Objective
To measure the incidence and severity of health payment-induced poverty of rural households under the New Cooperative Medical Scheme (NCMS) in rural Shandong, China.

Method
We collected primary data from a household survey to identify catastrophic health payments and measure associated health payment-induced poverty in a county of Shandong province. From a stratified random cluster sample of 3101 households, 375 households that might be at risk of catastrophic payments were identified and interviewed. A validity test of the screening method was conducted, from which we obtained the adjusted total number of households with catastrophic payments in the sample of 3101. The health payment-induced poverty incidence and severity were compared without and with NCMS reimbursements.

Results
Before the NCMS intervention, 5.06% of the sample households fell below the national poverty line due to health payments in 2004, compared with 4.03% after reimbursements. With NCMS reimbursements, the health payment-induced poverty gap of those households still remaining below the Chinese national poverty line dropped by 19.2% to an average of 977.2 Yuan.

Conclusion
Out-of-pocket health payments remain a severe burden for rural households. Financial protection from the NCMS was limited.

Keywords
China, health insurance, poverty, New Cooperative Medical Scheme, rural

KEY MESSAGES
- The New Cooperative Medical Scheme in Linyi County provided only modest protection from health payment-induced poverty for households.
- Health payments have a significant impact on the prevalence of poverty in rural China. It is important to link a health protection system with poverty reduction in these areas.

Introduction
Health payments can be impoverishing and thus induce more ill health. The links between ill health and poverty are well documented (Fabricant et al. 1999; Musgrove and Zeramdini 2001; Meessen et al. 2003; Falkingham 2004; Lawson 2004; van Damme et al. 2004; Jackson et al. 2006a, 2006b; McIntyre et al. 2006), and concern for the health of poor people is a central issue in development (Wagstaff 2001, 2002; OECD and WHO 2005). The World Health Organization (WHO), the World Bank and United Nations agencies, as well as other non-governmental organizations, have advocated widely investment...
in health to reduce poverty (World Bank 2000; Claeson et al. 2001; ADB 2004; WHO 2005). Providing health insurance coverage for rural populations is increasingly regarded as not only an important health protection measure, but also an important poverty reduction strategy.

In China, the financial burden created by ill-health has risen to the extent that out-of-pocket health payments cause many households to fall into poverty, and others already in poverty to sink deeper. According to China’s 1998 National Health Survey, households officially identified as poor by the local government perceived disease and injury to be a major cause of their poverty (Liu et al. 2003). Van Doorslaer et al. (2006) found that out-of-pocket health spending in China in 2000 increased the dollar-a-day poverty headcount by 2.6%. Reducing the level of poverty generated by ill-health is a high priority on the national agenda (Liu and Rao 2006). As a result, since 2003 the New Cooperative Medical Schemes (NCMSs) have been developed as pilot projects in many rural counties, with the objective of protecting the rural population from the risk of being pushed into poverty due to ill-health.

The purpose of this study is to examine the impoverishing impact of health payments in an area of rural Shandong Province, where the NCMS was piloted. We use two indicators. The first is the ‘health payment-induced poverty headcount’, which calculates the percentage of households in the rural community at risk of an impoverishing health payment. The second is the ‘health payment-induced poverty gap’, which measures the average severity of impoverishing health payments for each affected household.

Cooperative medical schemes in China
Cooperative medical schemes are not new in China. Indeed China’s rural Cooperative Medical Scheme (CMS), adopted in the 1960s and 1970s by Maoist communes, was once regarded as a successful model for the developing world to ensure that health care was accessible to farmers and their families. China abandoned collective farming, the funding source of the CMS, under the post-1979 economic reform, and in 1982 abolished its communes. Consequently the CMS collapsed and coverage fell from 90% at its peak to less than 10% in the 1990s (Liu et al. 1996), and out-of-pocket payment for medical care now prevails for rural people.

