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Equality in financial access to healthcare in Cambodia from 2004 to 2014

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Abstract

Since the end of its internal conflict in 1998, Cambodia has experienced tremendous developments in the social, economic and health sectors, with the government embarking on substantial reforms in health financing. Health equity funds that have improved access to public health services for poor people have gradually been extended to the entire country. Using the World Health Organization's methods for the analysis of healthcare expenditure and household survey data from the 2004, 2009 and 2014 Cambodian Socio-Economic Survey, we assessed trends in reported illness, utilization of healthcare services and associated financial burden on households. The impact of out-of-pocket expenditures for health on catastrophic health expenditures, poverty headcount and depth over the same 10-year period are presented, disaggregated by consumption quintile and place of residence (rural, urban and capital). At the aggregated national level, evolution of these indicators was very positive and correlates with a substantial increase in the capacity-to-pay of households, which reduced the average financial burden on households. However, over time inequalities grew between rural and urban areas. By 2014, the national incidence of catastrophic health expenditure was 4.9%, but four times more likely among rural households than their peers in the capital. For rural households with members seeking medical care, catastrophic health expenditure incidence was 12.3%. The impoverishment rate due to health spending among the lowest consumption quintile was 15.3%; the highest rate in this analysis. These findings suggest that economic and health sector developments have indeed benefited many Cambodian people. However, these gains mainly benefited urban residents; especially those in the capital city. We argue that more resources should be allocated to rural health services to address inequalities and healthcare-related financial hardship, which traps vulnerable people into poverty.

Keywords: Cambodia, poverty, health financing, inequality, out-of-pocket health expenditure, health economics, catastrophic health expenditure, survey

Key Messages

- In a single decade, Cambodia has seen tremendous reduction of reported illness, financial burden, catastrophic expenditure incidence and impoverishments related to healthcare.
- This positive trend at national level masks increasing inequalities between the capital, other urban and rural areas.
- New strategies are needed to reverse the current trend and not leave the poor rural areas behind.

Introduction

During the 1990s, many economies in Asia underwent profound changes, with associated negative effects on financial access to healthcare (Ensor 1999). China's market economy transition was accompanied by a deterioration and reduced access to its healthcare system (Liu *et al.* 1999). This was also the case in Vietnam (Segall *et al.* 2002) and Mongolia (Dorjdagva *et al.* 2016). The principal reasons for this reduced access and financial risk protection were a reduction in government funding for health, introduction of user fees, and an increasing presence and role of the private sector, coupled with insufficient regulation (Ensor 1997). Consequently, governments tried to remedy the situation, mostly by increasing budget allocations and improving risk-pooling arrangements for formal sector employees, in combination with tax subsidies for poor and vulnerable population groups (Lagomarsino *et al.* 2012; Yip *et al.* 2012; Van Minh *et al.* 2013). Enabling factors were mainly continued economic growth with resulting increased fiscal space.

Rapid economic growth was also observed in Cambodia, where peace was established in 1998 following decades of civil conflict. Since then the economy, mainly driven by garment exports, agriculture and construction, has grown at 7% per annum on average, with double-digit growth in some years. This economic growth more than doubled disposal income over a 6-year period (World Bank 2016a). Poverty, in official terms, was reduced from 52.3% in 2004 to 20.5% in 2011 (World Bank 2016a). The poverty rate in rural areas remains higher than urban areas (59.0 vs 39.7% in 2004 and 23.7 vs 16.1% in 2011, respectively) while many households live just slightly above the poverty line and are prone to economic shocks. Nevertheless, the poverty gap has reduced significantly (World Bank 2016b).

Unlike, the aforementioned Asian countries undergoing an economic transition, Cambodia embarked on health sector reforms relatively early, in 1996. These reforms were aimed at increasing geographical coverage to enable population access to care at public health facilities and increasingly invested government money into the sector. The poorly regulated private sector, consisting of qualified and unqualified providers, both for-profit and not-for-profit, was already well established, mainly because of the limited scope of the public health sector (Ovesen and Trankell 2010). However, to date the private sector continues to expand in size, coverage and services.

