Catastrophic outpatient health payments and health payment-induced poverty under China's New Rural Cooperative Medical Scheme

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Abstract

In 2003, the New Rural Cooperative Medical Insurance Scheme (NCMS) was initiated to provide the rural Chinese population with financial protection against health risks and to improve equity and access to healthcare in rural China. The NCMS started to partly reimburse catastrophic outpatient care in 2007, but rural Chinese households still incur substantial out-of-pocket (OOP) payments, which are likely to disrupt the material living standards of the household. Using an individual level dataset—China Health and Nutrition Survey of 2009, this paper compares the level of catastrophic health payment and health payment-induced poverty for outpatient care before and after the NCMS reimbursement. Concentration Index is used to measure the distribution of catastrophic health payments across income groups. The study finds that there is no significant difference in terms of catastrophic health payments or health payment-induced poverty before and after the NCMS reimbursement. Even after the NCMS reimbursement, the economic burden of OOP payments for healthcare is still concentrated disproportionately among the less wealthy households. The study concludes that a heavy burden of OOP payment has become a poverty trap for poor households; hence, calling for a more comprehensive and effective insurance package.

1. Introduction

In most low- and middle-income countries with relatively limited healthcare cost prepayment mechanisms, e.g. health insurance, healthcare financing still largely relies on direct payments, often known as out-of-pocket (OOP) payments. OOP payments have a few main economic consequences. They may impede people from receiving the care they need or encourage them to postpone the use of care; when the payments increase to a particular level, they may become a source of financial hardship that forces individuals or households to cut back their daily expenses and consumption, sell assets, or, worst of all, trap them in long-term debt (Kavosi et al. 2012; Van Doorslaer et al. 2007). Such direct costs are defined as "catastrophic" if they "exceed some fraction of household income or total expenditure in a given period" (O'Donnell et al. 2008; Wagstaff and Lindelow 2008; Kavosi et al. 2012; Pradhan and Prescott 2002; Xu et al. 2007; Van Doorslaer et al. 2007).

As argued by many health economists, OOP payments are the most inequitable source of health financing. One concept of fairness in health financing is that households should be protected from economic burdens of illness, and the risks of such burdens should be shared by the society (Wagstaff 2007; Somkotra and Lagrada 2008). China has a high burden of OOP payments. OOP payments for healthcare increased from 21.65% in 1982 to 39.81% in 1992, and to 57.72% in 2002. In a 2008 National Health Survey, average per episode cost for an inpatient visit involved OOP payments equivalent to approximately 52.69% of annual per capita household expenditure (Centre for health and information 2008). Consequently, an increasing number of the Chinese population cannot afford healthcare services. In 1993, around 5.2% of the Chinese people reported that they could not afford outpatient care when they were sick. This percentage increased to 13.8% in 1998 and to 18.7% in 2008 (Gu 2008).

Several developing countries, such as Thailand, Iran and India, have introduced government-subsidised social health insurance programmes to ensure equitable healthcare financing. While in some countries, insurance yields compelling results (Somkotra and Lagrada 2008; Tangcharoensathien et al. 2007), in others, the effectiveness of these programmes in achieving equitable financing is unclear (Shahrawat and Rao 2012).

In 2003, the New Rural Cooperative Medical Scheme (NCMS) was launched in response to the dire health needs of the rural population. The launch of the programme represents a major step of the Chinese government to move towards a more equitable and efficient rural health financing system. The NCMS is a health insurance program subsidised by the central government and administered by county-level governments. The main goal of the scheme is to improve the rural population's access to health services by alleviating the financial burdens of paying for healthcare. Although deriving its name from the old Cooperative Medical Scheme (CMS), its predecessor, NCMS has a number of distinctive features. The new program is largely subsidized by the government, and the individual subscriber's contribution to the premium is relatively low. In many regions subscribers are expected to contribute only about 10 RMB (USD 1.64) per person per month; remaining costs are covered by central and local governments. Further, participation in NCMS provides rural residents with access to a range of healthcare facilities, from village clinics to municipal hospitals, although the reimbursement rates for health services received differ from one facility to another. The expansion of NCMS since its inception in 2003 has been truly remarkable: by 2012, NCMS covered 97.5% of the rural population in China, some 832 million people, making it arguably the largest health insurance program in the world (China Daily 2012).

From 2007 onwards, NCMS began to include outpatient care in its benefit package, with the aim of improving utilization of outpatient services—the most frequently used and widely accessible care option for rural residents. The program has since become more comprehensive: since 2007 coverage has expanded from mainly catastrophic illnesses to encompass outpatient services (Xinhua 2012). Two main categories of catastrophic outpatient care are eligible for reimbursement: (1) general chronic conditions, such as hypertension (phrase I and II), heart disease complicated by heart failure, coronary heart disease (myocardial infarction), cerebral haemorrhage and cerebral infarction convalescence, etc.; and (2) severe chronic conditions that require specialist care, such as aplastic anaemia, leukaemia, haemophilia, severe mental illness, cancer chemotherapy, chronic renal insufficiency, dialysis, vascular stent implantation, etc (Hao and Yuan 2009; Hu et al. 2008; Ministry of Health of Shandong Province 2008; Ministry of Health of Guangxi Province 2007; Ministry of Health of Hei Long Jiang Province 2009). According to government records, the average reimbursement rate for catastrophic outpatient costs is around 70% at village clinics and township health centres, and 40% at township hospitals and larger facilities (Xinhua 2007), but actual reimbursement rates are much lower than claims rates (Centre for Health Statistics and Information 2008). Further, from 2007 onwards, many provinces have started to reimburse general, that is, non-catastrophic outpatient care. Government records show that the reimbursement rate for these services is around 40% (Hao and Yuan 2009; Hu et al. 2008).

Despite its rapid expansion, studies thus far have yielded mixed reviews of the performance of the NCMS around a number of key criteria. Scholars have argued that the NCMS was not able to provide adequate financial protections for rural households, and thus called for a more generous package (Ma, Zhang, and Chen 2012). A 2004 World Health Organization (WHO)

report suggested that the NCMS overly emphasized medical catastrophe at the expense of the health needs of the majority of the rural population because the number of farmers falling into poverty due to medical expenses was likely to be small (World Health Organization 2004). The NCMS may also inflate medical costs at lower levels of health services hierarchy that tend to over-prescribe for patients covered by NCMS (Sun et al. 2009; Sun et al. 2009).

