Explanation of inequality in utilization of ambulatory care before and after universal health insurance in Thailand

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Accepted 1 March 2010

Thailand implemented a Universal Coverage Scheme (UCS) of national health insurance in April 2001 to finance equitable access to health care. This paper compares inequalities in health service use before and after the UCS, and analyses the trend and determinants of inequality.

The national Health and Welfare Surveys of 2001 and 2005 are used for this study. The concentration index for use of ambulatory care among the population reporting a recent illness is used as a measure of health inequality, decomposed into contributing demographic, socio-economic, geographic and health insurance determinants.

As a result of the UCS, the uninsured group fell from 24% in 2001 to 3% in 2005 and health service patterns changed. Use of public primary health care facilities such as health centres became more concentrated among the poor, while use of provincial/general hospitals became more concentrated among the better-off.

Decomposition analysis shows that the increasingly common use of health centres among the poor in 2005 was substantially associated with those with lower income, residence in the rural northeast and the introduction of the UCS. The increasing use of provincial/general hospitals and private clinics among the better-off in 2005 was substantially associated with the government and private employee insurance schemes.

Although the UCS scheme has achieved its objective in increasing insurance coverage and utilization of primary health services, our findings point to the need for future policies to focus on the quality of this primary care and equitable referrals to secondary and tertiary health facilities when required.

Keywords Health services research, health care utilization, health inequalities, universal health insurance, decomposition, Thailand
KEY MESSAGES

- After the Universal Coverage Scheme (UCS) was introduced in Thailand, the number of uninsured fell substantially and use of health centres and community hospitals increased among lower income groups.
- With the gatekeeper function of primary health care under the UCS, use of provincial and general hospitals is much lower, thus the timelines and quality of referrals from primary to tertiary health services are vital for equitable health services.
- The UCS has achieved its objectives of increasing insurance coverage and utilization of primary health services, but the challenges now are to minimize inequalities in choice of service providers and benefit packages across the main health insurance groups and among socio-economic and geographic sub-populations.

Introduction

Equitable health care systems are important because they can help to close gaps in health outcomes between rich and poor (Evans and Stoddart 1990; Baker and van der Gaag 1993; Leon and Walt 2001; Gwatkin 2002). Improving equity in access to health care is an important motivation for expanding health insurance coverage. This is so for middle-income Thailand and local researchers have a long-established interest in equity in health and health care as part of their development strategies (Na Songkla et al. 1997; Pannarunothai 2003; Faramnuoyphol 2005; Wibulpolprasert 2005; Seubman et al. 2007). But in spite of efforts to expand health insurance through various schemes since the 1970s, one-third of the Thai population were still not covered at the end of the millennium (Pramualratana and Wibulpolprasert 2002).

Thailand adopted a Universal Coverage Scheme (UCS) in April 2001 (Tangcharoensathien and Jongudomsuk 2004), finally extending health insurance to almost everyone. Here we describe the impact of the Thai UCS on use of ambulatory health care. We used data from the Thai national health and welfare surveys in 2001 and 2005, and analysed health service use, distribution and determinants before and after the introduction of the UCS.

Development of health insurance in Thailand

Initially, there were two national health insurance schemes: the Medical Welfare Scheme (MWS) of free care for the poor, initiated in 1975, and a subsidized Voluntary Health Card Scheme (VHCS) that began in 1983. Employment-related schemes were the Civil Servant Medical Benefit Scheme (CSMBS) established in 1978 for government and state enterprise employees and their dependants, and the Social Security Scheme (SSS), launched in 1990, which covers ambulatory care and hospitalization, as well as a wide range of high-cost care such as specialist treatments. Both CSMBS and SSS packages are comprehensive, including ambulatory care and hospitalization, as well as a wide range of high-cost care such as specialist treatments. Choice of provider under the CSMBS is almost unlimited and access to public hospitals is unrestricted. Choices of provider under the SSS include both public and private facilities. But despite these various schemes, Thai studies in the late 1990s documented substantial health service inequity, with the poor still tending to use health services less when ill and incurring higher expenses proportional to their incomes (Pannarunothai and Mills 1997; Pannarunothai and Rehnberg 1998).

The health insurance coverage rates from 1991 to 2005 are presented in Table 1. Those uninsured gradually decreased from 1991 to 1996 and declined sharply from 54.5% in 1996 to 29.8% in 2001, explained by the reduced income threshold for the MWS and by opt-in to the VHCS as a result of the 1997 Asian Financial Crisis.

The UCS began in April 2001 and by 2003 it covered 74.7% of the population, having picked up those insured by the MWS and the VHCS as well as almost all those previously uninsured. The UCS employs a capitation model to compensate institution providers, with initially either a fee exemption or a minimal co-payment of 30 Baht (~0.75 US$) per ambulatory visit or hospital admission (Prakongsai et al. 2002). The benefit package is comprehensive, covering ambulatory care and hospitalization, with an emphasis on health promotion and prevention.

Primary public health facilities are the main providers; about 80 private hospitals have also joined the system and registered around 3% of the beneficiaries. The UCS encourages registered members to use services provided by a contractor network, typically a district health system (health centres and community hospitals) where they live. Those who bypass the designated providers must make full payment for services received. Since implementation of UCS nationwide by April 2002, the UCS has reduced the difference in illness expenditure between the poorest and richest deciles, and increased demand for health services, particularly by those who were previously uninsured (Vasavid et al. 2005). The UCS has also reduced the catastrophic and impoverishing burden of hospital admission on lower income households (Somkotra and Lagrada 2009).

However, other studies have indicated that socioeconomic inequalities still persist, despite universal coverage being achieved (Lu and Hsiao 2003; Veugelers and Yip 2003; Schoen and Doty 2004; Suraratdecha et al. 2005; Yiengprugsawat et al. 2007).

