates there is inequity in health care service favoring the richer.

The results show that the richer chronically ill elderly used relatively more healthcare services than the poorer (Cm=.0156), as the actual healthcare services utilization has a positive value. But the need of healthcare has a negative value, which means that the poorer chronically ill elderly needed healthcare services more than the richer (Cn=-.0016). Equity in healthcare services has a positive value, thus there is inequity in healthcare services utilization favoring the richer elderly (HIwv=.017).

Table 4:   Wealth related inequity classified by chronically ill and types of healthcare services provider.

	Actual (Cm)	needed (Cn)	HIwv
Chronically ill	.0156567*	-.0015893*	.0172302*
Types of healthcare services provider			
Health Center	.0130452*	-.0011896*	.0142347*
Community Hospital	.0108116	-.0004187	.0112826
Provincial Hospital	.0560346*	-.0163088*	.0663433**

** p<0.05, * p<0.10

When comparing the types of healthcare service provider, the results showed that the richer used relatively more health care service than the poorer for all types of providers, but the need of healthcare index shows that the poorer elderly needed more healthcare service, particularly at the provincial hospital (Cm=0.056, Cn= -.016). Thus in public healthcare services providers, there was inequity in healthcare services utilization favoring the richer or pro-rich elderly, the inequity index were positive, particularly at provincial hospitals (HIwv=.066). However, there is more equity in healthcare services utilization among the elderly at health centers and district hospitals (HIwv is close to zero).

Wealth related inequity was adjusted by age and sex, and classified by area of residence. Table 5 showed that the actual health care service utilization and needs in rural areas were closer to zero compared to the index in urban area and the health inequity index in rural areas was lower than in urban areas. This implied that the pro-rich of health care utilization in urban areas was likely higher than in rural areas (HIwv=.031 compared to.016, respectively).

Table 5:   Wealth related inequity classified by area of residence.

	Actual (Cm)	needed (Cn)	HIwv
Urban	.0267173*	-.0033874*	.0305456*
Rural	.0141749*	-.0018166*	.0159276*

** p<0.05, * p<0.10

Discussion

The purpose of the study was to investigate the effect of health care reform regarding the "30 Baht for All Treatment Policy" and the degree of equity in healthcare services utilization among the older population in Kanchanaburi DSS Site, Thailand during 2000 and 2004. The results show the effect of the 30 Baht for All Treatment Policy and support the existence of significant inequity to various degrees in healthcare services utilization. Therefore, there is evidence of violation of the principle "equal use for equal need" among different socioeconomic groups.

The factors affecting healthcare services utilization

In this study, the elderly of the sample group used healthcare services an average of 3.7 times per year. Using Fixed Effect Logistic Regression Analysis, the factors affecting healthcare services utilization during 2000 and 2004 were sex, age, and wealth index, area of residence, insurance card, chronic illness, and year. These findings could be explained as follows:

Sex: It was found that females were 1.2 times more likely to use healthcare services than males. It was also found that women paid more attention to their own health than men did, and were more likely to utilize healthcare services (*Pol and Thomas, 1992*). Siriboon (1992) found that the rates of medical consultation were higher among women than men. It is widely recognized that male elderly have a lower life expectancy than that of female elderly. Female elderly who live longer have more chance to have illness, thus, female elderly have to use healthcare services more than male elderly. In addition, the oldest elderly include more females than males. Thus, an elderly female's health status should be a concern for healthcare services providers.

Age: It was found that the older elderly were more likely to use healthcare services than the younger elderly. We know that the older elderly have more chance to have illness than the younger elderly. Thus, the results show that the elderly aged 70-79 years and those aged 80 years and over were 1.14 times and 1.16 times more likely to use healthcare services than the elderly aged 60-69 years. A study by Pol and Thomas (1992) found that when people get older, they will have more chronic illness, thus, they need more healthcare services.

Wealth index: A study by the United Nations (1999) found that income or economic status is an important factor in healthcare services utilization. It is difficult for the poor to access healthcare services because they may have the problem of the affordability of traveling and healthcare costs. In addition, the poor actually have more sickness than the rich. The results showed that the elderly who lived in the rich households could use healthcare services more easily than those who lived in the poor households, especially, the elderly who lived in the rich and richest households (wealth index level 4 and 5) were 1.4 and 1.7 times more likely to use healthcare services than those who lived in the poorest households (wealth index level 1). We know that some elderly have to depend on their family because they do not have income and need support for their living. Thus,

household economic status represented by household wealth index helped and supported healthcare services utilization such as healthcare expenditure, or travel cost.