There was an attempt beginning in 1994 to provide rural health insurance when the Chinese Ministry of Health, in collaboration with international agencies, trialled community-based health financing in a number of rural counties throughout China. However, without financial support from the central government and their own provincial governments, these rural community medical schemes (RCMS) were limited in scale to risk-pooling at the township level, with the premiums charged to farmers often too low for schemes to be sustainable (Yu et al. 1998; Carrin et al. 1999). In due course, many broke down owing to insufficient financial and political support, but some were revived and others persisted, especially those in the richer counties (Jackson et al. 2005).

By 2003, 79% of the rural population was not protected by any kind of health insurance (Centre for Health Statistics and Information, Ministry of Health 2004). Medical costs were rising along with China’s high economic growth, and were becoming a significant burden for farmers. It was reported that the average hospital admission expenditure in rural areas had increased from 613 Yuan in 1993 to 2649 Yuan in 2003 (Centre for Health Statistics and Information, Ministry of Health 2004). It is acknowledged in China that medical expenditure is an important cause of rural poverty. One study found that 7.22% of the rural population were living below the locally defined poverty line, and 45% of these poor households were below the poverty threshold because of out-of-pocket medical expenses (Liu et al. 2003).

A priority of the central government has been to reform rural health financing. A New Cooperative Medical Scheme (NCMS) was initiated in 2003 as a pilot in more than 300 rural counties. The NCMS is defined as a mutual help and risk-pooling health protection system, organized and supported by four levels of government (central, provincial, county and township) and involving voluntary participation by the rural population. The NCMS, now expanding beyond the initial pilot areas, will reach the majority of China’s 800 million rural population by 2010 (Central Committee of the CPC and the State Council 2002).

This new millennium model is an improvement on the previous model of the 1990s in two ways. Firstly, provincial governments must contribute financially to the NCMS in counties under their jurisdiction; for the less developed central and western China, the central government also provides an annual subsidy of 10 Yuan for each person who joins the NCMS. Local governments (provincial, municipal and county or township) in total pay at least 10 Yuan per person to match the individual premium of 10 Yuan. Secondly, NCMS subscribers come from larger risk-sharing pools at the county level (population 500 000–1 million) in contrast to the RCMS of the 1990s, which were pooled at the township level (population 10 000–50 000).

One explicit goal of NCMS policy is to ‘reduce illness-induced poverty’ in rural households (Central Committee of the CPC and the State Council 2002). The central government expects that implementation of the NCMS will alleviate financial hardship and help prevent illness-induced poverty. Therefore, hospitalization and other catastrophic medical payments are its specific targets. Here we report on this new millennium model and measure health payment-induced poverty under the NCMS using a case study of Linyi County, an NCMS pilot in Shandong Province.

Setting and methods
NCMS in Linyi County
Linyi County is one of the seven pilot NCMS counties in Shandong Province. It is a typical agricultural county with a total population of 519 300, of whom 81% are farmers. Linyi’s economy ranks in the middle of the Shandong county range; the net annual income of the agricultural population averaged 3031 Yuan in 2003 (Bureau of Statistics of Linyi County 2004). Funding resources available to the NCMS in Linyi were also around the middle level for the seven Shandong pilot counties, at 23 Yuan per person per year (10 Yuan from the farmer and a total of 13 Yuan from governments at different levels). Coverage of the NCMS in Linyi was relatively high; when it started in August 2003, coverage was 93.5%, increasing to
94.6% in 2004. The benefit package of Linyi’s NCMS was similar to those of most other counties, covering hospital outpatient and inpatient services. Outpatient reimbursements averaged 20% of total expenses. Inpatients received discounts of 20–80% of total expenses; the higher the expenses, the higher the benefit up to a ceiling of 10,000 Yuan per person per year (see Table 1 for details of the benefit package).