However, findings are not always consistent; other scholars praised the achievements of the scheme. Wagstaff *et al*. (2009) reported a decrease in medical expenditure after the introduction of the NCMS for those covered by the NCMS. Tan and Zhong (2010) and Babiarz *et al*.(2012) found that the NCMS successfully lowered OOP payment levels and protected households against financial risks by reducing the spending by patients with catastrophic illness. Zhang *et al*.(2010) also suggested that in terms of inpatient care, the NCMS helped to relieve the financial burden on the household, especially those who were in low income groups.

Although previous work has started to build a picture of the effectiveness of the NCMS in reducing OOP payments, current understanding of the association between the NCMS and the costs of outpatient care in rural areas remains limited. The NCMS was originally designed to cover catastrophic inpatient care, but by 2007, most counties had expanded the benefit package beyond inpatient care to outpatient services (Babiarz et al. 2010). However, given the fact that outpatient care is considered the most frequently used and accessible healthcare source in rural China, almost none of the existing studies have empirically assessed the costs of outpatient care under the NCMS after 2007. Second, under the current rural health system, many counties encourage local spending by lowering minimum spending levels or by offering higher reimbursement rates at local facilities, such as village clinics and township

health centres (Babiarz et al. 2012; Brown and Theoharides 2009). Previous studies tend not to perform analysis on aggregated costs at different levels of health facilities, even though reimbursement rates are set differently at different health facilities, and this may lead to inaccurate estimations (Sun et al. 2009; Ma, Zhang, and Chen 2012). In terms of methodology, existing studies mainly focus their investigations on absolute reduction of OOP payments, whereas the investigation of payments-to-income ratio is largely limited (Babiarz et al. 2012; Babiarz et al. 2010; Lei and Lin 2009). Even less research has taken into account the different opportunity costs for spending on health care for household with different income levels, which should also be reflected in calculating catastrophic health payments. Further, the association between insurance and the reduction of health payment-induced poverty should also be tested. This is of significant importance in the context of China where ill health has already become one of the leading causes of household impoverishment (Whitehead, Dahlgren, and Evans 2001; Kavosi et al. 2012; Shahrawat and Rao 2012; Werner 2009).

Drawing from the discussion above, this paper compares the differences of the incidence and severity of catastrophic health payments and health payment-induced poverty in outpatient care before and after the introduction of NCMS reimbursements. Specifically, it measures outpatient payments by using two threshold approaches, one requiring that the payments do not exceed a pre-specified proportion of income, the other requiring that the payments do not drive households into poverty. Concentration Indices are used to measure the distribution sensitivity of catastrophic payments (O'Donnell et al. 2008). This study assesses the above thresholds among households having at least one member with a chronic condition, and care being sought at village and township level heath facilities. Data are drawn from a cross-sectional household level dataset – China Health and Nutrition Survey 2009.

The empirical results derived from this study are expected to provide suggestive evidence for policy makers. In particular, the actual outcomes of the NCMS may be contrary to the stated objectives of the insurance scheme. Although the NCMS has extended its package to outpatient care, its benefit package is far from comprehensive. The NCMS still requires substantial contributions through private financing from individuals, via OOP payments. Given that outpatient care has proven to be expensive, with low reimbursement rates, such costs may pose obvious threats to households. The empirical results show that the incidence and severity of catastrophic health payments and health payment-induced poverty remain almost constant after the insurance reimbursements were made. Further, while there exists a wide gap in health needs as well as financial status among the NCMS participants, the scheme requires the same premium to be paid, and offers the same benefit package to all participants. Empirical results confirm that OOP payments are concentrated disproportionately among the poor and those with greater health needs. This may be due to the fact that their abilities to secure health services are weaker compared with the rich, and they are not entitled to additional insurance benefits.

The following sections describe methods, results, conclusion and relevant policy implications.

2. Methods

Data source

This paper uses a cross-sectional household level dataset – CHNS 2009, which is the most recent available survey wave at the time of writing. The objective of the paper is to compare household health expenditure before and after the NCMS reimbursement. This dataset is ideal for the purpose of this paper because all the surveyed provinces had included catastrophic healthcare and general outpatient services in the NCMS benefit package by 2008 (Ministry of Health of Hei Long Jiang Province 2009; People's Daily 2009; Ministry of Health of Guangxi Province 2007; Ministry of Health of Shandong Province 2008; Hao and Yuan 2009; Hu et al. 2008). A total of 1,846 households is included in the study after dropping observations in urban areas and those are not insured the NCMS.

Dependent and independent variables

Table 1 shows the variable specification. Health payment is for a 4-week window in the CHNS. Individuals are asked to report their health payments, the percentage of these health payments that can be reimbursed by the NCMS. I exclude the outliers on health costs distribution: the top and bottom one per cent of cases are dropped from the analysis (Wagstaff and Lindelow 2008). Catastrophic health payments and health payment-induced poverty are measured separately for the total sample and households that have at least one member with a chronic disease. Chronic disease conditions include any of the following: hypertension, diabetes, myocardial infarction and apoplexy. Care sought at village clinics and township health centres are measured separately, conditional on at least one visit in the past 4 weeks. Household income data are measured as gross annual household income aggregated from all sources including: gardening, farming, livestock/poultry, fishing, handicraft and small commercial household business inflated to 2009 (the last wave of the survey).

[Table 1 about here]

Definition of catastrophic payments

Using household income as the denominator, catastrophic payments are defined as occurring when health payments exceed a given fraction of household per capita income (Xu et al. 2003; Wagstaff and van Doorslaer 2003). There are two approaches in the literature. The first is *Ability to Pay* (ATP), defined as the household's per capita expenditure/disposable income net of spending on basic necessities; and this is used as the denominator to define catastrophic thresholds. The difficulty of adopting the first approach lies in the definition of basic necessities. The most common strategy is to use household expenditure/income net of food expenditure as a denominator; however, not all food expenditures are nondiscretionary, and it is possible that richer families may spend substantially more on food consumption than their poorer counterparts. Another approach to define catastrophic payments thresholds is to consider given thresholds. Since the CHNS data lack relevant information on food consumption, and therefore spending on basic necessities cannot be accurately calculated, this paper uses the second approach which considers catastrophic thresholds levels at 5%, 10%, 15%, 20%, and 25% (Wagstaff and Lindelow 2008; O'Donnell et al. 2008; Xu et al. 2003; Xu et al. 2007).

Measuring the impact of the NCMS on catastrophic headcounts and catastrophic payment gaps

This study uses the methods introduced by Wagstaff and van Doorslaer (2003) to measure catastrophic payment. Specifically, this study looks at the incidence and severity of catastrophic payments before and after the deduction of the NCMS. Incidence of catastrophic

payments is measured by the number of people who fall below the catastrophic thresholds (headcount); and the intensity of the payment is measured by the average amount exceeding the catastrophic threshold (gap).