Methods

Data sources

Data analysed here are from the 2001 and 2005 waves of the national Thai Health and Welfare Surveys (HWS). Children aged less than 15 years were excluded, leaving 168141 adults in 2001 and 52011 in 2005 in the analysis. The 2001 sample was considerably larger than that for 2005 because the National
Measuring socio-economic health inequalities

Adult-equivalent monthly income per capita is used as the socio-economic measure in this study, weighting each child aged under 15 as 0.5 of an adult. Total household income was estimated by summing monthly income and monthly income in-kind for all household members. We accounted for economic scale in any household with more than one member by raising the adult-equivalent household size to the power of 0.75. Determinants of inequity investigated included age, sex, income, education, work status, geographic residence and health insurance.

The concentration index (C) was used as our measure of socio-economic health inequalities (Wagstaff et al. 1999; Kakwani et al. 1997; van Doorslaer et al. 2006). C takes on values ranging between −1 and +1, with 0 indicating no inequity and negative (positive) values indicating concentration among the less well-off (better-off). The higher the absolute value of C, the greater the degree of concentration is in a negative or positive direction.

The concentration index can be written in various ways, one of the most cited being:

\[ C = \frac{2}{n \mu} \sum_{i=1}^{n} h_i R_{i\mu} - 1 \]  

(1)

\( h_i \) is the health outcome for the \( i \)th individual; \( \mu \) is the mean of \( h \); \( n \) is the number of persons; and if each of the \( n \) individuals is ranked according to their socioeconomic status, beginning with the most disadvantaged, then \( R_{i\mu} \) is their weighted fractional rank (O’Donnell et al. 2008). For binary health outcomes (e.g. use or non-use of a health service), the feasible bounds of the concentration index narrow as the prevalence rate rises. In order to compare observed concentration indices when outcome prevalences differ, Wagstaff (2005) suggested normalizing the concentration index by dividing by 1 minus the prevalence. That approach is also adopted here, and normalized concentration indices (\( C^* \)) are presented (Wagstaff 2005).

Decomposing inequalities observed into their determinants

The concentration index can be expressed as the sum of contributions of determinants (Wagstaff et al. 2003). Recent studies have applied the decomposition method to study equity in health services (Nguyen and Hakkinen 2004; van Doorslaer et al. 2004). Based on the linear additive relationship between the binary health outcome variable \( h \), \( C \) can be expressed as:

\[ C = \sum_{k} \left( \frac{p_k \bar{X}_k}{\mu} \right) C_k + \frac{GC}{\mu} \]  

(2)

The decomposition equation has two components. The first is the ‘explained’ component, in which \( p_k \) is the coefficient of each determinant calculated using generalized linear models with a binomial distribution and identity link on the binary health outcome, \( \bar{X}_k \) is the mean of each determinant, \( \mu \) is the mean of the binary health outcome and \( C_k \) is the concentration index for each determinant. This ‘explained’ component reveals the proportion of inequity attributable to each investigated determinant, and \( GC \) is the residual. We estimate the beta coefficients using a generalized linear model (GLM) with binomial distribution and identity link, which is the linear probability model. This specifies the outcome as a linear function of the covariates and parameters and so the decomposition (Equation 2) holds. The advantage over least squares is that it allows for the non-normality and heteroscedasticity of the error term arising from the binary nature of the outcome.

Results

Changes in reported recent illness during reference periods

Table 2 shows the age–sex distribution of the two samples and the prevalence of recent illness in age–sex groups. Overall, 16.2% of the 2001 HWS sample reported having been ill during the 2 weeks prior to interview, while 19.6% of the 2005 sample reported being ill during the previous month. Gradients by age and sex are clear, with older groups and females compared with males of a given age reporting more illness (e.g. in 2001, 6.7%
in the youngest male group compared with 31.2% in the oldest male group; 8.5% in the youngest female group compared with 38.1% in the oldest female group). Higher proportions reporting recent illness in 2005 compared with 2001 probably reflect the longer reference period (a month compared with 2 weeks) at the later date.

**Equity of health service use for reported recent illness**

Table 3 presents, for those defined as ‘recently ill’, the prevalence and poor–rich distribution of use of different types of health services. Among those who reported recent illness during the two reference periods, 9.2% in 2001 and 9.6% in 2005 did not seek treatment. More than half of these people gave the minor nature of their illness as a reason for not seeking treatment, and they had a slight tendency to be relatively poor ($C = -0.088$ in 2001, $C = -0.066$ in 2005; or $C^n = -0.097$ in 2001, $C^n = -0.073$ in 2005). Pharmacies were the most common health service used, although their use had declined slightly by 2005 (from 24.5 to 22.1%), and they were patronized disproportionately more frequently by those who were economically better-off ($C = 0.096$ in 2001, $C = 0.103$ in 2005; or $C^n = 0.127$ in 2001, $C^n = 0.132$ in 2005).

A significant change in the pattern of health service use was found in respect of health centres. Their use increased from 15.6% in 2001 to 17.9% in 2005, and with the UCS promoting them as primary health care gatekeepers, a strong tendency to be resorted to by the poor intensified ($C = -0.196$ in 2001, $C = -0.224$ in 2005; or $C^n = -0.232$ in 2001, $C^n = -0.273$ in 2005). According to the nature of the data, people referred to higher level services were deemed to have used those services, not health centres, suggesting that the use of health centres probably increased by more than the figures indicate. Use of community hospitals also increased, from 14.1% to 18.9%, but the extent to which they were accessed primarily by the poor declined slightly ($C = -0.190$ in 2001, $C = -0.170$ in 2005; or $C^n = -0.221$ in 2001, $C^n = -0.210$ in 2005).

Because the UCS specified that primary health care facilities should be the first points of contact with the health system, the use of tertiary facilities such as provincial or general hospitals fell substantially, from 22.1% in 2001 to 12.1% in 2005. The fact that it was poorer people who were mainly responsible for this trend (being forced to attend lower level services in the first instance) is reflected in the finding that provincial/general hospitals were increasingly used by those who were economically better-off ($C = 0.035$ in 2001, $C = 0.134$ in 2005; or $C^n = 0.045$ in 2001, $C^n = 0.152$ in 2005). The use of private clinics rose, from 10.4% in 2001 to 14.3% in 2005, and concentration of usage among the better-off declined slightly ($C = 0.129$ in 2001, $C = 0.109$ in 2005; or $C^n = -0.144$ in 2001, $C^n = 0.127$ in 2005). Private hospitals continued to be used by a small minority who were markedly better-off than those using other services.