Health payment-induced poverty

Health payment-induced poverty is defined as poverty entirely attributable to health payments and is measured by the difference between poverty before health payments are subtracted from total household income and poverty after they are subtracted. It occurs when health payments in a given year actually push a household below the poverty line (‘health payment-induced poverty’), or further below the poverty line (‘health payment-deepened poverty’). Facing impoverishing health expenditure, households may adopt many methods to cope with the payments (Flores et al. 2008), which may influence household income. Our health payment-induced poverty definition and measurement assume that household income is not responsive to the health payments and associated variation of income is ignored.

To determine whether a household was protected against health payment-induced poverty, the thresholds used for poverty were the international poverty lines of US$1.08 per day and US$2.15 per day at 1993 purchasing power parity (PPP), and the Chinese national poverty line (NPL), which in 2004 was a net annual income of 668 Yuan per capita (based on the minimum calorie intake method). To make the results comparable internationally, we also applied the international poverty lines when measuring the health payment-induced poverty headcount.

Table 1 Benefit package of the NCMS in Linyi County

<table>
<thead>
<tr>
<th>Items</th>
<th>Detail of benefit package</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outpatient reimbursement</td>
<td>20% of total expenses (drugs and medical expenses)</td>
</tr>
<tr>
<td>Inpatient reimbursement</td>
<td>Expenses ≤1000 Yuan, 30% of total expenses</td>
</tr>
<tr>
<td></td>
<td>1001–3000 Yuan, 40%</td>
</tr>
<tr>
<td></td>
<td>3001–5000 Yuan, 50%</td>
</tr>
<tr>
<td></td>
<td>5001–8000 Yuan, 60%</td>
</tr>
<tr>
<td></td>
<td>8001–10,000 Yuan, 70%</td>
</tr>
<tr>
<td></td>
<td>Expenses &gt;10,000 Yuan, 80%</td>
</tr>
<tr>
<td>Deductible</td>
<td>None</td>
</tr>
<tr>
<td>Ceiling</td>
<td>10,000 Yuan</td>
</tr>
<tr>
<td>Essential drug list</td>
<td>Drug expenses on the essential drug list are covered.</td>
</tr>
<tr>
<td>Other expenses covered</td>
<td>Migrants’ expenses for hospitalization at uncontracted hospitals (people who join the scheme but migrate to urban areas for work)</td>
</tr>
<tr>
<td>Expenses excluded</td>
<td>Drugs and expenses excluded under urban employees’ health insurance scheme.</td>
</tr>
<tr>
<td></td>
<td>Expenses at uncontracted health facilities.</td>
</tr>
<tr>
<td></td>
<td>Expenses due to alcoholism, suicide, accident, violence, injury, criminality, and occupational injury.</td>
</tr>
<tr>
<td></td>
<td>Expenses for hospitalization after getting notice of discharge.</td>
</tr>
</tbody>
</table>

We have followed the approach of Wagstaff and van Doorslaer (2003) and adapted two indices to measure health payment-induced poverty under the NCMS. They are the health payment-induced poverty headcount (incidence) and the health payment-induced poverty gap (intensity). The former, the headcount, focuses only on households in poverty caused by health payments. The latter, the gap, describes how much a household’s per capita income, after deducting payments for health care, is below the threshold of the poverty line.

Without reimbursement, households paid the full costs of medical services and for some the costs were impoverishing. Under the NCMS, part of the medical expenses was reimbursed. As out-of-pocket payments were reduced by the reimbursement, some households’ health payments ceased to be impoverishing, and the severity of impoverishing health payments for households remaining in poverty after reimbursement was alleviated.

Figure 1 illustrates health payment-induced poverty under the NCMS from the two viewpoints of poverty headcount and poverty gap. The x-axis shows the cumulative proportion of households ranked by ascending per capita income. The y-axis shows household per capita incomes. The solid curve represents the household income distribution before health payments, the dotted curve traces the situation with reimbursement of health payments and the dashed curve traces the presumed situation if health payments were not reimbursed. These three curves cross the poverty line at three points, which show the poverty headcount (PH) under three different conditions. The difference between the poverty headcounts without (PH₁) and with (PH₂)
reimbursement is the headcount reduction (PH$_2$–PH$_1$) under the scheme, and the difference between PH$_0$ and PH$_1$ is the health payment-induced poverty headcount. The shaded area between the dotted and dashed curves under the poverty line and to the left of the vertical line at PH$_2$ is the poverty gap reduction for households remaining in poverty with reimbursement.