Catastrophic payment headcount estimates the proportion of households with catastrophic health payments in the sample. Catastrophic headcounts are calculated before and after the NCMS reimbursement by Equations (1) and (2), respectively. The impact of the NCMS on the absolute difference in headcount is estimated by Equation (3). Let T^{before} be health payments before the NCMS reimbursement, T^{after} be health payments after the NCMS reimbursement, and x be total household income. A household is considered as falling below the catastrophic threshold z if T^{before}/x or T^{after}/x exceeds a specific threshold. Let CH be the indicator, CH^{before} equals 1 if $T^{before}/x > z$, and CH^{after} equals 1 if $T^{after}/x > z$, and zero otherwise. N is the total number of households.

Catastrophic payment before the NCMS reimbursement H^{before} is,

$$(1)\ H^{before} = \frac{1}{N}\sum_{i=1}^{N} CH_i^{before}$$

Catastrophic payment after the NCMS reimbursement H^{after} is,

$$(2)\ H^{after} = \frac{1}{N}\sum_{i=1}^{N} CH_i^{after}$$

Absolute difference in the headcount, DH, before and after the NCMS reimbursement is,

$$(3)\ DH = H^{before} - H^{after}$$

The severity of the catastrophic payments is measured by the average sum of the amount by which the health payment exceeds the threshold from all households experiencing catastrophic payments. The difference of the severity can be calculated before and after the

NCMS reimbursement by Equations (4) and (5), respectively. The impact of the NCMS on the absolute difference on gap was estimated by Equation (6). Standard error is calculated as the standard deviation of the sampling distribution of the sample mean (Everitt 2006).

Catastrophic gap before the NCMS reimbursement CG^{before} is,

$$(4)\ CG_{before} = \frac{\sum_{i=1}^{N} CH_i^{before}\left(\frac{T_i^{before}}{x_i} - z\right)}{N}$$

Catastrophic gap after the NCMS reimbursement CG^{after} is,

$$(5)\ CG_{after} = \frac{\sum_{i=1}^{N} CH_i^{after}\left(\frac{T_i^{after}}{x_i} - z\right)}{N}$$

Absolute difference in the catastrophic gap before and after the NCMS reimbursement is,

$$(6)\ DCG = CG^{before} - CG^{after}$$

Measuring the distribution sensitivity of catastrophic payments

The study also takes into account of the distribution sensitivity of the measures of catastrophic headcount and gap, the study uses the well-established methods of the Concentration Indices introduced by O'Donnell *et al*. (2008) and Erreygers (2009) to measure the distribution [1]. It is useful to have a brief discussion on Concentration Index to facilitate the following discussion. The Concentration Index has been used in many studies to quantify the degree of socioeconomic-related inequality in health variables (Wagstaff, Rutten, and Doorslaer 1993; Kakwani, Wagstaff, and vanDoorslaer 1997; O'Donnell et al. 2008). It quantifies the degree of socioeconomic-related inequality in a health variable. There are

[1] The detailed explanation of how to compute Concentration Index can be found at *Analyzing health equity using household survey data: a guide to techniques and their implementation* by O'Donnell *et al*.

many ways to express the Concentration Index. The most convenient for the purpose of this research is (O'Donnell et al. 2008):

$$(7)\quad CI = 1 - 2\int_0^1 L_n(p)dp = \frac{2}{\mu}\mathrm{cov}(h_{it}, R_i^t)$$

Where i represents the individual, h_i is the health variable, R is the individual's living standard ranking, μ is the mean of the health variable in the population, and t is the year. If there is no socioeconomic-related inequality, the index is zero. A positive value indicates a pro-rich inequality, and a negative value indicates a pro-poor inequality. As health economists have found that the traditional Concentration Indices may not be the best estimation of income-related inequities for binary/categorical health variables, the Erreygers's Concentration Index is often used to provide a more accurate estimation for binary dependent variables (Erreygers 2009). For catastrophic headcount measures, Erregyers's Concentration Indices will be used. The distribution of catastrophic gaps – a continuous variable – will be measured by Concentration Indices introduced by O'Donnell *et al*. (2008).

The study calculates the Concentration Indices for the distribution of the catastrophic headcount (C_h) and gap (C_g) relative to the household income. A positive index indicates that richer households are more likely to incur catastrophic payments, and a negative index indicates that poorer households are more likely to incur catastrophic payments. As suggested by O' Donnell, van Doorsaler and others (O'Donnell et al. 2008; van Doorslaer et al. 2006; Wagstaff and van Doorslaer 2003; Somkotra and Lagrada 2008), it is important to give some weight to poorer households when assessing the incidence and severity of catastrophic payments. The justification behind this approach is that, if the catastrophic headcount and gap are not adjusted, then households exceeding the thresholds, and all spending exceeding the thresholds will count equally. This is usually not the case since the opportunity costs of

such expenditure by the poor households are usually greater than the rich households if we assume a decreasing marginal utility of income. Therefore, measures on weighted catastrophic headcount and gap are proposed in Equations (8) and (9), respectively (O'Donnell et al. 2008):

(8) $H_w = H(1-C_h)$

(9) $G_w = G(1-C_g)$

Where H_w represents the weighted headcount, and C_h represents the Erregyers's Concentration Index for the catastrophic headcount, G_w represents the weighted gap, and C_g represents the Concentration Index for weighted gap (O'Donnell et al. 2008). This statistic is equivalent to a weighted sum of a catastrophic payment indicator variable, in this case, either *H* or *G*, by multiplying weights declining linearly from 2 to 0 as the household ranks from the poorest to the richest. The weights produced by Equations (8) and (9) impose the assumption that that poor household receive more weight, while the rich households receive less—if those who exceed the catastrophic threshold tend to be poor, the indices C_h and C_g tend to be negative, which will then make H_w greater than *H*.

Definition of health payment-induced poverty

Standard poverty measures do not take into account health payments. It is highly likely that a household at a time of illness will be forced to divert some of its usual spending on daily necessities to healthcare, and this may lead households to fall below the poverty line. For households already below the poverty line, the spending from borrowing or selling assets may further increase the poverty gap, and consequently push them into deeper poverty. It is estimated that, in Asia, 78 million people may fall into extreme poverty (US$1 per day) if their health spending were taken out of their per capita household expenditures (O'Donnell et al. 2008).

Health payment-induced poverty measures the difference between poverty before and after health spending is subtracted from household income (Sun et al. 2010; O'Donnell et al. 2008). As introduced by Wagstaff and van Doorslaer (2003), incidence and severity of health payment-induced poverty are compared before and after the deduction of the NCMS. Incidence is measured by the number of people who fall below the poverty line because of health payments (headcount); and the intensity is measured by the amount by which the household falls below the poverty line because of health payments (gap).