Area of residence: This study found that the elderly who lived in rural areas were 1.4 times more likely to use healthcare services than the elderly who lived in urban areas. According to the structure of public health service facilities in Thailand, health centers are located in rural areas, therefore, the elderly in rural areas use health center as primary service utilization due to convenience and being nearby their home. While the elderly in urban areas used public or private hospitals as primary healthcare services. Chayovan Chayovan, Wongsith and Saengtienchai (1989) found that the elderly in urban areas were more likely to utilize modern health care services than those in rural areas, who often had problems with transportation. Some preferred over-the-counter drugs and traditional medicine because they did not want to bother their children, so they sought service from health centers only as the last resort. Chooprapawan (2000) found that the elderly in urban area preferred over-the-counter drugs, private clinics and government hospitals, respectively whereas those in rural area preferred over-the-counter drugs, health centers and government hospitals, respectively.

Insurance card: The elderly card and 30 Baht card represented having insurance in this study. An insurance card helps to reduce barriers to healthcare services utilization such as decrease healthcare costs, and easier access to medical facilities. This study found that the elderly who had an insurance card were 3.9 times more likely to use healthcare services than those who did not have a card.. In 2001, the Universal Healthcare Coverage Scheme was implemented to ensure that the Thai population would have access to standardized services and be treated equally. Healthcare expenses should not obstruct utilization of healthcare services. The Universal Healthcare Coverage Scheme ensures that the population can remain healthy and receive appropriate treatment for illness.

Chronic illness: The results show that the elderly who had chronic illness were 1.6 times more likely to use healthcare services than the elderly who did not have chronic illness. This was explained by the fact that most of the elderly in this study who used healthcare services had chronic illness, and chronic illness required continuous treatment. The elderly tended to go to see the doctor and get their medicine frequently.

Year: Year represents the situations before and after the 30 Baht for All Treatment policy implementation. The results show that the elderly in 2004 (after) were 1.2 times

more likely to use healthcare services than the elderly in 2000 (before). With the 30 Baht for All Treatment card, the elderly could see a doctor for healthcare without worrying about the expenses, and the elderly who were not covered by any insurance were ensured by the 30 Baht for All Treatment card that they would have insurance.

Horizontal inequity in healthcare services utilization

The horizontal inequity index is composed of 2 parts: the actual healthcare services utilization and the need for healthcare. After adjustment for sex, age, and need for healthcare service, the results show that actual healthcare services utilization of the chronically ill elderly was greater among the rich, while the need of healthcare was greater among the poor.

Considering the types of healthcare service providers, the results showed that when the level of healthcare provider was higher (e.g. provincial hospital), the inequity index also increased. Actual healthcare utilization became increasingly pro-rich, while the need of healthcare was increasingly pro-poor, which means that the horizontal inequity became even more pro-rich. When considering the area of residence, the results were similar and the inequity index was larger in urban areas. This means that the poorer and the elderly living in rural areas receive relatively more benefits from the lower level healthcare providers compared to the richer and those living in urban areas, while the richer and those living in urban areas receive more benefits from particular provincial hospitals. These results are consistent with the analysis using the 2004 Health and Welfare Survey which found that the poorer patients (both in-patient and out-patient) received more benefits from public health centers and district hospitals compared to the richer (International Health Policy Program, 2005).

The results provide a clear picture of the inequity in healthcare services utilization related to household economic status, after adjusting for sex, age, and need of healthcare. Most of the elderly may not be disadvantaged regarding healthcare services availability because there are health centers that cover all villages at the sub-district level. But when considering accessibility, it was found that the elderly still had barriers not only financial barriers (such as transportation cost) but also bureaucratic barriers for securing needed referrals to specialist at a higher level of healthcare facilities (Carney, 1981; Wallace and Villa, 2003).