Data collection

The dataset used was a household survey initially designed for identifying households with catastrophic health payments. In 2005, we used a stratified cluster sampling method to obtain a sample of rural households under the jurisdiction of Linyi County. We divided the 10 townships into three groups according to their socio-economic status estimated by local officials. From each group, we randomly selected one township. From each of the three townships, we randomly selected villages until the number of households reached about 1000 per township. Consequently, we obtained a sample of 3101 households (consisting of 12 725 people) from a total of 19 villages, accounting for 10.1% of the total population in the three study townships. Our study was limited to this sample of 3101 households, from which we identified households that had potentially incurred catastrophic medical payments.

Identifying households with catastrophic health payments in 2004

Because of limited resources, it was not possible to interview all 3101 households. A total of 375 potential catastrophic households were identified in this sample using (i) NCMS claims data and (ii) interviews with key informants (village heads, village doctors and women’s leaders). We defined potential catastrophic households as those belonging to one or more of the following three categories.

The first category, identified either by claims data or key informants, comprised households from which a household member had been hospitalized during 2004. The assumption was that hospitalization was usually expensive, so that households with members who had been hospitalized were at high risk of incurring catastrophic medical bills.

The second category, identified by key informants, comprised households not in the first category but which had members who had chronic and/or serious illnesses but were not hospitalized. These households might have consumed multiple outpatient services. Cumulated outpatient costs could be catastrophic for the family.

The third category, also identified by key informants, was poverty-stricken households that were known to have incurred medical payments in 2004, but not large enough payments for inclusion in the other two categories. Relatively low expenses could be catastrophic for the very poor.

Household interviews

All the 375 potentially catastrophic households identified from our sample of 3101 households were interviewed to establish if they were truly catastrophic. Respondents were either household heads or their spouses. The interviews averaged 1½ hours and were conducted during May 2005 when it was not a busy time for farmers in Shandong.

Data were collected from the households on health payments and income using a detailed household questionnaire. Health payments included all household members’ medical expenses for both outpatient and inpatient care during the year 2004. For this study, we excluded non-medical direct expenses related to treatment-seeking like transport and food, and other indirect costs like loss of income due to illness.

The 2004 income measured was an aggregate of four categories of income: household production (10 categories), wage incomes of household members, transfer income (gifts, pensions, remittances, welfare) and property income (interest, rents). Using such direct measures of income, instead of using expenditure data, avoids the pitfalls of rapid estimates of income based on household expenditure. This is relevant for China, where household expenditure is often distorted by the propensity to save for emergencies and thus is not a good proxy for household income. Indeed, China has the highest saving rate in the world (Qian 1988; Kraay 2000), and savings are security against illness costs (Wu 2001). General information on income, health payments, reimbursement and hospital admission of the 375 households is shown in Table 2.

Validity test of our screening method

To ensure we had not missed any catastrophic payment households in the sample and to demonstrate the robustness of our results, we conducted a validity test of our method. The test was a rapid appraisal of neighbouring households of the 375 potential catastrophic households and was conducted as follows.

Each of the 375 potentially catastrophic households was matched with one screen-negative neighbour (whose dwelling was located nearest to or opposite the household that had been interviewed) to confirm that this neighbour did not have a catastrophic medical payment in 2004. Rapid appraisal questions were put to the neighbours to determine whether they in fact had catastrophic payments but were missed by our screening method. If rapid appraisal results were positive, then the household head (or spouse) was interviewed using the same questionnaire as used for the 375 potentially catastrophic households. Eight (2.1%) of the neighbouring households turned out to be false negatives, and this meant that we had...
to adjust the estimated total number of catastrophic households in our sample. The screening method for detecting households with catastrophic health payments was valid. False positives were quickly identified at interview and reclassified as negative. Negative screening tests were rarely false: 97.9% of negative results were correct. We could thus assess 3101 representative Linyi households with interviews needed for only 383 (375 + 8). Such efficiency made it feasible for us to undertake the time-consuming task of collecting detailed estimates of income and expenditure.