Concurrent with health sector reforms, user fees were introduced, mainly as a means to motivate staff and raise additional revenue for facilities. Since this created a barrier to access, health equity funds (HEFs) were established to enable people living in poverty to have financial access to healthcare, by reimbursing public health providers for fee-exempt services rendered to poor people. HEFs started in 2000 and were incrementally expanded until nationwide coverage was achieved in 2015 (Ministry of Health 2016).

Using nationally representative data, we provide an overview of how equity trends in access to healthcare, financial burden, catastrophic health expenditure and related impoverishment evolved between 2004 and 2014.

Methods

Data

Data were derived from the Cambodian Socio-Economic Survey (CSES), a countrywide household survey begun in 2004. CSES collects information on income, expenditures, indebtedness and consumption. CSES is conducted annually by the National Institute of Statistics of Cambodia (NIS) with a sample of about 3600 households, and at 5-year intervals (starting in 2004, and then in 2009 and 2014) with a sample of 12 000 households. The CSES questionnaire includes a health module covering healthcare-related expenditure and household members' health status and care-seeking behaviour in the 30 days prior to the survey. In this analysis, we use the data from CSES 2004, 2009 and 2014. All three surveys reported negligible non-response rates (National Institute of Statistics of Cambodia 2005, 2010, 2015).

Key variables

- ***Health status:*** The CSES data do not permit a full assessment of individual health status. Self-reported illness among individuals is therefore used as a proxy.
- ***Healthcare seeking:*** Access to healthcare is approximated through the share of individuals that sought care when self-reporting an illness. CSES collects information on the type of healthcare provider consulted; however, this includes formal medical facilities as well as non-medical care providers such as drug stores, pharmacies and traditional healers.
- ***Medical care seeking:*** Care provided by biomedical professionals such as private and public hospitals, clinics and health centres. Healthcare and medical care seeking were derived from the first provider visited.
- ***Out-of-pocket expenditure (OOPE):*** The direct spending on healthcare by households.
- ***Capacity-to-pay (CTP):*** A proxy indicator for household disposable income. It is calculated from total consumption after deduction of subsistence expenditures. The latter is derived from the average food expenditures for all households whose food share is between the 45th and 55th percentile. CTP is adjusted for household size using an equivalence factor of 0.56 in line with the methods of Xu *et al.* (2003).
- ***Financial burden:*** The share of OOPE among CTP. This variable provides an indication of the financial burden that OOPE imposes on households.
- ***Catastrophic health expenditure (CHE):*** This refers to OOPE equal to or higher than 40% of CTP.
- ***Poverty headcount:*** A household and its members are considered poor if total consumption is equal to or below the subsistence expenditure level used as the poverty line (see below on construction of consumption basket).

- *Impoverishment:* A household, and its members, is considered impoverished if its CTP is below the poverty line after deduction of OOPE.
- *Normalized poverty gap (depth):* The difference between the poverty line and the actual consumption of households, expressed as a share of subsistence expenditure.
- *Normalized poverty impact:* The difference in the normalized poverty gap before and after deduction of OOPE.

Detailed construction of the variables was also presented in a complementary article by Jacobs *et al.* (2016) assessing the determinants of OOPE and CHE.

Statistical analysis

All results presented were adjusted to monthly figures unless specified otherwise. All statistics were adjusted using the CSES sampling weights for individuals and/or households.

Values in Khmer riel (KHR) were converted to constant 2014 values using the Consumer Price Index published by NIS (2016). Figures in international dollars (Int'l.$) were derived from current KHR using the purchasing power parity conversion factor published by the World Bank (2016c).

