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Catastrophic Payments and Poverty in Cambodia: Evidence from Cambodia Socio-Economic Surveys 2004, 2007, 2009, 2010 and 2011

Chhim Chhun, Tong Kimsun, Ge Yu, Timothy Ensor and Barbara McPake

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Mr Chhim Chhun	Research Associate, Cambodia Development Resource Institute (chhun@cdri.org.kh)
Dr Tong Kimsun	Senior research fellow, Cambodia Development Resource Institute (kimsun@cdri.org.kh)
Dr Ge Yu	Research Fellow, University of Leeds.
Prof. Tim Ensor	Director of the Leeds Institute of Health Sciences, University of Leeds.
Prof. Barbara McPake	Director of ReBuild Consortium and Director of Nossal Institute for Global Health, the University of Melbourne

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CDRI
☞ 56, Street 315, Tuol Kork, Phnom Penh, Cambodia
✉ PO Box 622, Phnom Penh, Cambodia
☎ (855-23) 881384/881701/881916/883603
🖷 (855-23) 880734
E-mail: cdri@cdri.org.kh
Website: www.cdri.org.kh

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Contents

List of Tables

Acronyms

CSES	Cambodia Socio-Economic Survey
ReBUILD	Research for Building Pro-poor Health Systems during Recovery from Conflict

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Abstract

This paper estimates the incidence and intensity of catastrophic health payments and their impoverishment effects and identifies the sources of catastrophic payments by using the nationally representative household survey, the Cambodia Socio-Economic Survey conducted in 2004, 2007, 2009, 2010 and 2011 by the National Institute of Statistics. We find that the proportion of households with out-of-pocket health spending exceeding the 10 percent threshold (the incidence of catastrophic payments) declined from 12.3 percent in 2004 to 9.2 percent in 2011, and the amount of out-of-pocket health spending as a share of total household expenditure exceeding the 10 percent threshold (the intensity of catastrophic payments) also dropped, from 2.0 percent in 2004 to 1.3 percent in 2011. Better-off households are more likely to exceed the payment threshold than poor households. The level of consumption per capita, household size, distance between household and commune health centre, and households in rural areas are positively associated with catastrophic payments, while education and access to safe drinking water and sanitary toilets have played a very important role in reducing the likelihood of incurring catastrophic payments. Out-of-pocket health spending seems to increase poverty incidence and the poverty gap. Its effects on poverty incidence are diminished over time, but poor households become even poorer. The evidence indicates that health-related programmes to reduce catastrophic health spending should be well targeted and public health interventions in the water and sanitation sector that promote access to safe drinking water and hygienic toilets can be an indirect approach to address the problem.

Key words: out-of-pocket health spending, household expenditure, catastrophic health payments, poverty.

1. Introduction

Out-of-pocket spending is the most important source of health financing in most developing countries, including Cambodia. Payments pose considerable challenges for household finances, many households using scarce savings, borrowing from friends, relatives and moneylenders or selling assets. Catastrophic health expenditure can have long-lasting effects on household welfare as indebted households sell productive assets. Ultimately, households may need to reduce essential current consumption.

Given the disadvantages of out-of-pocket health spending, the World Health Organization (2010) encourages pre-payment mechanisms to pool the cost of health care. Programmes including health equity funds, commune-based health insurance and maternal health vouchers have been introduced in Cambodia since 2000. To implement these programmes effectively and efficiently, it is important to know on whom the burden of health payments falls. Catastrophic payments are defined as the share of expenditure on health services in total household expenditure or non-food expenditure (household capacity to pay) in excess of a certain threshold. Evidence on the size of these payments will inform policymakers of which groups are most in need of protection. For example, if the incidence is likely to occur among rural households, there is a need for risk pooling of health financing in rural areas.

In Cambodia there are very few studies of catastrophic payments and their impact on household welfare. These studies mostly rely on small-scale surveys and examine the relationship between catastrophic payments and indebtedness (Kassie 2000; Van Dammer et al. 2004), poverty (Kassie 2000; Wilkinson, Holloway and Fallavier 2001; Van Dammer et al. 2004) and landlessness (Wilkinson, Holloway and Fallavier 2001). In 2014, two papers assessed out-of-pocket and catastrophic expenditure on health in Cambodia (Hanvoravongchai and Fernandes 2014; Hanvoravongchai et al. 2014) using descriptive statistics. They concluded that catastrophic payments are the major cause of indebtedness, poverty and landlessness; however, neither measured the incidence and intensity of catastrophic payments nor identified their causes. This paper aims to measure the incidence and intensity of catastrophic payments and their impoverishment effects, and to identify the key determinants of catastrophic payments in Cambodia by using the nationally representative multipurpose household survey—the Cambodia Socio-Economic Survey—conducted in 2004, 2007, 2009, 2010 and 2011.

Section 2 of the paper reviews previous studies related to catastrophic payments and their impact. Section 3 describes the data used for the analysis and discusses methodologies to define catastrophic payments, assess the impoverishment effects and identify the key underlying factors of catastrophic payments incidence. Section 4 presents the empirical findings. Section 5 concludes.

2. Literature review

Studies on catastrophic health payments and their national impoverishment effects are almost non-existent in Cambodia. Extensive studies have been undertaken elsewhere, including Vietnam (Wagstaff and van Doorslaer 2003), India (Flores et al. 2008; Ghosh 2010), Uganda (Kagarura, Bruno and Ddumba-Ssentamu 2014), Bangladesh, China, Hong Kong, India, Indonesia, Korea Republic, Kyrgyz Republic, Malaysia, Nepal, Philippines, Sri Lanka, Thailand and Vietnam (van Doorslaer et al. 2007; O'Donnell et al. 2005).