**Estimation of health payment-induced poverty**

To obtain direct estimates of health payment-induced poverty in the Linyi village population, data were required on all households that incurred any health expenses in 2004. The 375 households interviewed in this study did not include all households that incurred health payments in 2004; but they did include all households with hospital admissions, most households with chronic/serious illnesses that had only sought outpatient care and most ‘poor’ households that incurred medical expenses in that year. Some households that were marginally ‘poor’ and incurred ‘small’ medical expenses in 2004 may not have been included. Such households, however, probably accounted for a small proportion of all households that incurred medical expenses, and a small proportion of households pushed below the poverty line due to medical expenses. The rapid appraisal test among 375 screen-negative households was conducted to test their true situation with respect to catastrophic payments, and impoverishing health payments in the screen-negative sample households were estimated. Only 1.6% of the screen-negative households had impoverishing health payments before reimbursement in 2004. Thus, it is believed that the results from the available datasets can provide reasonable estimates of impoverishing health payments in the sample of the Linyi village population.

Estimation of the health payment-induced poverty headcount and health payment-induced poverty gap is based on results from the screen-positive household interviews and the screen-negative household rapid appraisal test. Indicators based on the screen-positive households are firstly calculated as ‘unadjusted’ measurements.

Then, estimation of the false negatives among the 2726 screen-negative households (3101 minus 375) is an extrapolation based on the eight false negatives found among the matched sample of the 375 screen-negative households who were neighbours of the 375 potential catastrophic households. The results are used to adjust the impoverishing health payment indicators derived from the screen-positive household interviews. The adjusted indicators are presented and assumed to be true indicators for the sample of the Linyi village population.

**Results**

**Health payment-induced poverty headcount under the NCMS**

Before health payments, 35 households or 1.13% of the sample of the Linyi village population (n = 3101) were below the Chinese NPL of 668 Yuan per capita per year. These households already in poverty before any health payment were pushed further into poverty following health payments. In addition, 157 previously non-poor households were pushed below the poverty line after paying for health care. Thus the health payment-induced poverty headcount was 5.06% of the sample households without reimbursement; with reimbursement, the frequency was reduced by 32 (20.4%) to 125 households, and the headcount was 4.03% of the sample.

**Figure 2** Health payment-induced poverty headcount under the NCMS in the Linyi village population sample, 2004.

Notes: without = without reimbursement; with = with reimbursement; NPL = national poverty line.

Health payment-induced poverty headcount fell to 3.29%; i.e. NCMS reimbursements added another 3.68 percentage points to the poverty headcount in the sample of the Linyi village population. With reimbursement, the health payment-induced poverty headcount fell to 3.29%; i.e. NCMS reimbursements led to a 10.6% decline in the impoverishing impact of health payments.