This paper uses three poverty thresholds. They are the international poverty line of US$1.08 per person per day, US$2.15 per person per day, and the Chinese National Poverty Line (NPL), which is a net per capita income of RMB1,196 per year (US$175.08 per year) in 2009. If a poverty line allows health costs, then the line should be adjusted downwards. However, in this study, none of these poverty lines are adjusted when assessing health payment-induced poverty. The US$1.08 per day poverty line is not adjusted because it is used in the Millennium Development Goal as the extreme poverty line. The Chinese National Poverty Line is lower than the extreme poverty line; it is not defined as to cover expected health expenditures so it not adjusted. The US$2.15 per day line is not adjusted in order to make a comparison (O'Donnell et al. 2008; Wagstaff, Doorslaer, and World Bank. Development Research Group. Public Services for Human Development. 2001). The exchange rate use for US dollars to RMB was US$1 equals RMB6.83 in 2009.

Measuring the impact of the NCMS on the reduction of health payment-induced poverty

Estimating of health payment-induced poverty headcount and gap is similar to what has been presented for estimating catastrophic payments. Figure 1 illustrates the impact of the NCMS

on health payment-induced poverty using a stylized version of the Jan Pen's Parade (Cowell 2011; O'Donnell et al. 2008). The *x*-axis shows the cumulative proportion of households ranked by income, and *y*-axis shows the household per capita income. The solid black curve represents household per capita income gross of health payment; the solid blue curve and the dotted blue curve represent household per capita income net of the health payment before and after the NCMS reimbursement respectively. The points from the starts of the curves to the intersections with the poverty line (*PL*) represent the numbers of people living in poverty (PH_0, PH_2, and PH_1) under three conditions. The impact of the NCMS on health payment-induced poverty headcount can be calculated by the difference between PH_1 and PH_2. The areas (A, B and C) between the two blue curves capture the poverty gaps reduced by the NCMS.

[Figure 1 about here]

Specifically, the standard poverty headcount, health payment-induced headcount can be calculated by Equation (10). Let T^{before} be health payments before the NCMS reimbursement, T^{after} be health payments after the NCMS reimbursement, and y_i be per capita household income in household *i*. A household is considered as falling below the poverty thresholds *PL* if $y_i < PL$. The poverty head count ratio gross of health payment can be obtained as follows (O'Donnell et al. 2008),

$$(10)\ PH_0 = \frac{\sum_{i=1}^{N} p_i^{gross}}{N}$$

Where $p_i^{gross} = 1$ if $y_i < PL$, and 0 otherwise, N is the total number of households in the sample.

In terms of measuring the poverty gap, defining the poverty gap gross of health payments, the individual-level poverty gap can be obtained by Equation (11),

$$(11)\ PG^{gross} = \frac{\sum_{i=1}^{N} g_i^{gross}}{N}$$

Where $g_i^{gross} = p_i^{gross}(PL - y_i)$.

The severity of poverty for each household is measured by the mean poverty gap,

$$(12)\ MPG^{gross} = \frac{PG^{gross}}{PH_0}$$

Similarly, to estimate the health payment-induced poverty before the NCMS reimbursement, this paper defines y_i as the per capita household income estimated by subtracting the health payment from total household income. Replacing health payments before the NCMS reimbursement with those after the reimbursement gives the analogous post-reimbursement measures.

Following other studies, the effect of OOP payments on poverty which is often termed as "Poverty Impact", can be obtained by the absolute difference between pre-reimbursement and post-reimbursement measures.

It has to be noted that the methodology used in this study is only be able to compare the incidence, severity and distribution of catastrophic health payments and health payment-induced poverty before and after the NCMS reimbursement. It is important to note that the purpose of the study is not to build a causal model to assess the impact of the NCMS on health expenditure. Findings should be interpreted as associations rather than causal as it is

impossible to achieve the goal with a non-experimental cross-sectional data. The analysis remains descriptive, but this paper seeks a more refined description of the relationship between the NCMS and health expenditures.

3. Empirical results

Table 2 shows that for the total sample, average monthly health expenditures before insurance reimbursement are 41.70RMB, while for households with members with chronic conditions, the expenditures are 69.07RMB. However, the per episode reimbursement rate for people with chronic conditions is 11.3%, which is lower than the total sample. Average OOP payments for households with chronic disease members are 59.64RMB, which are 23.70RMB higher compared with the payments for the total sample.

Table 2 illustrates health payment for healthcare as a share of household income before and after the NCMS reimbursement. The results show that health payments account for 3.45% of the household income before the reimbursement, and 3.13% after the reimbursement for the total sample. The difference is only 0.33% ($p < 0.01$). For households with chronic disease members, health payments share is 10.43% before the reimbursement, but there is no significant change after the reimbursement.

[Table 2 about here]

Catastrophic payments under the NCMS

Table 3 presents measures of the incidence and distribution of catastrophic payments before and after the NCMS reimbursement in 2009. Household income is used as the proxy to define

catastrophic payment thresholds for healthcare, and the catastrophic thresholds are presented at the 5%, 10%, 15%, 20%, and 25% level.

The estimate of the catastrophic headcount is 6.61% ($p < 0.01$) for the total sample and 8.57% ($p < 0.01$) for households with chronic disease members at the 5% threshold level. Health payments are more likely to become catastrophic for households with chronic disease members compared to the total sample at all threshold levels.

For households that have at least one outpatient visit to health facilities in the past 4 weeks, 41.67% ($p < 0.01$) of the households fall below the 5% threshold level. Table 3 also presents the rank-weighted headcount. The rank-weighted catastrophic headcount is 64.14% for care sought at village and township health facilities at the 5% level. The difference between the rank-weighted and the un-weighted headcount is 22.47%; this is not surprising given the relatively high concentration of catastrophic payment among the poor households.

The difference of catastrophic health payment headcount before and after the insurance reimbursement is reported under absolute difference in Table 3. The Concentration Index of catastrophic headcount for households with chronic disease members is -0.095 ($p < 0.01$) at the 5% threshold level, whereas the index is -0.075 ($p < 0.01$) for the total sample. This also implies that catastrophe is more likely to be concentrated among the poor and for households with chronic disease members. The results show that for households with chronic members and care sought at village and township health facilities, no significant reduction is observed in terms of the favouring-poor distribution of catastrophic payments after the insurance reimbursement.