Wagstaff and van Doorslaer (2003) used the Vietnam Living Standards Surveys in 1993-94 and 1997-98 to measure the incidence and intensity of catastrophic health payments and their impact on poverty in Vietnam. They found that the incidence and intensity were reduced during the study period, and the poor were less likely to suffer from catastrophic health payments in terms of both incidence and intensity. The poverty impact of catastrophic health payments had declined over time. The impact on poverty was largely due to the poor becoming poorer rather than the non-poor becoming poor.

Ghosh (2010) used the 1993-94 and 2004-05 National Sample Survey to measure catastrophic payments and impoverishment due to out-of-pocket health spending in India. Adopting the methodology proposed by Wagstaff and van Doorslaer (2003), Ghosh (2010) defined catastrophic payments as out-of-pocket health payments in excess of 10 percent of total household spending. The results showed that out-of-pocket health expenditure increased over the study period, and the relationship between the share of out-of-pocket health spending in total expenditure and per capita state domestic product was positive. The incidence of catastrophic health payments increased 2.3 percentage points during the study period but was likely to be concentrated more among the better-off households, and approximately 4.4 percent of the total population fell below the poverty line due to out-of-pocket health expenditure. These findings highlight that broad-based risk pooling and prepayment are likely to be a better health financing strategy for Indian households because they limit out-of-pocket health spending, reduce the likelihood of impoverishment and improve the utilisation of health care services by the poor, especially the poorest.

Kagarura, Bruno and Ddumba-Ssentamu (2014) used the 2005-06 Uganda National Household Survey data to examine the effect of catastrophic payments on household poverty. Having defined catastrophic payments as out-of-pocket health spending that exceeded 10 percent of total household income/expenditure, the study found that the incidence of catastrophic payments amounted to 19 percent and tended to occur among all socio-economic groups, but more in rural areas and among the non-poor. Out-of-pocket health spending was likely to increase poverty by 5.8 percent. The authors argued that the government might need to provide free health care for all or to establish prepaid schemes at all levels to protect against catastrophic expenditure should it be unable to expedite the National Social Health Insurance Scheme.

Van Doorslaer et al. (2007) conducted a comprehensive study on catastrophic payments and their impoverishment effects in 14 Asian countries—Bangladesh, China, Hong Kong, India, Indonesia, Republic of Korea, Kyrgyz Republic, Malaysia, Nepal, Philippines, Sri Lanka, Thailand and Vietnam—that together account for 81 percent of the Asian population. They revealed that rich households in the majority of low and middle-income countries are more likely to spend a large proportion of total household income on health care, catastrophic payments tend to concentrate in better-off households in most low-income countries, and out-of-pocket health spending is still the primary cause of poverty.

Unlike other studies that simply measured catastrophic payments and their impoverishment effects, O'Donnell et al. (2005) attempted to identify the key determinants of the incidence of catastrophic payments in Bangladesh, Hong Kong, India, Sri Lanka, Thailand and Vietnam by using probit regression. In general, they found that households with more members or higher per capita consumption were more likely to incur catastrophic payments, and the incidence was higher in rural areas and among households without sanitary toilets and safe drinking water. This evidence suggested a need to develop risk pooling of health financing in rural areas, and that public sanitation interventions can be effective in addressing the high incidence of catastrophic payments.

3. Data and methodology

3.1 Sample selection

With financial and technical support from various international partners including the Asian Development Bank, United Nations Development Programme, World Bank, United Nations Children's Fund, International Labour Organization and Swedish International Development Cooperation Agency, the National Institute of Statistics conducted 10 rounds of a nationally representative household survey—the Cambodia Socio-Economic Survey (CSES)—between 1993 and 2011. Not all the rounds are comparable due to questionnaire design, sampling design and survey timing.[1] Comparisons between surveys conducted before and after 2004 are particularly problematic and not recommended. It is important to note that the 2004 survey started in November 2003 and lasted until February 2005, with a total sample of 867 villages and 15,000 households, while the remaining surveys were conducted within a calendar year. To be consistent with other surveys, observations collected in 2003 and 2005 were dropped from the study. The 2004 and 2009 surveys sampled around 700 villages while in 2007, 2008, 2010 and 2011, only half the number of villages and about one-third of the households were sampled (Table 1).

Table 1: Number of households interviewed, 2004-11

	2004	2007	2008	2009	2010	2011
Phnom Penh	1116	737	729	1113	744	747
Other urban	1710	628	626	1332	640	638
Other rural	8999	2188	2154	9526	2208	2207
Total	11825	3553	3509	11971	3592	3592

Source: CSES 2004, 2007-2011

In CSES 2007, 2009, 2010 and 2011, monthly health expenditures for all household members were recorded in the non-food expenditure section and for each member for the last four weeks in the health section. For CSES 2004, health expenditure was recorded only in the health section, while for CSES 2008 health expenditure was recorded only in the non-food section. Having examined the survey data closely, we note that the proportion of households with health expenditure generated from the non-food expenditure section is higher than that from the health section (Table 2). This implies that the interviewed households tended to respond to survey questions on health expenditure in the non-food and health sections differently. To be consistent, this study is based on data from the 2004, 2007, 2009, 2010 and 2011 surveys using information in the health section.