**Decomposing pro-poor inequity: health centres and community hospitals**

Percentages shown in Table 4 indicate the proportional contributions of pro-poor determinants to the corresponding total explained negative concentration indices. They are percentages

| Health services | 2001 | 2005 |
|-----------------|------|------|
|                 | % use | Concentration index | Normalized concentration index ($C^n$) | % use | Concentration index | Normalized concentration index ($C^n$) |
| No health services useda | 9.2 | -0.088 | -0.097 | 9.6 | -0.066 | -0.073 |
| Pharmacies | 24.5 | 0.096 | 0.127 | 22.1 | 0.103 | 0.132 |
| Health centres | 15.6 | -0.196 | -0.232 | 17.9 | -0.224 | -0.273 |
| Community hospitals | 14.1 | -0.190 | -0.221 | 18.9 | -0.170 | -0.210 |
| Provincial hospitals | 22.1 | 0.035 | 0.045 | 12.1 | 0.134 | 0.152 |
| Private clinics | 10.4 | 0.129 | 0.144 | 14.3 | 0.109 | 0.127 |
| Private hospitals | 4.2 | 0.491 | 0.513 | 5.0 | 0.484 | 0.509 |

**Table 3** Concentration indices showing poor–rich distribution in the use of health services for those reporting recent illness: Thailand Health and Welfare Surveys 2001 and 2005

Source: Health and Welfare Surveys 2001 and 2005, National Statistical Office, Thailand.

Note: *Traditional/herbal medicines were included under ‘No health services used’.

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[Note: Source and Table references are included for clarity in the natural text.]
### Table 4  Changes in determinants of concentration indices for users of health centres and community hospitals for recent illness between 2001 and 2005

| Source | Health centres | Community hospitals |
|--------|----------------|----------------------|
|        | 2001 | 2005          | 2001 | 2005          |
|        | CCI  | %     | CCI  | %     |
| Concentration index (CCI) | -0.196 | -0.224 | -0.190 | -0.170 |
| **Demographic characteristics** | | | | |
| Males, 30–44 years | -0.002 | 0.7 | 0.000 | 0.1 |
| Males, 45–59 years | -0.002 | 0.8 | 0.000 | 0.0 |
| Males, 60+ years | 0.005 | 0.003 | -0.003 | 1.2 |
| Females, 15–29 years | 0.002 | 0.004 | 0.000 | 0.2 |
| Females, 30–44 years | 0.001 | 0.006 | 0.001 | 0.000 |
| Females, 45–59 years | 0.000 | 0.000 | 0.000 | 0.000 |
| Females, 60+ years | 0.004 | -0.001 | 0.4 | -0.004 | 1.6 |
| **Age-sex total** | 0.009 | 1.5 | 0.012 | 0.5 |
| **Socio-economic characteristics** | | | | |
| Income quintile 1 | -0.045 | 19.1 | -0.076 | 23.7 |
| Income quintile 2 | -0.021 | 8.9 | -0.031 | 9.7 |
| Income quintile 3 | 0.000 | 0.000 | 0.000 | 0.000 |
| Income quintile 4 | 0.003 | 0.009 | 0.016 | 0.022 |
| **Income total** | -0.063 | 28.0 | -0.098 | 33.4 |
| Education: no formal | -0.005 | 1.9 | -0.011 | 3.4 |
| Education: primary level | -0.006 | 2.4 | -0.025 | 7.8 |
| Education: secondary level | 0.021 | 0.010 | 0.004 | 0.003 |
| **Education total** | -0.010 | 4.3 | -0.026 | 11.2 |
| Work: agriculture and fishery | -0.020 | 8.5 | -0.009 | 3.0 |
| Work: elementary occupation | 0.001 | 0.000 | 0.000 | 0.000 |
| Not in workforce | 0.005 | 0.016 | -0.006 | 2.7 |
| **Economic activity total** | -0.014 | 8.5 | 0.007 | 3.0 |
| **Socio-economic total** | -0.086 | 40.9 | -0.117 | 47.5 |
| **Geographic characteristics** | | | | |
| Bangkok | 0.000 | -0.002 | 0.5 | n.a. |
| Rural Central | 0.009 | 0.009 | 0.004 | 0.008 |
| Urban North | 0.000 | 0.000 | 0.001 | 0.002 |
| Rural North | -0.014 | 5.9 | -0.017 | 5.2 |
| Urban Northeast | 0.000 | 0.1 | -0.001 | 0.2 |
| Rural Northeast | -0.043 | 18.1 | -0.063 | 19.7 |
| Urban South | -0.001 | 0.5 | 0.000 | 0.1 |
| Rural South | -0.001 | 0.3 | 0.002 | -0.001 | 0.2 |
| **Region total** | -0.048 | 24.9 | -0.071 | 25.7 |
| **Health insurance characteristics** | | | | |
| No health insurance | 0.006 | 0.000 | 0.1 | -0.009 | 4.2 |
| MWS (2001) | -0.058 | 24.8 | n.a. | -0.021 | 9.7 |
| UCS with fee exemption (2005) | n.a. | -0.077 | 24.0 | n.a. | -0.035 | 14.9 |
| VHCS (2001) | -0.018 | 7.5 | n.a. | -0.009 | 4.0 |
| UCS with co-payment (2005) | n.a. | -0.007 | 2.2 | n.a. | -0.004 | 1.8 |
| CSMBS | -0.001 | 0.3 | 0.009 | 0.005 | 0.004 |
| Private insurance | 0.000 | 0.1 | 0.001 | 0.000 | 0.000 |
| **Health insurance total** | -0.071 | 32.6 | -0.074 | 26.3 |
| **TOTAL** | -0.197 | 100.0 | -0.251 | 100.0 |
| **Residuals (unexplained)** | 0.001 | 0.026 | -0.007 | 0.006 |

**Source:** Health and Welfare Surveys 2001 and 2005, National Statistical Office, Thailand.

**Notes:** Percentages shown are proportional contributions to the total explained negative concentration index.

Reference groups: males aged 15–29 years, income quintile 5, higher level education, professionals or others, residing in urban Central region, eligible for Social Security Scheme.