**Health payment-induced poverty gap under the NCMS**

For households remaining below the poverty line with reimbursement, at the Chinese NPL the mean health payment-induced poverty gap without reimbursement was 1210.1 Yuan. The NCMS reduced this health payment-induced mean poverty gap by 232.9 Yuan, or by 19.2% of the mean poverty gap induced by health payments (Table 3). At the US$1.08 per day poverty line, the reduction in the health payment-induced mean poverty gap by the NCMS was 222.1 Yuan per household; and 199.4 Yuan per household at the US$2.15 per day poverty line. The absolute reductions attributable to the NCMS declined from the NPL to the US$1.08 and US$2.15 poverty lines, but the percentage reduction in the health payment-induced mean poverty gap showed little difference at the three poverty lines.
5.06% of households in 2004 fell into expenditure is a financial burden for many rural households. In health payments and provide strong evidence that medical developments in China's health financing system have been many are at risk of impoverishing health payments. The recent after 30 years of economic reforms, most farmers in China are paying out-of-pocket for treatment of illness and injury, and many are at risk of impoverishing health payments. The recent in China’s health financing system have been evaluated for effects on financial protection. A few studies have measured the impact on out-of-pocket health payment (Lei and Lin 2009; Wagstaff et al. 2009; You and Kobayashi 2009). Yip and Hsiao (2009) evaluated the effectiveness of the NCMS in reducing medical impoverishment by comparing an NCMS with another experimental model scheme called Rural Mutual Health Care (RMHC), and concluded that the NCMS was less effective than the RMHC at reducing medical impoverishment. Yi et al. (2009) in their study of five provinces also found NCMS protection against catastrophic illnesses to be inadequate, with reimbursement averaging 15% of expenditure for inpatients. These studies support the conclusion from our study that health payment-induced poverty was still severe under the NCMS. Since there is no uniform NCMS in rural China, the designs of the NCMSs in different counties vary a little and this will have some influence on the impact of the NCMS in terms of financial protection. Research on the impact of different models of NCMS is needed. Our paper describes one version of the NCMS in a rural county in a large, heavily populated province, and quantified the incidence and severity of the impoverishing health payments under the NCMS. It contributes to a better understanding of health financing reform in China and would be expected to capture well the typical outcome for an NCMS in rural China.

**Poverty incidence and severity in relation to health payments for rural households**

We measured both the incidence and severity of impoverishing health payments and provide strong evidence that medical expenditure is a financial burden for many rural households. In the Linyi County sample, 5.06% of households in 2004 fell into poverty (at the NPL threshold) because of health payments, and NCMS reimbursements only reduced this incidence to 4.03%, which was still high. Yet Linyi County ranks economically in the middle among all counties of Shandong Province, and Shandong is above average economically among the provinces of China. This implies that the harsh economic effects of illness and injury in the less well-off parts of China would be worse. Moreover, many households could incur impoverishing health payments several years in a row, especially those facing chronic illnesses.

For the three poverty lines overall, NCMS reimbursement reduced by about one-fifth the health payment-induced mean poverty gap among those households below the poverty line before reimbursement (Table 3).

**Table 3** Mean poverty gaps (Yuan) across those households remaining below the poverty lines with reimbursement, 2004

<table>
<thead>
<tr>
<th></th>
<th>Chinese national poverty line(^a)</th>
<th>International poverty line, US$1.08/day</th>
<th>International poverty line, US$2.15/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-health payment (a)</td>
<td>37.4</td>
<td>54.0</td>
<td>358.0</td>
</tr>
<tr>
<td>Before reimbursement (b)</td>
<td>1247.5</td>
<td>1212.5</td>
<td>1418.7</td>
</tr>
<tr>
<td>After reimbursement (c)</td>
<td>1014.6</td>
<td>990.4</td>
<td>1219.3</td>
</tr>
<tr>
<td>Health payment-induced before reimbursement (b–a)</td>
<td>1210.1</td>
<td>1158.5</td>
<td>1060.7</td>
</tr>
<tr>
<td>Reduction by the NCMS (b–c)</td>
<td>232.9</td>
<td>222.1</td>
<td>199.4</td>
</tr>
<tr>
<td>Reduction as % of health payment-induced before reimbursement</td>
<td>19.2%</td>
<td>19.2%</td>
<td>18.8%</td>
</tr>
</tbody>
</table>

\(^a\)Chinese national poverty line in 2004 = income of 668 Yuan per capita per year.
2004 exchange rate: US$1 = 8 Yuan.