Table 2: Proportion of households with health expenditure (percent)

	2004	2007	2008	2009	2010	2011
Non-food section		67	72	78	74	72
Health section	47	42		45	51	45

Source: Authors' calculation

1 See Chhim et al. (forthcoming) for a detailed explanation of the incomparability of CSES.

3.2 Methodology

3.2.1 Catastrophic payments

Households are defined as incurring catastrophic payments if the share of out-of-pocket health expenditure in total household income or expenditure exceeds a specific threshold. O'Donnell et al. (2007) noted that income does not always reflect medical spending since some households can sometimes finance health care from their savings rather than from a reduction in current consumption. This will make no difference to the share of out-of-pocket health expenditure in income, but the share in expenditure for households without savings will be larger than for those with savings. This indicates that expenditure could be a better indicator of catastrophic health payments than income. If the measurement of catastrophic payments is based on the expenditure approach, the most common threshold used in the literature is 10 percent on the basis that this is likely to impose great difficulties on household living conditions (Pradhan and Prescott 2002; Rason 2002; Wagstaff and van Doorslaer 2003). Other thresholds are used in other studies, ranging from 5 to 25 percent of expenditure (e.g. O'Donnell et al. 2007), while World Health Organization researchers Xu et al. (2003) used 40 percent of non-food expenditure as the threshold. Following the literature, we will use the thresholds of 5, 10, 15, 20 and 25 percent for our analysis.

Three main indicators are commonly used for catastrophic payments analysis: the incidence of catastrophic payments or headcount; intensity of catastrophic payments or catastrophic payments overshoot; and the mean positive overshoot. The incidence of catastrophic payments is simply the proportion of households with the share of out-of-pocket health expenditure in household expenditure exceeding the chosen threshold.

If we assume that T is out-of-pocket health expenditure, X is total household expenditure, and Z is a threshold, then the incidence of catastrophic payments is

$$H = \frac{1}{N}\sum_{i=1}^{N} E\left[\frac{T_i}{X_i} > Z\right]$$

where N is the sample size and $E[\cdot]$ is an indicator function that equals 1 if $\frac{T_i}{X_i} > Z$ and zero if otherwise. However, the incidence of catastrophic payments does not capture the amount of health expenditure exceeding the threshold, Z, as a proportion of total expenditure. To fill this gap, catastrophic payments overshoot is given by

$$O = \frac{1}{N}\sum_{i=1}^{N}\left[\left(\frac{T_i}{X_i}\right) - Z\right] E\left[\frac{T_i}{X_i} > Z\right]$$

Having both the incidence of catastrophic payments and catastrophic payments overshoot, the mean positive overshoot is defined as

$$MPO = \frac{O}{H}$$

O'Donnell et al. (2005) also note that the above measurements are insensitive to household well-being, since the incidence of catastrophic payments simply counts equally all households that have health expenditure exceeding the threshold and the overshoot counts equally all health spending exceeding the threshold. To gain a better understanding of whether the impact

of catastrophic payments falls on the poor or the rich, concentration indices for the incidence (C_E) and intensity (C_O) of catastrophic payments are estimated using convenience regression or covariance method. The positive (negative) value of C_E indicates that the rich (the poor) are likely to pay for health care exceeding the threshold; similarly, the positive (negative) value of C_O implies that the intensity of catastrophic payments tends to be greater among the rich (the poor).

3.2.2 Key determinants of catastrophic payments

A dummy variable is defined equal to one if out-of-pocket health spending exceeds the thresholds (a binary dependent variable). Given the limitations of the linear probability model that generates a predicted probability that is less than zero or greater than one and contains heteroskedasticity (Wooldridge 2003), probit regression is used to estimate the key determinants of catastrophic payments. More precisely, we estimate the binary response models taking the form

$$P(y = 1|\, x) = G(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k)$$

where G is the standard normal cumulative distribution function, which takes a value between zero and one for all real numbers. The independent variables x include total household consumption per capita, household size, household head characteristics (age, educational attainment, gender, main occupation and marital status), sanitation proxied by the availability of a toilet and safe drinking water, the distance to the nearest commune health centre and district referral hospital and the location of the dwelling (urban vs. rural). The descriptive statistics on both dependent and independent variables are presented in Appendix 1.

3.2.3 Out-of-pocket health expenditure and poverty

It is widely noted that large out-of-pocket health expenditures can impoverish households (e.g. O'Donnell et al. 2005). The current standard poverty measurement, which looks at total household expenditure including out-of-pocket health spending, may categorise as non-poor some households with substantial health care spending but with spending on other basic needs below a subsistence level, because total expenditure is still high.

In such an extreme case, spending on health care might be excluded from poverty estimation, or poverty will be underestimated. A problem is that not all health spending, particularly spending that might be classified as discretionary, should be excluded from the estimates of household means. To examine the effects of out-of-pocket health expenditure on poverty, the literature suggests estimating poverty on the basis of total household expenditure with and without out-of-pocket health spending. The difference between the two poverty estimates can indicate the magnitude of the impoverishing effect of health payments (Wagstaff and van Doorslaer 2003).[2]

2 Flores et al. (2008) argue that the difference between poverty estimation generated from gross consumption and net of out-of-pocket health spending developed by Wagstaff and van Doorslaer (2003) does not capture accurately the impoverishing effect of health payments. They emphasise that household health care financing strategies such as savings, asset sales, borrowing and transfers have important implications for the measurement and interpretation of the impact of health payments on poverty. If households finance a substantial proportion of their health payments from those strategies, the gross consumption of out-of-pocket health spending is not equal to non-medical consumption in the long run. For this reason, the impoverishment effect of health payments proposed by Wagstaff and van Doorslaer (2003) could overestimate the impact on transient poverty and overlook hidden chronic poverty. Using the 1995-96 Indian National Sample Survey, Flores et al. (2008) show that the impact of catastrophic health payments on poverty is seriously overestimated if health financing strategies are not taken into account. Since the sources of health financing are not available in the Cambodia Socio-Economic Survey, we were unable to adopt this approach.