The results show that there was greater pro-rich horizontal inequity at higher levels of healthcare services providers. Higher levels of healthcare services were actually found in urban areas, and most of the higher economic status elderly also lived in urban areas. Although some accessibility barriers (such as medical care costs) for the elderly were reduced by the Universal Healthcare Coverage Scheme, the area of residence was still an important barrier for the elderly of healthcare services use because most of the elderly lived in rural areas. We already know that the elderly in rural areas were obstructed from using higher levels of healthcare services by poor roads, long distances and high costs to the hospitals. In addition, most high level services, particularly at provincial hospitals were found in urban areas, so it was difficult for the elderly in rural areas reach the services. Moreover, personnel of the primary health centers perceived the illnesses of elderly as a natural consequence of aging, thus, they felt that it was not necessary to provide aggressive treatment or transfer them to a higher level of services. When comparing all age groups shown in appendix A and B, inequity in health care services utilization was not only found with the elderly but in all age groups. Insurance schemes could not alleviate inequity in health care services utilization with differences in economic status.

Limitation of the Study

There were several potential biases in the self-reported data that should be addressed. First, the respondents may not want to disclose some parts of the data such as the income data. Only 80 percent of the total sample disclosed income data, and only 50 percent of the elderly disclosed data about income. It was difficult to use the income data for analysis, thus assets was used to indicate household wealth of the elderly. Second, the Kanchanaburi project has no data to directly indicate health status. This study modified a question about chronic illness to indicate health status. However, there is also the limitation that health status can identify only good or bad health. For a good study, health status should have variance and indicate 5 levels: excellent, good, moderate, bad, and very bad.

This study could not classify the kind of healthcare utilization such as inpatient, outpatient, etc. The classification of healthcare use would help us to know about the degree of the sickness and affect the analysis of inequity in healthcare services utilization and the factors that affect healthcare services use.

The horizontal inequity index was composed of 2 parts including actual healthcare service utilization and need of healthcare. In this study, need of healthcare was measured by chronic illness, and healthcare services utilization was measured by times of healthcare use. Due to the limitations of the data, there were no data of times of healthcare use in 2000. Instead of comparing inequity in 2000 and 2004, this study used only the horizontal inequity index in 2004 to test equity, one of the principles of 30 Baht scheme.

Finally, as mentioned at the outset, this research is limited to the study of equity in healthcare services utilization, but not the access to care or quality of care. Therefore this study may neglect some important barriers to healthcare access and resulting inequity that are important from a policy perspective.

Conclusions

The unavoidable factors (sex, age, area of residence), and avoidable factor (economic status) affected healthcare services utilization. After the "30 baht for All Treatment policy" had been implemented, individuals with a "30 Baht Card" were significantly more likely to use healthcare services than non-card holders. Moreover, the socio-economic status is significantly associated with healthcare services utilization, and pro-rich and urban-rural inequity in healthcare utilization still exist. The study offers some support for the inequity does exist in that healthcare services utilization favoring those of higher economic status among the older population in the Kanchanaburi Demographic Surveillance System. The wealthier elderly were significantly more likely to use healthcare services. At higher levels of healthcare services, there was greater inequity in healthcare services utilization favoring the rich elderly. Despite this, the elderly used more healthcare services since the 30 Baht for All Treatment policy was implemented. Factors that shape the health care use for the Kanchanaburi DSS elders are grounded in not only the socio-economic status but also the restructuring of the healthcare system. Socioeconomic status (SES) forms the foundation for understanding healthcare use disparities including health outcomes (such as having chronic illness), process (such as accessibility to health services), and financing (such as the 30 Baht for All Treatment Policy that give free of charge for the elderly). SES may underlie all of major determinants of healthcare utilization including avail and access to care.

Acknowledgments

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Appendix A: Wealth related inequity of all age group classified by chronically ill and types of healthcare services provider.

	Actual (Cm)	needed (Cn)	HIwv
Chronically ill	.0158597*	-.0016046*	.0174643*
Types of healthcare services provider			
Health Center	.0142945*	-.0011533*	.0154478*
Community Hospital	.0111108	-.0004254	.0115362
Provincial Hospital	.0569004*	-.0163785*	.0732789**

** p<0.05, * p<0.10

Appendix B: Wealth related inequity of all age group classified by area of residence.

	Actual (Cm)	needed (Cn)	HIwv
Urban	.0287548*	-.0036221*	.0323769*
Rural	.0153475*	-.0018324*	.0171799*

** p<0.05, * p<0.10