Discussion

After 30 years of economic reforms, most farmers in China are paying out-of-pocket for treatment of illness and injury, and many are at risk of impoverishing health payments. The recent in China’s health financing system have been evaluated for effects on financial protection. A few studies have measured the impact on out-of-pocket health payment (Lei and Lin 2009; Wagstaff et al. 2009; You and Kobayashi 2009). Yip and Hsiao (2009) evaluated the effectiveness of the NCMS in reducing medical impoverishment by comparing an NCMS with another experimental model scheme called Rural Mutual Health Care (RMHC), and concluded that the NCMS was less effective than the RMHC at reducing medical impoverishment. Yi et al. (2009) in their study of five provinces also found NCMS protection against catastrophic illnesses to be inadequate, with reimbursement averaging 15% of expenditure for inpatients. These studies support the conclusion from our study that health payment-induced poverty was still severe under the NCMS.

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funding levels of NCMSs in Shandong’s pilot counties were too low, as farmers still paid relatively large sums out-of-pocket.

The second factor relates to the benefit package of the scheme, which was determined by its funding level and premiums. In Linyi County the NCMS insured for both outpatient and inpatient care, and was supposed to increase reimbursements in proportion to medical expenditure. In practice, the reimbursement rates did not vary significantly between low-paying and high-paying households. Households with ≥3000 Yuan in total medical payments received reimbursement of 18.7%, compared with 16.9% for households with total payments of <3000 Yuan. With reimbursement rates averaging at 17.8%, co-payments were still high. Thus, the scheme in Linyi County could not alter the predicaments of many households.

**Limitations**

This study quantified health payment-induced poverty and measured the reduction in the level of impoverishing health payments among rural households under the NCMS. The strength of our methodology is that we have two indicators of poverty—health payment-induced poverty headcount and poverty gap—to inform on whether NCMS reimbursements have achieved their goal of reducing health payment-induced poverty. However, there are several limitations.

First, the households included in the dataset were selected based on screening to identify households with catastrophic health payments. Households without catastrophic health payments were not represented in the financial data gathered. The health payment-induced poverty headcount and poverty gap measurements are only estimates. It is not possible to obtain the incidence and severity of total poverty in the population directly from the data collected; therefore the severity of health payment-induced poverty as a fraction of total poverty in the population cannot be assessed directly.

Second, the survey only measured direct medical expenses (health payments) to assess health payment-induced poverty. Other direct non-medical costs due to ill-health, such as food while hospitalized and transportation, were not counted. The exclusion of direct non-medical costs may have underestimated the poverty impact of health care expenditure.

Third, impoverishing health payments do not necessarily mean that households with such payments are pushed into chronic poverty. This is because households may smooth income and consumption through borrowing, savings and other social resources (Morduch 1995; Dercon 2002). Coping mechanisms adopted by households may minimize the effects of ill-health on the welfare of all concerned (Chima et al. 2003). Some households may recover from the financial shock quite quickly and experience only transient poverty. Only those that cannot overcome the shock of ill-health and associated expenditure will suffer long-term low welfare and chronic poverty. A longitudinal study is needed to trace the long-term effect of impoverishing health payments in generating chronic poverty. The poverty analysis in this cross-sectional study cannot provide insight into changes in chronic poverty, but it does produce estimates pointing to poverty dynamics and indicating the severity of the problem of health payments as a cause of poverty in rural China.

Fourth, the quantification of financial burdens experienced by rural people is based on self-reported income and expenditure data. There might be under-reporting of income and over-reporting of expenses, although efforts to minimize reporting errors were made during questionnaire design and field investigation.

**Conclusion**

This study was conducted in only one county and only 2 years after implementation of the NCMS schemes. Large-scale and long-term study of the NCMS is needed to provide more evidence. However, the findings of this study are relevant and valuable for policy makers. They reveal that health payments have a large effect on the prevalence of poverty and indicate that it is important to link a health protection system with poverty reduction in rural areas. Under the NCMS it should be the responsibility of governments at all levels to provide more support for households trapped in poverty due to out-of-pocket health payments.

**Acknowledgements**

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**Endnote**

1 It should be noted that 1.13% is not the percentage of all poor households in the population. It does not include those poor households who did not have a health payments in 2004.

**References**