If we assume that X is total household expenditure per capita, T is out-of-pocket health expenditure per capita and PL is the poverty line, then the poverty headcount that includes out-of-pocket health expenditure can be written as

$$H^{gross} = \frac{1}{N}\sum_{i=1}^{N} E\,[X_i < PL]$$

However, poverty headcount does not indicate the intensity of poverty. To address this, the poverty gap, measured as the shortfall in income or expenditure of the poor relative to the poverty line in currency units, is defined as

$$G^{gross} = \frac{1}{N}\sum_{i=1}^{N} (PL - X_i)\,E\,[X_i < PL]$$

To express the poverty gap as a proportion of the poverty line, the normalised poverty gap is given by

$$NG^{gross} = \frac{G^{gross}}{PL}$$

All poverty measures that exclude out-of-pocket health expenditure could be estimated by replacing X with $(X - T)$.

3.2.4 Poverty line

To estimate the poverty headcount and poverty gap, a poverty line needs to be constructed. In line with the government and international development partners involved in poverty analysis using the Cambodia Socio-Economic Survey, we use the poverty line published by the Ministry of Planning (2006) for 2004, World Bank (2009) for 2007, the Ministry of Planning (2013) for 2009, and updated by the authors for 2008, 2010, and 2011 using the consumer price index released by the World Bank (Table 4) for the remaining poverty line.

Table 3: Overall poverty line (riels per person per day)

	2004	2007	2008	2009	2010	2011
Phnom Penh	2351	3092	4210	6347	6684	7167
Other urban	1952	2704	3622	4352	4584	4917
Other rural	1753	2367	3447	3503	3690	3958

Sources: Ministry of Planning (2006, 2013), World Bank (2009) and authors' estimation

Table 4: Consumer price index (Phnom Penh prices=100)

	2004	2007	2008	2009	2010	2011
Phnom Penh	63.09	82.49	112.30	100.00	105.30	112.92
Other urban	49.25	64.39	86.26	80.22	84.50	90.64
Other rural	45.20	59.27	86.32	73.48	77.40	83.02

Source: World Bank (2012)

4. Empirical findings

Incidence and intensity of catastrophic health payments: Using the common threshold of 10 percent, the incidence of catastrophic payments in Cambodia fell from 12.3 percent in 2004 to 9.7 percent in 2007, increasing to 12.6 percent in 2009 before reaching 9.2 percent in 2011. Following the same pattern, the mean overshoot dropped from 2.0 percent in 2004 to 1.3 percent in 2007 and increased to 1.9 percent in 2009 before reaching 1.3 percent in 2011. Despite the fluctuations in catastrophic payments incidence and overshoot within the study period, both were lower in 2011 than in 2004. This conclusion holds even if the share of health payments in non-food expenditure is used.

Table 5: Incidence and intensity of catastrophic health payments (percent)

	2004					2011				
Out-of-pocket spending as share of total expenditure	Threshold budget share, z					Threshold budget share, z				
	5%	10%	15%	20%	25%	5%	10%	15%	20%	25%
Headcount	20.3	12.3	8.6	6.5	4.9	15.3	9.2	6.2	4.0	2.9
Overshoot	2.8	2.0	1.5	1.1	0.8	1.9	1.3	0.9	0.7	0.5
Mean positive overshoot	13.7	16.3	17.3	17.2	17.1	12.4	14.0	14.6	16.2	16.3

Out-of-pocket spending as share of non-food expenditure	Threshold budget share, z					Threshold budget share, z				
	20%	25%	30%	35%	40%	20%	25%	30%	35%	40%
Headcount	21.5	18.8	16.9	15.1	13.9	13.8	11.4	10.0	8.9	7.9
Overshoot	25.8	24.8	23.9	23.1	22.4	10.8	10.2	9.6	9.2	8.7
Mean positive overshoot	119.7	131.7	141.8	153.2	161.4	78.2	89.5	96.1	102.5	111.1

Note: See Appendix 2 for 2007, 2009 and 2010 results. Survey design has been taken into account.
Source: Authors' calculations

Concentration index: The concentration index C_E is positive for all study periods, indicating that rich households have a greater tendency to exceed the catastrophic payment thresholds than poor households. Since the concentration index C_O is also positive, the overshoot is more likely to be larger among richer households. This finding is in line with previous studies (e.g. van Doorslaer 2007). Even if health payments are assessed in relation to household capacity to pay, the concentration index C_E is still positive except for the threshold of 20 percent in 2007 and 2010, and of 25 percent in 2007.