MWS = Medical Welfare Scheme; UCS = Universal Coverage Scheme; VHCS = Voluntary Health Card Scheme; CSMBS = Civil Servant Medical Benefit Scheme.
of the sums of all negative contributions to concentration index (CCI) values, not percentages of the negative ‘total explained’ values. The former exceed the latter by amounts necessary to offset the sums of positive CCI values. The method of calculation used effectively assumes that negative CCI values contribute pro rata to this offsetting process.

Inequity in the use of health centres and community hospitals in 2001 and 2005 is compared and decomposed according to determinate categories (Table 4). As regards pro-poor use of health centres and community hospitals, socio-economic determinants were the major contributors at both dates (40.9% in 2001 and 47.5% in 2005 for health centres; 50.5% in 2001 and 45.0% in 2005 for community hospitals). Those in the two bottom income quintiles contributed increasingly over time to the unequal use of health centres by the poor (28.0% in 2001; 37.9% in 2005), but explained less of the pro-poor use of community hospitals (33.4% in 2001; and 30.0% in 2005). This probably reflects the requirement under the UCS that persons covered by that scheme first register with a health centre and, except in emergency cases, visit a community hospital only after being referred there.

Among the geographic determinant categories, the contribution of residence in the rural Northeast was, for both health centres and community hospitals, in both years, easily the most prominent one (18.1% in 2001 and 19.7% in 2005 for health centres; 26.3% in 2001 and 25.5% in 2005 for community hospitals). This probably partly reflects the relative prominence of primary health care facilities.

Other important contributions to pro-poor inequalities were made by health insurance characteristics (i.e. 32.6% in 2001 and 26.3% in 2005 for health centres; 18.0% in 2001 and 17.0% in 2005 for community hospitals). It is interesting to note that in both 2001 and 2005, the health insurance schemes targeting the poorest Thais were the main contributors here.

In 2001, coverage by the MWS contributed 24.8% to the concentration of use of health centres among the poor. In 2005 the roughly equivalent coverage category was the UCS with fee exemption. Its clients were also particularly likely to be poor and to use health centres, and contributed a very similar 24.0% to the concentration of health centre use among the poor.

The MWS and UCS with fee exemption were also the main health insurance contributors to the concentration of community hospital use among the poor at the two dates. The rise from an MWS contribution of 9.7% in 2001 to a UCS with fee exemption contribution of 14.9% in 2005, in conjunction with the virtual disappearance of the ‘no health insurance’ category, meant that the overall health insurance contribution to pro-poor use of community hospitals was in 2005 more concentrated on a single insurance category.

**Decomposing pro-rich inequity: general hospitals, pharmacies and private clinics**

Use of provincial and general hospitals, pharmacies and private clinics was concentrated among the better-off in both 2001 and 2005 (Table 5). We do not present decomposition results for private hospitals because private hospitals were used by only a small proportion of the population (≤5%); patterns (unsurprisingly) were similar to private clinics which were used by a much higher proportion of the population. In contrast to Table 4, percentages shown in Table 5 indicate proportional contributions of pro-rich determinants to the corresponding total explained positive concentration indices.

The pro-rich use of provincial/general hospitals was, as indicated above, quite marginal in 2001, but the concentration index had almost quadrupled by 2005. This is likely to be a function of the UCS mandating referral of its members to such facilities from primary health facilities, thus eliminating some ‘unnecessary’ use by poorer people. While socio-economic characteristics were the largest contributors to the explained portions of the concentration indices in both years (38.9% in 2001; 45.8% in 2005), an important difference in the overall net contributions of those characteristics at the two dates should be noted.

The greater importance of income quintile 5 in 2005 than in 2001 could also be part of this phenomenon. Focusing on income quintiles, it is intriguing that quintile 4 should be more important at both dates, but especially in 2001, than quintile 5. This could indicate that pro-rich use of provincial/general hospitals, albeit quite modest in 2001, is to some extent focused on those whose incomes are above average, but not so high as to enable them to make use of private hospitals. The finding that persons not in the workforce, at both dates, make major offsetting contributions to the overall tendencies for provincial/general hospital use to be concentrated among the better-off (CCI contributions of −0.033 in 2001, −0.040 in 2005) probably reflects the presence in this group of people prevented from working by serious ill health or disability, which requires treatment at facilities above those focused on primary health care. Such people tend to be poor, not ‘better-off’.

The next largest contributions to pro-rich use of provincial/general hospitals were by the geographic determinant, but its contribution in 2005 (20.9%) was distinctly below that in 2001 (31.9%). The main decline was in the largest constituent effect, that of residence in Bangkok (from 17.9% in 2001 to 9.8% in 2005). People are naturally more likely to use general hospitals when they live close to them, and such health facilities are heavily concentrated in and around Bangkok (urban Central region). The decline in the importance of residence in Bangkok might suggest that proximity to provincial/general hospitals has become less important in determining who uses them.

With health insurance, the CSMBS for government employees, retirees and their eligible dependants was the key, this scheme providing a level of access for the better-off to tertiary public facilities (29.0% contribution to explained portion of concentration index in 2001; 21.9% in 2005). However, the SSS, which was unimportant in 2001, rose to make an 11.3% contribution in 2005. This may have been related to the extension of eligibility for coverage by the SSS to businesses with only one worker. Under the UCS, direct access to provincial/general hospitals was more closely tied to coverage by schemes like the CSMBS and SSS.