[Table 3 about here]

Table 4 shows measures for the severity of catastrophic payments before and after the NCMS reimbursement. The catastrophic gap is 3.0% ($p < 0.01$), and 7.30% ($p < 0.01$) for the total sample and households that sought care at village and township health facilities, respectively. The catastrophic gap is 9.77% ($p < 0.01$) for households with chronic diseases. The results also show a modest decline in terms of catastrophic gap after the NCMS reimbursement for the total sample and sample that includes households that sought care at village and township health facilities. However, no change is observed on the severity of catastrophe for households with chronic disease members after the NCMS reimbursement.

In terms of the distribution of catastrophic gaps, most of the Concentration Indices (C_g) are negative, indicating that the catastrophic gaps are more concentrated among the poor households. It is noted that the indices for catastrophic gap are -0.851($p < 0.01$) for households with chronic disease members, -0.666 ($p < 0.01$) for the total sample, and -0.510 ($p < 0.01$) for households that sought care at village and township health facilities. The indices indicate a favouring-poor concentration of catastrophic gap among the population. The level of inequity is more pronounced for households with chronic disease members.

[Table 4 about here]

The NCMS and the poverty impact

Figure 2 shows health payment-induced poverty headcount before and after the NCMS reimbursement. Before the health payment, 134 households, or 7.26% of the sample, fell below the US$2.15 poverty line. A total of 18 households were pushed below the poverty line because of the health payments. No significant reduction in terms of poverty headcount was observed.

Using US$1.08 per day as the poverty threshold, poverty headcount gross of health payments was 37 (2%). The number increased to 55 (2.98%) before the NCMS reimbursement, and decreased to 51 (2.76%) after the NCMS reimbursement. At the Chinese NPL, fewer households were classified as poor before taking into account of health payment. The difference before and after the NCMS reimbursement on poverty headcount reduction were not statistically significant at any poverty thresholds.

[Figure 2 about here]

Table 5 shows the health payment-induced poverty gap before and after the NCMS reimbursement. For households falling below the US$2.15 per day poverty line, the estimate of poverty gap gross of health payment is 11.60RMB. The mean positive poverty gap is 159.79RMB. However, if OOP payment for healthcare is netted out of the household income, the average poverty gap increases to 19.48RMB, and the mean positive gap increases to 236.60RMB. After the NCMS reimbursement, the average poverty gap reduces by 7.88RMB (p<0.1). No significant reduction is observed in terms of mean positive gap.

If we take a look at the households with chronic disease members, the poverty gap and mean positive poverty gap are larger for all poverty lines compared with the total sample. However,

no significant difference before and after the NCMS reimbursement in terms of the average gap or the mean positive poverty gap for households with chronic disease members was observed.

[Table 5 about here]

4. Discussion and conclusion

Using data from CHNS 2009, this study provides new evidence of the magnitude, distribution and economic consequences of OOP payments for outpatient care in rural China before and after the NCMS reimbursement. The study suggests that outpatient care is not a low cost event, and indeed can be catastrophic. No significant difference in terms of catastrophic payments and health payment-induced poverty was observed after the NCMS reimbursement. For care sought at village and township health facilities, outpatient care is likely to become catastrophic. For households with chronic disease members, a large catastrophic payments gap is observed, and the gaps are disproportionately concentrated among the poor. However, no significant difference is observed after the NCMS reimbursement.

The findings are consistent with previous studies. Specifically, this study suggests that, using the catastrophic payment threshold at 5%, 6.61% of rural households in 2009 fell into a catastrophe due to OOP payments. Similar results are demonstrated by Sun *et al*.(2009). That study investigated the impact of the NCMS in Linyi County in Shandong, adopting 50% ATP, and showed that the incidence of catastrophic payments was 8.98% before the NCMS reimbursement and 8.25% afterwards. The incidence from our study appeared to be larger relative to an earlier study conducted by Wagstaff and Lindelow (2008). Using the earlier waves of the CHNS data (1993, 1997 and 2000), Wagstaff and Lindelow suggested that

catastrophic headcount increased from 2.0% in 1993 to 3.4% in 2000 at a threshold level of 5%. The differences may be due to the use of the early waves of the CHNS data and the inclusion of the urban sample in the analysis; in the same study, using data from Gansu Survey of Children and Family (GSCF) in 2003, the reported incidence of catastrophic payments was 6.5%, which was closer to our findings. Despite the differences, one common feature as suggested by this study as well as others is the positive correlation among catastrophic payment variables, and their negative correlation with level of wealth of the household in the rural China– the less wealthy rural Chinese households are more likely to experience catastrophic payments.

The impacts of the NCMS on the severity of catastrophic payments in rural households are reported by the average catastrophic gap. Using a 5% threshold level, the average catastrophic gap is reduced by just 0.30 point per cent by the NCMS. The severity of the payments could still be disastrous for most rural Chinese residents. Similar findings were demonstrated by Sun *et al*.(2009). The study also suggested that the effects of the NCMS on reducing the catastrophic gap were limited.

This study quantifies the level of inequity in health financing and finds that the NCMS reduces the level of inequity of the incidence of catastrophic payments for the total sample; however, it has no significant impacts for households with members suffering chronic disease, or for households seeking care at village and township health facilities. This study also finds that the catastrophic payment gap is disproportionately concentrated among the poor for households with chronic disease members even after the NCMS reimbursement. However, this may seem less surprising if we take a close look at the insurance design. In practice, the reimbursement rate does not differ between the rich, the poor, or households with potentially

greater health needs. If the goal of the NCMS is to have as few poor households crossing catastrophic thresholds as possible, the insurance should provide the poor and those with high health risks with more generous package. Low reimbursement rates and excessively high co-payments are directly responsible for catastrophic outpatient payments, and with the poor bearing the brunt of the consequences. Furthermore, at the moment, the NCMS emphasises inpatient care and catastrophic outpatient care. This study and previous studies have proven that outpatient care could also be quite expensive given the income level of the overall Chinese rural population (Zhang et al. 2010), and the share of outpatient costs in the aggregate may have a substantial impoverishing effect on households (Shahrawat and Rao 2012). Households with greater health needs or those already in the lower income quintiles may find it difficult to cope with outpatient care or any types of care; consequently, they may more easily fall below catastrophic thresholds when they seek care.

We may find that the situation of China is even bleaker than that found in other countries. It is noted that OOP payments, as perceived as the most regressive instrument of health financing (Whitehead, Dahlgren, and Evans 2001), are generally regressive or are proportional to ATP in most high-income countries. Even in most of the low-/middle-income Asian countries, OOP payments still absorb a larger share of economic resources of the rich households. However, both our study and existing studies showed that China, unlike that of many other Asian countries, demonstrated a favouring-poor concentration of OOP payments (Van Doorslaer et al. 2007). The proportion of population that experienced "catastrophe" (as defined as 40% of non-food consumption) in China was the highest among the rest of Asia except Nepal and Sir Lanka, and higher still among the less wealthy (Van Doorslaer et al. 2007; Wagstaff, Lindelow, Wang, et al. 2009).