Table 6: Distribution-sensitive catastrophic payment measures

	2004					2011				
Out-of-pocket spending as share of total expenditure	Threshold budget share, z					Threshold budget share, z				
	5%	10%	15%	20%	25%	5%	10%	15%	20%	25%
Concentration index, C_E	0.12	0.20	0.25	0.32	0.37	0.04	0.10	0.16	0.25	0.36
Rank-weighted headcount, H_W	17.9%	9.9%	6.4%	4.4%	3.1%	14.7%	8.2%	5.1%	29.9%	1.9%
Concentration index, C_O	0.33	0.39	0.45	0.50	0.56	0.21	0.29	0.35	0.42	0.47
Rank-weighted overshoot, O_W	1.8%	1.2%	0.8%	0.6%	0.4%	1.4%	0.9%	0.5%	0.3%	0.2%

Out-of-pocket spending as share of non-food expenditure	Threshold budget share, z					Threshold budget share, z				
	20%	25%	30%	35%	40%	20%	25%	30%	35%	40%
Concentration index, C_E	0.08	0.10	0.11	0.13	0.15	0.01	0.04	0.06	0.07	0.09
Rank-weighted headcount, H_W	19.8%	16.9%	15.0%	13.1%	11.8%	13.7%	10.8%	9.3%	8.3%	7.1%
Concentration index, C_O	0.42	0.43	0.45	0.46	0.47	0.28	0.30	0.32	0.33	0.34
Rank-weighted overshoot, O_W	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%

Note: See Appendix 3 for 2007, 2009 and 2010 results. Survey design has been taken into account.
Source: Authors' calculations

Key determinants of catastrophic payments: As shown in Table 7, the coefficient of total household consumption per capita is positive and statistically significant at the 1 percent level, implying that higher consumption per capita is strongly associated with a higher probability of incurring catastrophic payments for health care. This implies that better-off households are more likely to pay for health services in excess of the defined thresholds than poor households, a finding consistent with the results of concentration index C_E. If we replace total household consumption per capita by consumption quintiles, the top 20 percent of the total population are more likely to incur catastrophic payments than the bottom 60 percent. The incidence of catastrophic payments is correlated with household size. The coefficient of household members aged 0-4, 15-64 and 64+ are all positive and significant at the 1 percent level, indicating that household spending on health care rises with household size. This implies that households with young or older members have a higher probability of incurring catastrophic payments for health. Education plays a very important role in reducing the likelihood of incurring catastrophic payments. The coefficient of household head with completed primary school or higher is negative and statistically significant at the 1 percent level, suggesting that a household head with higher educational attainments is less likely to incur catastrophic payments than those who have no schooling. It is worth noting that there is no difference between household heads who have not completed primary school and those who have no schooling. This could suggest that education helps maintain the health of household members (Grossman 1972 cited in O'Donnell et al. 2005). Household head characteristics such as gender and marital status are also important determinants of catastrophic payments. Male-headed households are less likely to incur catastrophic payments than female-headed households; households with married heads are more likely to incur catastrophic payments than those with unmarried heads.[3]

3 The coefficients of male-headed households and head-married households are not statistically significant for thresholds of 15 percent and 25 percent.

Table 7: Key determinants of catastrophic payments (probit model)

	Threshold budget share, z				
	5%	10%	15%	20%	25%
Consumption per capita (log)	0.453***	0.584***	0.670***	0.787***	0.866***
Household members aged 0-4	0.114***	0.086***	0.078***	0.077***	0.067**
Household members aged 5-9	0.032**	0.030*	0.041**	0.072***	0.079***
Household members aged 10-14	0.011	0.008	0.017	0.009	-0.017
Household members aged 15-64 (male)	0.044***	0.042***	0.034**	0.032*	0.035*
Household members aged 15-64 (female)	0.080***	0.083***	0.068***	0.081***	0.081***
Household members aged 64+	0.281***	0.274***	0.247***	0.242***	0.237***
Household head age	0.001	0.000	0.001	0.002	0.001
Household head gender (1=male)	-0.137**	-0.156**	-0.087	-0.164**	-0.087
Household head marital status (1=married)	0.100*	0.112*	0.063	0.115	0.026
Household head education (1=primary incomplete)	-0.049	-0.052	-0.061	-0.043	-0.029
Household head education (1=primary completed)	-0.087**	-0.138***	-0.145***	-0.121**	-0.102*
Household head education (1=lower secondary)	-0.157***	-0.229***	-0.258***	-0.211***	-0.251***
Household head education (1=upper secondary)	-0.260**	-0.247**	-0.306**	-0.184	-0.362**
Household head education (1=technical training)	-0.313**	-0.335**	-0.457**	-0.515***	-0.483**
Household head education (1=university and higher)	-0.437***	-0.807***	-0.781***	-0.772***	-0.870***
Household head nationality (1=Khmer)	0.191**	0.290***	0.336***	0.385***	0.354***
Household head occupation (1=agriculture)	-0.031	0.003	0.003	0.019	-0.003
Household head occupation (1=industry)	-0.041	-0.035	-0.008	0.003	-0.01
Housing (1=roof : thatch, palm leaves, plastic sheet)	0.021	0.011	0.017	0.016	0.025
Housing (1=wall : bamboo, thatch, grass)	0.101***	0.117***	0.104***	0.147***	0.209***
Safe drinking water (1=piped in dwelling)	-0.155***	-0.190***	-0.206***	-0.303***	-0.329***
Toilet (1=having toilet)	-0.117***	-0.089**	-0.099**	-0.110**	-0.122**
Distance to commune health centre (log)	0.013*	0.019***	0.019**	0.020***	0.018**
Region (1=rural)	0.160***	0.250***	0.305***	0.355***	0.367***
Region (1=Phnom Penh)	-0.204**	-0.195**	-0.14	-0.018	0.077
Region (1=Plains)	-0.076	-0.133**	-0.144**	-0.123**	-0.160**
Region (1=Tonle Sap)	-0.061	-0.056	-0.025	0.028	0.01
Region (1=Coastal)	-0.041	-0.087	-0.099	-0.093	-0.065
Year (1=2007)	-0.164***	-0.171***	-0.239***	-0.222***	-0.242***
Year (1=2009)	-0.137***	-0.182***	-0.223***	-0.295***	-0.333***
Year (1=2010)	-0.172***	-0.208***	-0.252***	-0.314***	-0.368***
Year (1=2011)	-0.300***	-0.325***	-0.359***	-0.459***	-0.472***
Constant	-5.485***	-7.140***	-8.236***	-9.670***	-10.464***
Sample size	34482	34482	34482	34482	34482

Note: Significant at ***1 percent, **5 percent and *10 percent. Survey design has been taken into account.
Source: Authors' calculation.