For pharmacies, levels of pro-rich use in 2001 and 2005 were similar. The principal contributions to this usage were made by the cluster of socio-economic determinants (49.1% in 2001; 50.1% in 2005). The main contributing determinant categories differ at the two dates in an interesting way. At both dates high income was a factor (quintile 5: 10.9% in 2001; 13.3% in 2005).
Table 5 Changes in determinants of concentration index for users of provincial/general hospitals, pharmacies and private clinics for recent illness between 2001 and 2005

| Demographic characteristics          | Concentration index (CCI) | Sources |
|--------------------------------------|---------------------------|---------|
| Males, 15—29 years                  | -0.002 -0.004             | VHCS (2001) n.a. |
| Males, 30—44 years                  | -0.002 -0.001             | VHCS (2001) n.a. |
| Males, 45—59 years                  | 0.000 0.2 0.000           | VHCS (2001) n.a. |
| Males, 60+ years                    | -0.001 -0.006             | VHCS (2001) n.a. |
| Females, 15—29 years                | -0.001 -0.003             | VHCS (2001) n.a. |
| Females, 30—44 years                | -0.002 -0.003             | VHCS (2001) n.a. |
| Females, 45—59 years                | 0.000 0.000               | VHCS (2001) n.a. |
| Age-sex total                        | -0.008 0.2 -0.017 0.0     | VHCS (2001) n.a. |

| Socioeconomic characteristics     |                             | Reference groups: females aged 60 and above, income quintile 1, no formal education, agriculture and fishery, residing in rural Northeast, eligible for MWS in 2001 or UCS with fee exemption in 2005. |
|------------------------------------|-----------------------------|-------------------------------------------------|
| Income quintile 2                 | -0.003 -0.015               | Sources: Health and Welfare Surveys 2001 and 2005, National Statistical Office, Thailand. |
| Income quintile 3                 | 0.000 0.000                 | Note: Percentages shown are proportional contributions to the total explained positive concentration index. |
| Income quintile 4                 | 0.012 11.3 029 11.4        | Reference groups: females aged 60 and above, income quintile 1, no formal education, agriculture and fishery, residing in rural Northeast, eligible for MWS in 2001 or UCS with fee exemption in 2005. |
| Income quintile 5                 | -0.003 022 8.6             | Sources: Health and Welfare Surveys 2001 and 2005, National Statistical Office, Thailand. |
| Income total                       | 0.006 11.3 036 20.0         | Note: Percentages shown are proportional contributions to the total explained positive concentration index. |
| Education: primary level          | -0.011 -0.020               | Reference groups: females aged 60 and above, income quintile 1, no formal education, agriculture and fishery, residing in rural Northeast, eligible for MWS in 2001 or UCS with fee exemption in 2005. |
| Education: secondary level        | 0.003 2.6 012 4.8           | Sources: Health and Welfare Surveys 2001 and 2005, National Statistical Office, Thailand. |
| Education: higher level           | 0.001 1.2 038 14.8          | Note: Percentages shown are proportional contributions to the total explained positive concentration index. |
| Education total                   | -0.007 3.8 030 19.6         | Reference groups: females aged 60 and above, income quintile 1, no formal education, agriculture and fishery, residing in rural Northeast, eligible for MWS in 2001 or UCS with fee exemption in 2005. |
| Elementary occupation             | 0.002 2.1 000               | Sources: Health and Welfare Surveys 2001 and 2005, National Statistical Office, Thailand. |
| Professionals and others          | 0.023 21.7 016 6.3          | Note: Percentages shown are proportional contributions to the total explained positive concentration index. |
| Not in workforce                  | -0.033 -0.040               | Reference groups: females aged 60 and above, income quintile 1, no formal education, agriculture and fishery, residing in rural Northeast, eligible for MWS in 2001 or UCS with fee exemption in 2005. |
| Economic activity total           | -0.008 23.8 -0.024 6.3     | Sources: Health and Welfare Surveys 2001 and 2005, National Statistical Office, Thailand. |
| Socio-economic total              | -0.008 38.9 043 45.8        | Note: Percentages shown are proportional contributions to the total explained positive concentration index. |

| Geographic characteristics       |                             | Reference groups: females aged 60 and above, income quintile 1, no formal education, agriculture and fishery, residing in rural Northeast, eligible for MWS in 2001 or UCS with fee exemption in 2005. |
|----------------------------------|-----------------------------|-------------------------------------------------|
| Bangkok                          | 0.019 17.9 025 9.8          | Sources: Health and Welfare Surveys 2001 and 2005, National Statistical Office, Thailand. |
| Urban Central                    | 0.008 7.8 015 5.9           | Note: Percentages shown are proportional contributions to the total explained positive concentration index. |
| Rural Central                    | 0.004 3.3 002 0.7           | Reference groups: females aged 60 and above, income quintile 1, no formal education, agriculture and fishery, residing in rural Northeast, eligible for MWS in 2001 or UCS with fee exemption in 2005. |
| Urban North                      | 0.001 0.5 002 0.7           | Sources: Health and Welfare Surveys 2001 and 2005, National Statistical Office, Thailand. |
| Rural North                      | 0.000 0.002 1.0             | Note: Percentages shown are proportional contributions to the total explained positive concentration index. |
| Urban Northeast                  | 0.000 0.1 002 0.9           | Reference groups: females aged 60 and above, income quintile 1, no formal education, agriculture and fishery, residing in rural Northeast, eligible for MWS in 2001 or UCS with fee exemption in 2005. |
| Urban South                      | 0.002 2.1 005 2.0           | Sources: Health and Welfare Surveys 2001 and 2005, National Statistical Office, Thailand. |
| Rural South                      | 0.000 0.000                 | Note: Percentages shown are proportional contributions to the total explained positive concentration index. |
| Region total                     | 0.033 31.9 053 20.9         | Reference groups: females aged 60 and above, income quintile 1, no formal education, agriculture and fishery, residing in rural Northeast, eligible for MWS in 2001 or UCS with fee exemption in 2005. |