The study also measures health payment-induced poverty for healthcare by quantifying the extent to which such payments may push households into poverty. As demonstrated by the results, the effects of the NCMS on preventing households from becoming impoverished are limited—the majority of health payment-impoverished households remained below the poverty lines after the NCMS reimbursement, and the severity of their situations is not improved. This again is consistent with previous research (Sun et al. 2010; van Doorslaer et al. 2006).

Two possible policy solutions have been discussed to improve the design of the insurance. One solution is to reduce OOP payments by providing higher reimbursements through more generous government subsidises and through an increased level of risk-pooling (Yip and Hsiao 2009; Zhang, Yi, and Rozelle 2010). A less costly solution is to provide extra benefits for the less wealthy households or those with high risks of incurring catastrophic illness costs, and this was adopted by a few low- and middle-income Asian countries, such as Thailand and Vietnam (Somkotra and Lagrada 2008). However, it is not clear whether these solutions are applicable to the Chinese situation. First, a more generous insurance package may not always lead to a reduction of health costs since ample studies in the field of health economics have suggested the opposite (Dusansky and Koc 2010; Feldman and Dowd 1991; Arrow 2001; Manning et al. 1987). Stensland *et al*. (2010) found that hospitals under more financial pressure –with less market share and less ability to charge higher private rates – were likely to generate profits on Medicare patients. In the case of China, the current health provision system is still functioning on the basis of a FFS system. Healthcare providers, who are largely relying on revenue from drugs and services, are also likely to charge more from those who are covered by insurance. Anecdotal evidence showed that health providers in China may supply high margin high-technology care and expensive medicines to the NCMS patients

wherever possible, and the insured patients had paid more than was warranted (Hu et al. 2009; Yip and Hsiao 2009). Examples also included the initiative of merging China's Government Insurance Health Scheme (GIS) and Labour Insurance Health Scheme (LIS) into one single insurance with a larger risk pool and more generous reimbursement rates in the 1990s. This reform increased the health payments in Zhejiang Province among the insured patients, especially the wealthy patients (Liu and Zhao 2006). A more recent case was the launch of the urban employee insurance—UEI in 1998. With a relatively generous package, this insurance had been proven to be responsible for over-prescribing of drugs and unnecessary use of health services (Hu et al. 2009).

The proposal of increasing the level of risk pooling at individual level, at first glance, seems feasible—a more comprehensive risk pooling could increase the NCMS funds and improve the insurance package for the participants. However, for poor households, who already have difficulty in coping with daily living, increasing the premium may increase dropout rates and consequently high costs of care. Furthermore, if we take a close look at the structure of the NCMS funds, we notice that the current NCMS funds have huge surpluses. Mao (2005) found that in the affluent East regions, the surplus accounted for 27.58% of the total NCMS funds, while in the less affluent Central and West regions, the surplus accounted for 32.51% and 55.98% of the total funds respectively. Since risk pooling is currently administrated at the county level, keeping a large surplus of funds might be a safe way to prepare for a wide disease outbreak. A more efficient use of the insurance funds could include a larger pool, in other words, to increase the risk pooling level from one county to a few counties or even to provincial level. But this may also increase the administrative costs and other related costs.

The second policy solution is to develop a specific sub-insurance to target the poor and those with greater health needs. However, establishing a well-functioning insurance for fee-waiver or fee reduction for a specific population may be very difficult in practice (Whitehead, Dahlgren, and Evans 2001). In countries like China where poverty is rife, it is extremely difficult to identify the target population—the poor—sufficiently and accurately. Further, as suggested above, the current Chinese health system is based on a FFS system. Healthcare providers may take advantage of the patients who are entitled to extra insurance benefits. Providing fee waiver or reduction to the poor may motivate the health providers to prescribe more. Such problems may become more accentuated since the current Chinese health system also allows the revenue from fees to be directly linked to incomes and bonuses for the health staff (Economic Intelligence Unit 1998).

In interpreting the results we must also bear the limitations in mind. First of all, the recall period of the health cost variable is relatively short (4 weeks). It might problematic because most surveys use 12 months as the recall period. Outpatient costs used in this study are self-reported. Such data can be problematic because self-reporting may lead to inaccuracy and bias. Second, the threshold approaches adopted in the study to investigate the impacts of insurance on costs may have some limitations. When measuring catastrophic payments, it is not possible to identify the households that are recommended for treatment, but cannot meet these costs and so forgo treatment. Subsequent deterioration of health may lead to indirect costs such as welfare loss, and these losses cannot be captured by the measurement of catastrophe (Pradhan and Prescott 2002). Further, the justification of measuring health payment-induced poverty is that health costs as responses to basic needs are not adequately reflected in the poverty line. Adjusting higher poverty lines downwards is suggested when measuring health payment-induced poverty because these lines may make some implicit

allowance for expected healthcare needs. However, the stochastic nature of healthcare needs makes it difficult to capture in a fixed poverty line (O'Donnell et al. 2008). Last but not least, although this study has provided a more refined descriptive analysis to capture the association between the NCMS and outpatient health expenditures, the results can only be interpreted as correlation rather than causality. Determining causal relationships between insurance and health expenditure is complex, and may require establishing a control group or using longitudinal data. Such task is not feasible using the available data.

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Table 1 Descriptive statistics for the study population (mean/standard deviation)

		Total sample (N = 1,846)	Chronic conditions (N=351)
Variable	Definition	Mean	Mean
Household monthly health expenditures	Health expenditure during the past month (before the NCMS reimbursement)	41.697 (228.908)	69.073 (314.433)
Per episode reimbursement rate for the NCMS participants	Per episode reimbursement rate for household that have health expenditures during the past month	13.012 (26.163)	11.300 (26.202)
Household monthly OOP health expenditures	OOP health expenditure during the past month (after the NCMS reimbursement)	35.936 (207.609)	59.641 (292.586)
Chronic conditions member in household	Dummy variable: 1, the household has at least a member with chronic conditions; 0 otherwise	0.171 (0.376)	--
Village clinics and township health centres	Dummy variable: 1, the household has sought care at village clinics or township health centres in the past 4 weeks; 0 otherwise	0.065 (0.247)	0.092 (0.290)
County and city hospitals	Dummy variable: 1, the household has sought care at county or city hospitals in the past 4 weeks; 0 otherwise	0.016 (0.124)	0.035 (0.184)
Private clinics and others	Dummy variable: 1, the household has sought care at private clinics and other facilities in the past 4 weeks; 0 otherwise	0.018 (0.134)	0.035 (0.184)
Per capita household income	Per capita household income inflated to 2009 (adjusted to household size using Equivalence Scale)	24775.810 (38044.530)	23415.970 (26941.940)
Household size	Number of people live in the household	2.045 (0.901)	2.190 (0.918)