Households that have access to sanitary toilets and safe drinking water are less likely to spend in excess of the defined thresholds of total household expenditure than those without sanitary toilets ($p<0.05$). The distance between households and health centres also appears important. Households farther from health centres or in rural areas are more likely to incur catastrophic payments—the coefficient is positive and statistically significant at the 10 percent and 1 percent levels.

Impoverishment effects: Based on the national poverty line used by the Ministry of Planning (2006, 2013), the World Bank poverty profile (2009) and the authors' estimation, out-of-pocket health spending increased the poverty headcount ratio by 3.6 percentage points in 2004 and 2.3 percentage points in 2007, then increased it slightly between 2009 and 2010 before reaching 2.0 percentage points in 2011. The poverty gap rose by 12.0 percent in 2004, declined to 11.2 percent in 2007 and rose to 15.0 percent for 2009-11. The normalised poverty gap followed the same trend as the poverty gap. This evidence suggests that the proportion of poor households declined over the study periods, but poor households seemed to be poorer due to out-of-pocket health spending.

Table 8: Effects of out-of-pocket health spending on poverty

	2004				2011			
	Gross of health payment (1)	Net of health payment (2)	Difference		Gross of health payment (1)	Net of health payment (2)	Difference	
			Absolute (3)=(2)-(1)	Relative [(3)/(1)]*100			Absolute (3)=(2)-(1)	Relative [(3)/(1)]*100
Poverty headcount ratio (%)	37.6	41.2	3.6	9.7	17.3	19.3	2.0	11.5
Poverty gap (riels)	178.0	199.3	21.3	12.0	135.5	156.4	20.9	15.4
Normalised poverty gap (%)	10.0	11.2	1.2	11.9	3.2	3.7	0.5	15.4

Note: See Appendix 4 for 2007, 2009 and 2010 results. Survey design has been taken into account.
Source: Authors' calculation

5. Conclusion and policy implications

This paper measures the incidence and intensity of catastrophic payments and their effects on household welfare, particularly poverty, and identifies key sources of catastrophic payments by using the Cambodia Socio-Economic Survey in 2004, 2007, 2009, 2010 and 2011. To the best of our knowledge, this is the first attempt to provide substantial national evidence on those indicators.

Following the methodology proposed by Wagstaff and van Doorslaer (2003) and O'Donnell et al. (2005), we found that the proportion of households with out-of-pocket health spending exceeding the 10 percent threshold declined from 12.3 percent in 2004 to 9.2 percent in 2011. Similarly, the amount of out-of-pocket health spending as a share of total household expenditure exceeding the 10 percent threshold dropped from 2.0 percent in 2004 to 1.3 percent in 2011. Better-off households are more likely to exceed the payment thresholds than poor households.

Catastrophic payments are positively associated with consumption per capita, household size, household head characteristics such as marital status, distance between households and commune health centres, and living in rural areas. They are negatively correlated with household head gender and educational attainments, and access to safe drinking water and a sanitary toilet. The evidence suggests that health-related programmes to reduce catastrophic health expenditure should be well targeted. Public health interventions such as sanitary toilets or safe drinking water can indirectly address catastrophic spending.

Out-of-pocket health spending seems to have increased the poverty headcount ratio by a declining amount and the poverty gap by an increasing amount during the study periods, indicating that the effects of out-of-pocket health spending on poverty incidence diminish over time but that poor households become even poorer.

References

Chhim Chhun, Tong Kimsun, Ge Yu, Timothy Ensor and Barbara Mcpake (forthcoming). *The Impact of Health Financing Policies on Household Spending: Evidence from Cambodia Socio-Economic Survey 2004 and 2009.* Phnom Penh: CDRI.

Eddy van Doorslaer, Owen O'Donnell, Rasindra Rannan-Eliya, Aparnaa Somanathan, Shiva Raj Adhikari, Charu C. Garg, Deni Harbianto et al. 2007. "Catastrophic Payments for Health Care in Asia." *Health Economics* 16(11): 1159-1184.

Flores, Gabriela, Jaya Krishnakumar, O'Donnell Owen and Eddy van Doorslaer. 2008. "Coping with Health-care Costs: Implications for the Measurement of Catastrophic Expenditures and Poverty." *Health Economics* 17(12): 1393-1412.

Ghosh Soumitra. 2010. *Catastrophic Payments and Impoverishment Due to Out-of-pocket Health Spending: The Effects of Recent Health Sector Reforms in India.* Asian Health Policy Program Working Paper 15. Stanford, CA: Centre for Health Policy, Planning and Management, Tata Institute of Social Sciences.

Grossman, M. 1972. *The Demand for Health: a Theoretical and Empirical Investigation.* NBER Occasional Paper 119. New York: National Bureau of Economic Research.