| Health insurance                 |                             | Reference groups: females aged 60 and above, income quintile 1, no formal education, agriculture and fishery, residing in rural Northeast, eligible for MWS in 2001 or UCS with fee exemption in 2005. |
|----------------------------------|-----------------------------|-------------------------------------------------|
| No health insurance              | -0.005 0.000                | Sources: Health and Welfare Surveys 2001 and 2005, National Statistical Office, Thailand. |
| VHCS (2001)                      | -0.006 0.004                | Note: Percentages shown are proportional contributions to the total explained positive concentration index. |
| UCS with co-payment (2005)       | n.a. 0.004 3.6 n.a.         | Reference groups: females aged 60 and above, income quintile 1, no formal education, agriculture and fishery, residing in rural Northeast, eligible for MWS in 2001 or UCS with fee exemption in 2005. |
| CSMBMS                           | 0.031 29.0 056 21.9         | Sources: Health and Welfare Surveys 2001 and 2005, National Statistical Office, Thailand. |
| SSS                              | -0.002 0.029 11.3           | Note: Percentages shown are proportional contributions to the total explained positive concentration index. |
| Private insurance                | -0.001 -0.001               | Reference groups: females aged 60 and above, income quintile 1, no formal education, agriculture and fishery, residing in rural Northeast, eligible for MWS in 2001 or UCS with fee exemption in 2005. |
| Health insurance total           | 0.018 29.0 079 33.2         | Sources: Health and Welfare Surveys 2001 and 2005, National Statistical Office, Thailand. |
| TOTAL                            | 0.034 100.0 158 100.0       | Note: Percentages shown are proportional contributions to the total explained positive concentration index. |
| Residuals (unexplained)          | 0.001 -0.024 0.001 0.004    | Reference groups: females aged 60 and above, income quintile 1, no formal education, agriculture and fishery, residing in rural Northeast, eligible for MWS in 2001 or UCS with fee exemption in 2005. |
Professional employment was also a factor, but more strongly so in 2005 (25.6%) than in 2001 (14.3%). In 2001, being not in the workforce was also a factor (12.4%), but it had become unimportant by 2005 (2.2%). These results suggest that in 2001, use of pharmacies tended to involve both higher-income professionals able to self-diagnose and self-prescribe for minor ailments and, perhaps, the likes of housewives and students, who were without insurance coverage and for whom pharmacies were a relatively cheap available option. Under the UCS, however, the latter group enjoyed improved access to other types of health facility.

The next largest contribution to pro-rich pharmacy usage at both dates was by geographic determinant, with residence in Bangkok and to a lesser extent both the urban and rural components of the surrounding Central region dominating (9.6% in 2001 and 22.4% in 2005 for Bangkok). These are the most developed parts of the country, with pharmacies readily accessible and people confident in using them. It seems entirely plausible that those responsible for the ‘no health insurance’ contribution in 2001 were largely Bangkok residents who were relatively well off, prepared to pay for health care if and when the need arose, and had ready access to pharmacies by virtue of their residential location.

In the case of use of private clinics, a positive concentration index in 2001 had declined slightly by 2005. Socio-economic and health insurance determinants were clearly the main sources of these concentration indices. Socio-economic determinants accounted for two-thirds of the explained portions of each of them (66.0% in 2001 and 69.8% in 2005), with being in the top income quintile making by far the largest individual contribution (41.8% in 2001 and 40.3% in 2005) followed by having better than secondary education (12.0% in 2001 and 11.9% in 2005). In 2001, health insurance contributed 29.3% of the explained portion of the concentration index, with having no health insurance (15.3%) and having SSS coverage (11.2%) the main component contributors. Once again, those with no health insurance seemingly included some people who were relatively well off and prepared to pay for private care as the need arose. By 2005 very few people were without coverage at all, so this had ceased to be a factor (0.7%) and SSS coverage was the key component contributor (16.3%). The main explanation for the importance of SSS coverage at both dates would appear to be the fact that that scheme (unlike the CSMBS) explicitly provides for beneficiaries to access private health care.

**Discussion**

With the establishment of the UCS, Thai citizens are now covered by three main public health insurance schemes: the CSMBS for employees of the government and state enterprises, the SSS for formal private sector employees and the UCS for the rest of the population. Health service utilization has shifted from tertiary towards primary health care facilities, an intended impact of the UCS.

Decomposition of inequalities in the use of five types of health facility for recent illness in 2001 and 2005 yielded some interesting results. While socio-economic factors were the main reasons for pro-poor use of health centres and community hospitals at both dates, the UCS, with its requirement of registering first with a health centre, saw an increase in the importance of being in the two lowest income quintiles in accounting for the pro-poor use of such facilities.

There was little change in the geographic importance to pro-poor use of these facilities of residence in the rural Northeast, undoubtedly because such facilities dominate the region’s health infrastructure. There was similarly little change in the importance of health insurance schemes targeting the poorest Thais; the MWS in 2001 and the UCS with fee exemption in 2005. In the case of pro-poor use of community hospitals, however, the reduction of the ‘no health insurance’ group under the UCS meant that, by 2005, what health insurance contribution there was to this inequality was more strongly focused on a single insurance category: the UCS with fee exemption.

In evaluating change in the determinants of pro-rich use of provincial and general hospitals between 2001 and 2005, it is important to recognize that in 2001 the concentration index being decomposed was only marginally positive. Although socio-economic factors made the largest contributions to the explained portions of both concentration indices, in 2001 those contributions were in fact offset by negative contributions of other socio-economic factors, especially one associated with being not in the workforce. The fact that being not in the workforce at both dates was a major factor in offsetting the pro-rich use of provincial/general hospitals almost certainly is a function of the role of these hospitals in catering to the poor with serious diseases or disabilities. The key findings in respect of provincial/general hospitals, however, are the major decline in use for recent illness and the increasingly pro-rich character of that residual usage as poorer, UCS-covered people were required to first seek primary health care.