Variables of interest are consistent with the recommendations of the World Health Organization (2013) as outlined by Xu *et al.* (2003). These were stratified by consumption quintile and household place of residence. Consumption quintiles were created at household level by ranking according to a calculated consumption basket of 20 items covering food, non-durable goods, OOPE, education, housing, utilities and fuel. In this article, consumption quintiles are referred to, in increasing order of wealth, as Q1 to Q5. Subsequent quintiles were combined by when appropriate after testing that their mean did not statistically differ at the 0.05 threshold (see below).

Place of residence was stratified according to: the capital (Phnom Penh including urban and rural localities); urban (other urban areas outside Phnom Penh); and, rural. These categories were used by NIS in its analysis of the CSES data and were already encoded in the original datasets.

Absolute and relative differences were used to assess trends over time. Absolute differences are reported in percentage points (pp) in the text, while relative differences are reported in percentages (%). Differences were deemed significantly different from zero when probability values (*P*-values) for statistics tests were under the 0.05 threshold. *P*-values between 0.05 and 0.1 were considered borderline. One-way analysis of variance, with Bonferroni multiple-comparison option, was used as the statistics test.

Means ratios were used to assess inequality and relative likelihoods between groups. Reference groups for means ratios were Q5 and the capital. Means ratios were deemed significantly different from 1 when *P*-values for statistics tests were under the 0.05 threshold, and borderline when between 0.05 and 0.1. Means ratios and means were tested against specific values or each other using the Wald test and svy command sets to account for the survey design. The term 'significant' in the text is used only to identify statistically significant results.

We assessed inequality in terms of capture of total OOPE by Q1 vs Q5. This approach is consistent with the methods propose by O'Donnell *et al.* (2008). Cumulative figures for OOPE and CTP were generated from the summation of weighted variables at household level. Normalized poverty gaps and normalized poverty impact were also calculated and interpreted following O'Donnell *et al.* (2008).

All data preparations and analyses were carried out using the statistical software package STATA 13 (StataCorp 2013).

Results

Summary statistics of key indicators are provided in Table 1.

Health status

Table 2 provides the means, means ratios and absolute differences in individual illness reporting.

The reductions in self-reported illness between 2004 and 2009 were significant among all groups. The proportion of self-reported illness among the total population fell by 3.6pp, from 18.0 to 14.4%. The largest difference across residential groups was observed in the capital, with a reduction of 9.3pp, from 19.4 to 10.1%. The differences for households in urban and rural areas were 2.0pp and 3.1pp, respectively. No significant differences could be found between 2009 and 2014.

In 2004, people residing in rural areas were borderline less likely to report being ill compared with people in the capital, with a means ratio of 0.94. By 2014, they were significantly more likely, with a means ratio of 1.65.

In 2004, only individuals in Q1 were significantly less likely to report an illness, with a means ratio of 0.85. By 2014, individuals in Q1 were borderline less likely to report an illness, and individuals in Q2 significantly less likely, with means ratios of 0.91 and 0.89, respectively.

Healthcare seeking

Table 2 also provides the means, means ratios and absolute differences in incidence of healthcare and medical care seeking among individuals with self-reported illness.

Between 2004 and 2014, the share of the population seeking care when ill increased significantly by 6.6pp, from 90.3 to 98.0%. In 2004, 96.2% of capital residents sought care when ill. Likelihood to seek care was significantly lower for residents of urban and rural areas, at means ratios of 0.95 and 0.93, respectively. However, by 2014 there was no significant difference in place of residence.

Healthcare seeking when ill did not significantly change among capital residents over the studied period. The largest significant increases among urban and rural residents were observed between 2009 and 2014, at 6.8pp and 7.0pp, respectively. By 2014, there was no significant inequality between places of residence.

Between 2004 and 2009, only Q1 saw a significant increase in healthcare seeking, of 5.0pp, from 81.6 to 86.6%. Between 2009 and 2014, care seeking when ill increased significantly for all quintiles, by 10.5pp in Q1 and 4.2pp in Q5. By 2014, only individuals in Q1 were significantly less likely to seek care when ill, with a means ratio of 0.98.