Hanvoravongchai, Piya, and Adelio Fernandes. 2014. *Out-of-Pocket and Catastrophic Expenditure on Health in Cambodia: Cambodian Demographic Health Survey 2005 and Socio-Economic Surveys 2004 and 2007 Analysis.* Phnom Penh: GIZ.

Kagarura Rwamparagi, Willy, Bruno K. Yawe and John Ddumba-Ssentamu. 2014. "Poverty Impact of Direct Payment for Health Care in Uganda." *Applied Economics and Business Review* 1(1): 1-8.

Kassie, A. 2000. *Credit and Landlessness: Impact of Credit Access on Landless in Cheung Prey and Battambang Districts, Cambodia.* Phnom Penh: Centre for Advanced Studies.

Ministry of Planning. 2006. *A Poverty Profile of Cambodia 2004.* Phnom Penh: MOP.

Ministry of Planning. 2013. *Poverty in Cambodia—A New Approach: Redefining the Poverty Line.* Phnom Penh: MOP.

O'Donnell, Owen, Eddy van Doorslaer, Rasindra Rannan-Eliya, Aparnaa Somanathan, Charu C. Garg, Piya Hanvoravongchai, Mohammed Nazmul Huq, et al. 2005. *Explaining the Incidence of Catastrophic Expenditures on Health Care: Comparative Evidence from Asia.* EQUITAP Project Working Paper 5.

O'Donnell, Owen, Eddy van Doorslaer, Adam Wagstaff and Magnus Lindelow. 2007. *Analysing Health Equity Using Household Survey Data: A Guide to Techniques and Their Implementation.* Washington, DC: World Bank.

Pradhan, M., and N. Prescott. 2002. "Social Risk Management Options for Medical Care in Indonesia." *Health Economics* 11 (5):431-46. doi: 10.1002/hec.689.

Ranson, M.K. 2002. "Reduction of Catastrophic Health Care Expenditures by a Community-based Health Insurance Scheme in Gujarat, India: Current Experiences and Challenges." *Bulletin of the World Health Organization* 80(8): 613-621.

Van Dammer, W., L. Van Leemput, Por Ir, W. Hardemand and B. Meessen. 2004. "Out-of-Pocket Health Expenditure and Debt in Poor Households: Evidence from Cambodia." *Tropical Medicine and International Health* 9(2): 273-280.

Wagstaff, Adam, and Eddy van Doorslaer. 2003. "Catastrophe and Impoverishment in Paying for Health Care: With Application to Vietnam 1993-1998." *Health Economics* 12(11): 921-934.

World Health Organization. 2010. *The World Health Report: Health Systems Financing – the Path to Universal Coverage.* Geneva: WHO.

Wilkinson, D., J. Holloway and P. Fallavier. 2001. *The Impact of User Fees on Access, Equity and Health Provider Practices. Report prepared for* the Health Economics Task Force, MOH/WHO Health Sector Reform Phase 3. ReBUILD Consortium.

Wooldridge, J.M. 2003. *Introductory Econometrics: A Modern Approach.* Cambridge, MA: MIT Press.

World Bank. 2009. *Poverty Profile and Trends in Cambodia, 2007: Findings from the Cambodia Socio-Economic Survey (CSES).* Phnom Penh: World Bank.

World Bank. 2012. "Consumer Price Index, Memo." Washington, DC: World Bank.

Xu Ke, David B. Evans, Kei Kawabata, Riadh Zeramdini, Jan Klavus and Christopher J.L. Murray. 2003. "Household Catastrophic Health Expenditure: A Multicountry Analysis." *Lancet* 362(1): 1-7.

Appendix 1: Descriptive statistics of dependent and independent variables for probit model (mean)

	2004	2007	2009	2010	2011
Consumption per capita per day (riels)	9662	9859	12373	12361	11693
Number of household members aged 0-4	0.49	0.47	0.47	0.46	0.43
Number of household members aged 5-9	0.59	0.55	0.52	0.46	0.48
Number of household members aged 10-14	0.72	0.61	0.54	0.51	0.48
Number of household members aged 15-64 (male)	1.39	1.41	1.44	1.38	1.37
Number of household members aged 15-64 (female)	1.58	1.59	1.59	1.55	1.55
Number of household members aged 64+	0.20	0.21	0.21	0.21	0.22
Household head age	44.91	45.28	45.45	45.93	46.59
Household head gender (1=male)	0.78	0.78	0.78	0.78	0.77
Household head marital status (1= married)	0.79	0.78	0.79	0.77	0.78
Household head education (1=primary incomplete)	0.43	0.48	0.44	0.48	0.47
Household head education (1=primary completed)	0.20	0.19	0.20	0.19	0.21
Household head education (1= lower secondary)	0.05	0.07	0.08	0.07	0.09
Household head education (1=upper secondary)	0.01	0.01	0.01	0.02	0.01
Household head education (1=technical training)	0.01	0.01	0.01	0.01	0.01
Household head education (1= university and higher)	0.01	0.01	0.01	0.02	0.02
Household head nationality (1=Khmer)	0.96	0.98	0.96	0.96	0.97
Household head occupation (1=agriculture)	0.51	0.52	0.53	0.49	0.53
Household head occupation (1=industry)	0.10	0.12	0.11	0.13	0.11
Housing (1= roof : thatch, palm leaves, plastic sheet)	0.29	0.20	0.16	0.14	0.12
Housing (1= wall : bamboo, thatch, grass)	0.45	0.37	0.34	0.32	0.29
Safe drinking water (1=piped in dwelling)	0.10	0.16	0.16	0.15	0.17
Toilet (1= having toilet)	0.26	0.36	0.39	0.43	0.46
Distance to commune health centre (metres)	5536	4951	4043	3874	3873
Rural (1=rural, 0=urban)	0.81	0.81	0.81	0.80	0.79
Region (1=Phnom Penh)	0.08	0.09	0.09	0.09	0.11
Region (1=Plains)	0.44	0.40	0.41	0.40	0.39
Region (1=Tonle Sap)	0.30	0.34	0.32	0.32	0.32
Region (1=Coastal)	0.08	0.07	0.07	0.07	0.07
Region (1=Plateau and Mountains)	0.10	0.10	0.11	0.11	0.11
Sample size	11808	3553	11970	3592	3592