Use of pharmacies for recent illness became slightly more pro-rich under the UCS. This was possibly because the new scheme diverted to other health services some of the poorer people who were without health insurance prior to the UCS. Certainly by 2005 those using pharmacies, who tended at both dates to be higher-income people, had become decisively more strongly professionally employed and Bangkok-resident. The impression gained is that pharmacies became less a service to which uninsured people resorted when minor illnesses struck and more strongly one used by well-educated urbanites who had the knowledge and confidence to self-diagnose and self-prescribe for minor health problems.

Finally, resort to private clinics for health care had become slightly less pro-rich over time. This may have been largely due to the extension of SSS coverage to smaller private sector enterprises. Socio-economic factors, especially being in the top income quintile, were the major determinant categories underpinning pro-rich use of private clinics at both dates.

The sizable private clinic contribution to health care use in 2001 was split between those with no insurance (some wealthy people who could afford to pay) and those with SSS coverage which provided a benefit package offering direct access to private clinics. By 2005 the UCS had eliminated being uninsured as a factor, leaving expanded SSS coverage as the lone health insurance determinant of consequence of the pro-rich use of private clinics.
Limitations

We noted differences in illness recall periods between 2001 and 2005, however, comparative patterns in ambulatory care are consistent with changes which could reasonably be attributed to the introduction of the UCS after 2001. The data on ambulatory care outcomes and socio-economic determinants were collected simultaneously. Future studies could use longitudinal cohort data to monitor the changes in socio-economic status and their link to changes in inequity in health service use as the UCS progresses. Also, this study has used binary outcome variables, thus restricting the range of measures of health services. Other variables such as the number of visits to public and/or private providers, quality of services and distance from health service providers would also be useful in developing countries (Gerdtham and Trivedi 2001; Jones and O’Donnell 2002). Future research could focus on differences in the choice of private/public provider under different schemes (CSMBS, SSS and UCS) and impacts on inequalities in health service use.

Conclusions

The findings reported here add to other studies on inequalities in health care in countries with a national health insurance system. They concur with a systematic review of health systems, universal health insurance and equity in the use of curative services which found a pro-rich bias in the use of specialist hospital services and reasonably equitable access to primary health care by different socio-economic groups (Hanratty et al. 2007).

Overall, a study by the National Health Security Office and ABAC-KSC Internet Poll Research Centre, which conducted surveys on perspectives of the scheme among UCS members, shows that more than 80% reported satisfaction with health-care personnel, prescribed medicines and medical equipment. The respondents were asked to appraise the strengths of and to suggest improvements to the UCS. The strengths of the scheme were identified as, for example, an increase in benefit with reduced health expenditure to households, scheme benefits for the poor, good services and access to designated providers. Improvements were also suggested, for example, quality of medicines, choices for designated providers and increasing the number of providers (National Health Security Office and ABAC-KSC Internet Poll Research Center 2004; Vasavid et al. 2004).

The decomposition results here are also consistent with findings of a recent qualitative analysis on stakeholders’ views on the priority health equity issues, which was based on a survey of senior administrators of the Thai Ministry of Public Health. The survey showed that economic disparities and urban-rural differences were perceived as the most important determinants of inequities and were unlikely to be resolved. Inequity due to health insurance coverage by the three major schemes (CSMBS, SSS and UCS) was perceived as the most important and most feasible issue to be resolved. Most respondents perceived the redistribution of health resources as less easily achievable (Tangcharoensathien et al. 2007).

Another study using the Thai household Socioeconomic Surveys of 2002 and 2004 found that use of services not covered by the UCS benefit packages and bypassing designated providers (prohibited under the capitation contract model without proper referrals) are major causes of catastrophic expenditure and impoverishment (Limwattananon et al. 2007).

The findings in this present study call for future policy to enhance equity further by strengthening the quality of primary health care services (WHO 2008), including ensuring adequate referral of the poor to secondary or tertiary care when required. The national health surveys will be particularly useful in monitoring changes in the use of health services as UCS progresses.

Acknowledgements

We would like to thank the Thai National Statistical Office for the Health and Welfare Surveys.

Funding

The study was conducted under the auspices of the overarching project ‘The Thai Health-Risk Transition: a National Cohort Study’, funded by the Wellcome Trust UK (GR071587MA) and the Australian National Health and Medical Research Council (268055).

Conflict of interest

None declared.

References

Baker JL, van der Gaag J. 1993. Equity in health care and health care financing: evidence from five developing countries. In: van Doorslaer E, Wagstaff A, Rutten F (eds). Equity in the Finance and Delivery of Health Care: An International Perspective. New York: Oxford University Press.

Evans RG, Stoddart GL. 1990. Producing health, consuming health care. Social Science and Medicine 31: 1347–63.

Faramruophol P. 2005. Multilevel analysis for measuring inequality in health. Presented at the conference ‘Health equity: lessons learnt from universal health coverage’. Miracle Grand Hotel, Bangkok, Thailand.

Gerdtham UG, Trivedi PK. 2001. Equity in Swedish health care reconsidered: new results based on the finite mixture model. Health Economics 10: 565–72.

Gwatkin DR. 2002. Reducing health inequalities in developing countries. In: Detels R, Tanaka H, Beaglehole R, McEwen J (eds). Oxford Textbook of Public Health. Oxford: Oxford University Press.

Hanratty B, Zhang T, Whitehead M. 2007. How close have universal health systems come to achieving equity in use of curative services? A systematic review. International Journal of Health Services 37: 89–109.

Jones A, O’Donnell O. 2002. Econometric Analysis of Health Data. Chichester: John Wiley & Sons Ltd.

Kakwani N, Wagstaff A, van Doorslaer E. 1997. Socioeconomic inequalities in health: measurement, computation, and statistical inference. Journal of Econometrics 77: 87–103.
Leon DA, Walt G. 2001. Poverty, Inequality and Health: An International Perspective. New York: Oxford University Press.