Table 2 Health payments for healthcare as a share of household income before and after the NCMS reimbursement

	Total sample (N = 1,846)	**Chronic conditions (N = 351)**
Before reimbursement (a)	3.45%***	10.43%*
	(0.010)	(0.058)
After reimbursement (b)	3.13%***	9.92%*
	(0.010)	(0.058)
Difference (a) – (b)	0.33%***	0.51%

(Notes: Standard errors are in brackets. * indicates $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$)

Table 3 Incidence of catastrophic payment at threshold levels 5%, 10%, 15%, 20% and 25%

		OOP payments as share of total household income														
		Total sample (N=1,846)					**Chronic conditions (N = 351)**					**Village clinics and township health centres (N = 120)**				
		Threshold level					Threshold level					Threshold level				
		5%	10%	15%	20%	25%	5%	10%	15%	20%	25%	5%	10%	15%	20%	25%
Pre-insurance	Headcount (H^{before})	**6.61%**	**4.82%**	**3.79%**	**2.76%**	**2.38%**	**8.57%**	**6.67%**	**5.08%**	**3.49%**	**2.86%**	**41.67%**	**29.17%**	**20.83%**	**14.17%**	**12.50%**
	Concentration Indices (C_h^{before})	**-0.075**	**-0.066**	**-0.060**	**-0.048**	**-0.047**	**-0.095**	**-0.091**	**-0.085**	**-0.066**	**-0.072**	**-0.539**	**-0.424**	**-0.420**	**-0.314**	**-0.279**
	Rank-weighted headcount (H_w^{before})	**7.10%**	**5.14%**	**4.02%**	**2.90%**	**2.50%**	**9.38%**	**7.27%**	**5.51%**	**3.72%**	**3.06%**	**64.14%**	**41.54%**	**29.58%**	**18.62%**	**15.98%**
Post-insurance	Headcount (H^{after})	**5.85%**	**4.17%**	**3.14%**	**2.33%**	**2.06%**	**7.62%**	**5.71%**	**4.44%**	**3.17%**	**2.86%**	**35.83%**	**24.17%**	**16.67%**	**10.00%**	**9.17%**
	Concentration Indices (C_h^{after})	**-0.065**	**-0.055**	**-0.049**	**-0.039**	**-0.037**	**-0.092**	**-0.083**	**-0.072**	**-0.063**	**-0.072**	**-0.439**	**-0.350**	**-0.319**	**-0.192**	**-0.167**
	Rank-weighted headcount (H_w^{after})	**6.23%**	**4.40%**	**3.30%**	**2.42%**	**2.13%**	**8.32%**	**6.19%**	**4.76%**	**3.38%**	**3.06%**	**51.57%**	**32.63%**	**21.99%**	**11.92%**	**10.70%**
Absolute difference	Headcount (H^{after} - H^{before})	-0.76%	-0.65%	-0.65%	-0.43%	-0.33%	-0.95%	-0.95%	-0.63%	-0.32%	0.00%	-5.83%	-5.00%	-4.17%	-4.17%	-3.33%
	Concentration Indices (C_h^{after} - C_h^{before})	0.010	0.010	0.011*	0.009**	0.011**	0.002	0.008	0.013	0.003	0.000	0.100	0.074	0.100	0.123	0.112
	Rank-weighted headcount (H_w^{after} - H_w^{before})	-0.87%	-0.73%	-0.72%	-0.48%	-0.36%	-1.06%	-1.08%	-0.75%	-0.35%	0.00%	-12.57%	-8.91%	-7.59%	-6.70%	-5.29%

(Note: * indicates $p < 0.1$, ** $p < 0.05$, **bold** indicates $p < 0.01$)

Table 4 Severity of catastrophic payment at threshold levels 5%, 10%, 15%, 20% and 25%

		OOP payments as share of total household income														
		Total sample (N=1,846)					**Chronic conditions (N = 351)**					**Village clinics and township health centres (N = 120)**				
		Threshold level					Threshold level					Threshold level				
		5%	10%	15%	20%	25%	5%	10%	15%	20%	25%	5%	10%	15%	20%	25%
Pre-insurance	Gap (CG^{before})	3.00%	2.72%	2.51%	2.34%	2.21%	9.77%	9.41%	9.10%	8.89%	8.72%	7.30%	5.55%	4.30%	3.45%	2.77%
	Concentration Indices (C_g^{before})	-0.666	-0.707	-0.730	-0.752	-0.769	-0.851	-0.872	-0.889	-0.899	-0.908	-0.510**	-0.519**	-0.530	-0.511	-0.470
	Rank-weighted gap(G_w^{before})	5.00%	4.65%	4.34%	4.10%	3.91%	18.08%	17.61%	17.19%	16.88%	16.63%	11.03%	8.44%	6.59%	5.21%	4.08%
Post-insurance	Gap(CG^{after})	2.70%	2.46%	2.28%	2.14%	2.03%	9.30%	8.99%	8.73%	8.54%	8.38%	5.82%	4.33%	3.33%	2.68%	2.21%
	Concentration Indices (C_g^{after})	-0.695	-0.734	-0.762	-0.784	-0.804	-0.872	-0.891	-0.906	-0.916	-0.924	-0.607**	-0.582**	-0.572**	-0.539	-0.486
	Rank-weighted gap(G_w^{after})	4.58%	4.26%	4.02%	3.83%	3.67%	17.41%	17.00%	16.63%	16.36%	16.12%	9.35%	6.85%	5.24%	4.13%	3.28%
Absolute difference	Gap (CG^{after}- CG^{before})	-0.30%	-0.26%	-0.23%	-0.20%	-0.18%**	-0.47%	-0.42%	-0.37%	-0.35%	-0.34%	-1.48%	-1.22%	-0.97%**	-0.76%**	-0.57%**
	Concentration Indices (C_g^{before}- C_g^{after})	-0.03	-0.03	-0.03	-0.03	-0.03	-0.02	-0.02	-0.02	-0.02	-0.02	-0.10	-0.06	-0.04	-0.03	-0.02
	Rank-weighted gap(G_w^{after} -G_w^{before})	-0.42%	-0.38%	-0.32%	-0.28%	-0.24%**	-0.67%	-0.61%	-0.55%	-0.52%	-0.51%	-1.67%	-1.58%	-1.35%**	-1.08%**	-0.80%*