Source: Authors' calculation

Appendix 2: Incidence and intensity of catastrophic health payments

	2007					2009					2010				
	Threshold budget share, z					Threshold budget share, z					Threshold budget share, z				
	5%	10%	15%	20%	25%	5%	10%	15%	20%	25%	5%	10%	15%	20%	25%
Out-of-pocket spending as share of total expenditure															
Headcount	16.4	9.7	6.0	4.6	3.2	20.5	12.6	8.7	6.1	4.5	18.9	11.7	7.9	5.6	3.9
Overshoot	1.9	1.3	0.9	0.7	0.5	2.7	1.9	1.3	1.0	0.7	2.5	1.8	1.3	1.0	0.7
Mean positive overshoot	11.8	13.6	15.6	14.6	14.8	13.0	14.8	15.3	15.7	15.8	13.3	15.4	16.5	17.2	18.7

	Threshold budget share, z					Threshold budget share, z					Threshold budget share, z				
	20%	25%	30%	35%	40%	20%	25%	30%	35%	40%	20%	25%	30%	35%	40%
Out-of-pocket spending as share of non-food expenditure															
Headcount	17.0	14.7	13.1	11.6	10.4	18.8	16.5	14.7	13.5	12.0	16.3	14.0	12.5	11.0	10.1
Overshoot	19.1	18.3	17.6	17.0	16.4	17.2	16.3	15.5	14.8	14.2	17.1	16.3	15.6	15.1	14.5
Mean positive overshoot	112.2	124.7	133.9	146.5	158.1	91.2	98.4	105.3	110.0	117.6	104.6	116.6	125.0	136.4	144.0

Note: Survey design has been taken into account.

Source: Authors' calculation

Appendix 3: Distribution-sensitive catastrophic payments measures

	2007					2009					2010				
	Threshold budget share, z					Threshold budget share, z					Threshold budget share, z				
	5%	10%	15%	20%	25%	5%	10%	15%	20%	25%	5%	10%	15%	20%	25%
Out-of-pocket spending as share of total expenditure															
Concentration index, C_E	0.04	0.08	0.13	0.14	0.17	0.08	0.15	0.22	0.31	0.3710	0.01	0.06	0.09	0.17	0.26
Rank-weighted headcount, H_W	15.7%	8.9%	5.2%	3.9%	2.6%	18.8%	10.6%	6.7%	4.2%	2.8%	18.8%	10.8%	7.1%	4.6%	2.9%
Concentration index, C_O	0.17	0.22	0.27	0.33	0.40	0.29	0.36	0.43	0.50	0.56	0.19	0.25	0.32	0.39	0.44
Rank-weighted overshoot, O_W	1.6%	1.0%	0.6%	0.4%	0.2%	1.8%	1.1%	0.7%	0.4%	0.3%	2.0%	1.3%	0.8%	0.5%	0.4%

	Threshold budget share, z					Threshold budget share, z					Threshold budget share, z				
	20%	25%	30%	35%	40%	20%	25%	30%	35%	40%	20%	25%	30%	35%	40%
Out-of-pocket spending as share of non-food expenditure															
Concentration index, C_E	-0.02	-0.01	0.00	0.02	0.04	0.07	0.09	0.10	0.11	0.13	-0.01	0.01	0.03	0.03	0.04
Rank-weighted headcount, H_W	17.2%	14.7%	13.1%	11.3%	10.0%	17.4%	15.1%	13.2%	11.9%	10.4%	16.4%	13.8%	12.1%	10.6%	9.7%
Concentration index, C_O	0.39	0.41	0.43	0.44	0.46	0.41	0.43	0.44	0.46	0.47	0.34	0.36	0.37	0.39	0.41
Rank-weighted overshoot, O_W	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%

Note: Survey design has been taken into account.

Source: Authors' calculation

Appendix 4: Effects of out-of-pocket health spending on poverty

	2007				2009				2010			
	Gross of health payment (1)	Net of health payment (2)	Difference		Gross of health payment (1)	Net of health payment (2)	Difference		Gross of health payment (1)	Net of health payment (2)	Difference	
			Absolute (3)=(2)-(1)	Relative [(3)/(1)]*100			Absolute (3)=(2)-(1)	Relative [(3)/(1)]*100			Absolute (3)=(2)-(1)	Relative [(3)/(1)]*100
Poverty headcount ratio (%)	31.9	34.2	2.3	7.2	21.2	23.9	2.6	12.2	18.1	20.8	2.7	14.8
Poverty gap (riels)	188.4	209.5	21.1	11.2	164.9	190.8	25.9	15.7	144.9	167.8	23.0	15.8
Normalised poverty gap (%)	7.9	8.8	0.9	11.2	4.5	5.2	0.7	16.1	3.7	4.3	0.6	16.1

Note: Survey design has been taken into account.

Source: Authors' calculation

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