Limwattananon S, Tangcharoensathien V, Prakongsai P. 2007. Catastrophic and poverty impacts of health payments: results from national household surveys in Thailand. *Bulletin of the World Health Organization* **85**: 600–6.

Lu JF, Hsiao WC. 2003. Does universal health insurance make health care unaffordable? Lessons from Taiwan. *Health Affairs (Millwood)* **22**: 77–88.

Na Songkla M, Suksirisereekul S, Chunharas S. 1997. *Equity in Health and Health Care in Thailand*. Nonthaburi, Thailand: Health System Research Institute.

National Health Security Office, ABAC-KSC Internet Poll Research Center. 2004. *The Perspectives of UC Members and Healthcare Providers to UC Program* [in Thai]. Nonthaburi, Thailand: Health System Research Institute.

Nguyen L, Hakkinen U. 2004. Income-related inequality in the use of dental services in Finland. *Applied Health Economics and Health Policy* **3**: 251–62.

NSO. 2001. *Report of the Health and Welfare Survey 2001*. Bangkok: National Statistical Office.

O’Donnell O, van Doorslaer E, Wagstaff A, Lindelow M. 2008. *Analyzing Health Equity Using Household Survey Data*. Washington, DC: World Bank.

Pannarunothai S. 2003. Equity in health: concept and data in Thailand. *Journal of the Medical Association of Thailand* **86**: 889–95.

Pannarunothai S, Mills A. 1997. The poor pay more: health-related inequality in Thailand. *Social Science and Medicine* **44**: 1781–90.

Pannarunothai S, Rehnberg C. 1998. *Equity in the Delivery of Health Care in Thailand*. Nonthaburi, Thailand: Health Systems Research Institute.

Prakongsai P, Patcharanarumol W, Tisayaticom K, Tangcharoensathien V. 2002. Capitation rate of the Universal Health Care coverage for the fiscal year 2546 (2003AD). *Journal of Health Science* [in Thai] **11**: 599–613.

Pramuarlata P, Wibulpolprasert S (eds). 2002. *Health Insurance Systems in Thailand*. Nonthaburi, Thailand: Health Systems Research Institute.

Schoen C, Doty MM. 2004. Inequities in access to medical care in five countries: findings from the 2001 Commonwealth Fund International Health Policy Survey. *Health Policy* **67**: 309–22.

Seubsmun S, Prapamontol T, Khamman S et al. (eds). 2007. *Look Back Study on the Thai Health-Risk Transition*. Nonthaburi, Thailand: Sukhothai Thammathirat Open University Press.

Somkota T, Lagrada LP. 2008. Payments for health care and its effect on catastrophe and impoverishment: experience from the transition to Universal Coverage in Thailand. *Social Science and Medicine* **67**: 2027–35.

StataCorp. 2006. *Intercooled Stata 9.0 for Windows*. College Station, TX: StataCorporation.

Suraratdecha C, Saiithamu S, Tangcharoensathien V. 2005. Is universal coverage a solution for disparities in health care? Findings from three low-income provinces of Thailand. *Health Policy* **73**: 272–84.

Tangcharoensathien V, Jongudomsuk P (eds). 2004. *From Policy to Implementation: Historical Events during 2001–2004 of Universal Coverage in Thailand*. Nonthaburi, Thailand: National Health Security Office.

Tangcharoensathien V, Limwattananon S, Prakongsai P. 2007. Improving health-related information systems to monitor equity in health: lessons from Thailand. In: McIntyre D, Mooney G (eds), *The Economics of Health Equity*. Cambridge, Cambridge University Press.

Van de Poel E, O’Donnell O, Van Doorslaer E. 2009. Urbanization and the spread of diseases of affluence in China. *Economics and Human Biology* **7**: 200–16.

van Doorslaer E, Koolman X, Jones AM. 2004. Explaining income-related inequalities in doctor utilisation in Europe. *Health Economics* **13**: 629–47.

van Doorslaer E, Masseria C, Koolman X. 2006. Inequalities in access to medical care by income in developed countries. *Canadian Medical Association Journal* **174**: 177–83.

Vasavid C, Tisayaticom K, Patcharanarumol W, Tangcharoensathien V. 2004. Impact of universal health care coverage on the Thai households. From policy to implementation: historical events during 2001–2004 of universal coverage in Thailand, In: Tangcharoensathien V, Jongudomsuk P (eds). *From Policy to Implementation: Historical Events during 2001–2004 of Universal Coverage in Thailand*. Nonthaburi, Thailand: National Health Security Office.

Vasavid C, Tisayaticom K, Patcharanarumol W, Tangcharoensathien V, Lertpatraphong K. 2005. Health and welfare of Thai population after Universal Care Coverage (UC) – Part II: Household health expenditure before and after UC. *Journal of Health Science* [in Thai] **14**: 317–25.

Veugelers PJ, Yip AM. 2003. Socioeconomic disparities in health care use: does universal coverage reduce inequalities in health? *Journal of Epidemiology and Community Health* **57**: 424–8.

Wagstaff A. 2005. The bounds of the concentration index when the variable of interest is binary, with an application to immunization inequality. *Health Economics* **14**: 429–32.

Wagstaff A, Paci P, van Doorslaer E. 1991. On the measurement of inequalities in health. *Social Science and Medicine* **33**: 545–57.

Wagstaff A, van Doorslaer E, Watanabe N. 2003. On decomposing the causes of health sector inequalities with an application to malnutrition inequalities in Vietnam. *Journal of Ecomometrics* **112**: 207–23.

WHO. 2008. *The World Health Report 2008: Primary Health Care – Now More Than Ever*. Geneva: World Health Organization.

Wibulpolprasert S (ed). 2005. *Thailand Health Profile 2001–2004*. Bangkok: Express Transportation Organization Publishing.

Yiengprugsawan V, Lim LL, Carmichael GA et al. 2007. Measuring and decomposing inequity in self-reported morbidity and self-assessed health in Thailand. *International Journal for Equity in Health* **6**: 23.