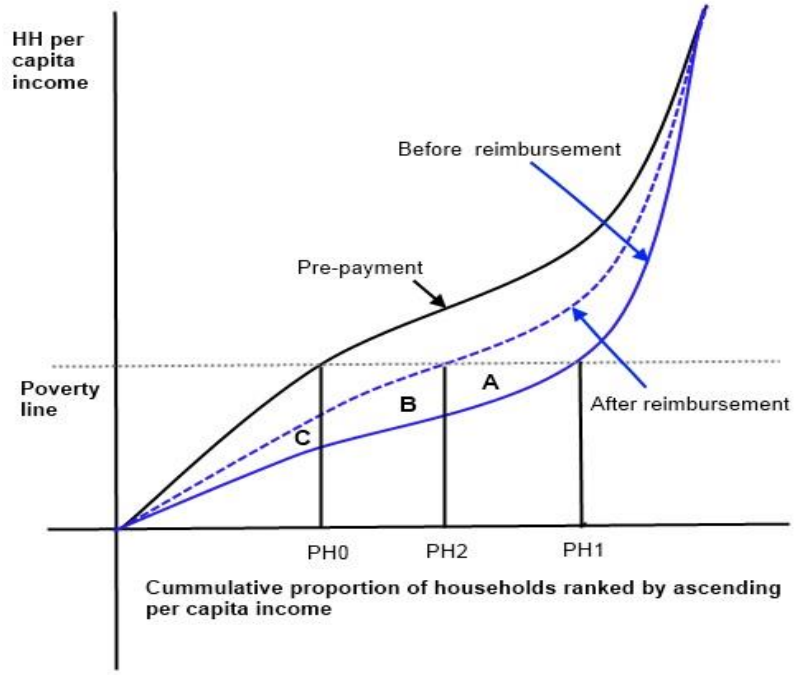
(Note: * indicates p < 0.1, ** p < 0.05, bold p < 0.01)

Table 5 OOP payments and the poverty gap before and after the NCMS reimbursement

	Total sample (N=1,846)			Chronic conditions (N = 351)		
	US$2.15/day	**US$1.08/day**	**NPL**	**US$2.15/day**	**US$1.08/day**	**NPL**
Poverty gap (RMB)						
Gross of health payment gap (PH_0)	11.60	1.61	0.14	15.87	2.17	0.02
Pre-reimbursement gap (PH_{before})	19.48	7.35	4.96	36.85	20.03	16.21
Post-reimbursement gap (PH_{after})	18.37	6.65	4.48	34.16	17.94	14.50
Health payment -induced gap before reimbursement (PH_{before} - PH_0)	7.88	5.74	4.83	20.98	17.86	16.19
Absolute reduction by the NCMS (PH_{before} - PH_{after})	1.11*	0.70	0.48	2.69	2.10	1.71
Mean positive gap (RMB)						
Gross of health payment mean positive gap (MPG^{gross})	159.79	80.48	31.58	166.64	62.17	7.83
Pre-reimbursement mean positive gap(MPG^{before})	236.60	246.78**	436.34**	351.77	420.68	851.13
Post-reimbursement mean positive gap(MPG^{after})	226.09	240.76**	435.39**	326.11	403.55	913.59
Health payment -induced mean positive gap before reimbursement (MPG^{before}- MPG^{gross})	76.81	166.29	404.75	185.13	358.51	843.30
Absolute reduction by the NCMS (MPG^{before}- MPG^{after})	10.51	6.01	0.95	25.66	17.13	-62.46

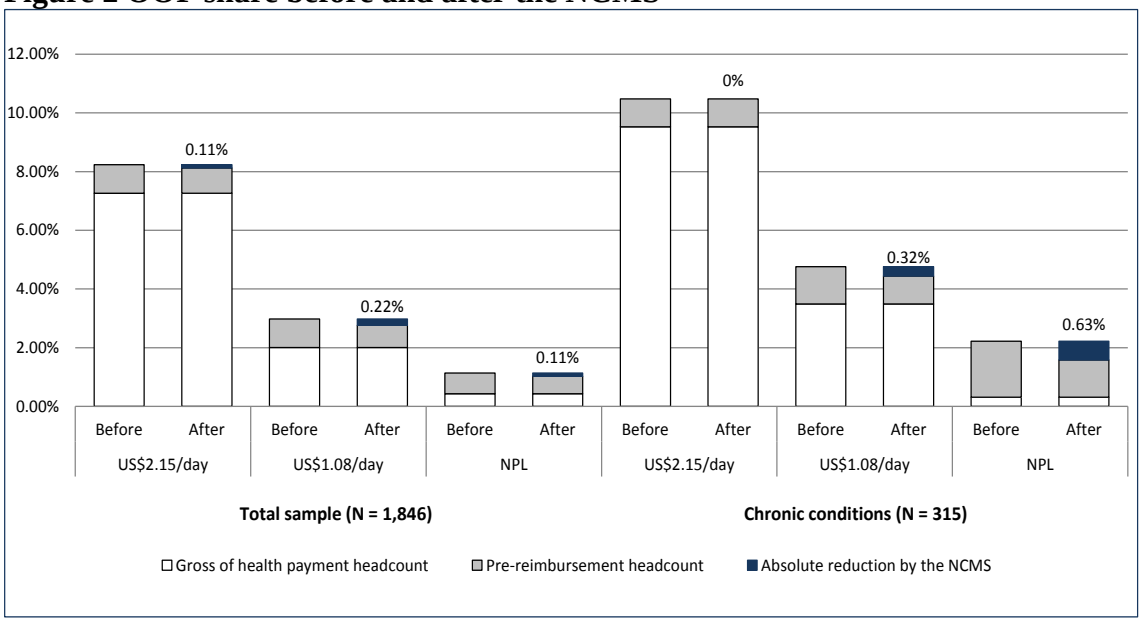
(Note: * indicates $p < 0.1$, ** $p < 0.05$, $p < 0.01$)

Figure 1 Stylise Pen's Parade for household per capita income gross and net of outpatient costs under the NCMS



(Note: PH0 is the poverty headcount gross of health payments; PH1 and PH2 are the poverty headcounts net of health payments before and after the NCMS reimbursement).

Figure 2 OOP share before and after the NCMS



(Note: Before: before the NCMS reimbursement; After: after the NCMS reimbursement. Chinese NPL = Chinese National Poverty Line)