Medical care seeking

Medical care seeking when ill increased significantly at the population level in both 5-year intervals (Table 2). Between 2004 and 2014, it increased by 32.5pp, from 52.4 to 84.9%. Observed increases were significant for both urban and rural dwellers. In the capital, the increase was only significant between 2004 and 2009, by 6.2pp, from 85.2 to 91.4%.

Inequality in medical care seeking across localities decreased from 2004 to 2014, whereby the means ratio for urban residents was no longer significant. Rural dwellers were still significantly less

Table 1. Key indicators at population level for 2004, 2009 and 2014 (mean; year-to-year absolute and relative differences)

		Mean			Difference (absolute; relative)			
		2004	2009	2014	2004–09		2009–14	
All households								
Household capacity-to-pay per month	[nominal KHR]	227 024	551 757	806 398	324 733*	143%	254 641*	46%
	[constant 2014 KHR]	418 578	644 855	806 398	226 278*	54%	161 543*	25%
	[Int'l.$]	207	378	505	171*	83%	127*	34%
Household out-of-pocket expenditure per month	[nominal KHR]	24 793	45 527	77 708	20 734*	84%	32 181*	71%
	[constant 2014 KHR]	45 713	53 209	77 708	7 496	16%	24 499*	46%
	[Int'l.$]	22.6	31.2	48.7	8.6*	38%	17.5*	56%
Household out-of-pocket expenditure as a share of capacity-to-pay [%]		8.7%	7.1%	7.4%	−1.6%*	−18%	0.3%	3.7%
Household catastrophic health expenditure [% of households]		7.1%	5.2%	4.9%	−1.9%*	−27%	−0.2%	−4.8%
Household impoverishment due to healthcare spending [% of households]		3.1%	2.2%	1.4%	−0.9%*	−28%	−0.8%*	−36%
Households that sought care								
Household out-of-pocket expenditure per month	[constant 2014 KHR]	96 899	120 428	157 929	23 529*	24%	37 501*	31%
	[Int'l.$]	47.8	70.6	98.9	22.7*	48%	28.3*	40%
Household out-of-pocket expenditure as a share of capacity-to-pay [%]		18.4%	16.1%	15.0%	−2.3%*	−13%	−1.1%*	−6.8%
Household catastrophic health expenditure [% of households]		15.0%	11.7%	10.0%	−3.3%*	−22%	−1.7%*	−14%
Household impoverishment due to healthcare spending [% of households]		6.6%	5.1%	2.90%	−1.5%*	−23%	−2.2%*	−43%
Households that sought medical care								
Household out-of-pocket expenditure per month	[constant 2014 KHR]	130 245	142 315	173 316	12 071	9.3%	31 001*	22%
	[Int'l.$]	64.3	83.4	109	19.1*	30%	25.1*	30%
Household out-of-pocket expenditure as a share of capacity-to-pay [%]		21.6%	18.0%	16.1%	−3.7%*	−17%	−1.9%*	−10%
Household catastrophic health expenditure [% of households]		19.6%	14.1%	11.1%	−5.5%*	−28%	−3.0%*	−21%
Household impoverishment due to healthcare spending [% of households]		7.3%	5.7%	3.1%	−1.6%*	−22%	−2.6%*	−46%

*P-value<0.05. **0.05<P-value<0.1.

likely to seek medical care when ill, despite an increase of the means ratio from 0.57 to 0.89.

Between 2004 and 2014, medical care seeking in Q1 increased significantly by 38.8pp, from 43.1 to 81.9%. By 2014, individuals in Q1 to Q4 were significantly less likely to seek medical care. The likelihood for Q1 and Q2 did not differ significantly (P-value = 1), at 0.90 and 0.88, respectively. Q3 and Q4 means ratios also did not differ significantly (P-value = 0.95), at 0.93 and 0.95, respectively. When combined, means ratios for Q1 to Q2 and Q3 to Q4 differed significantly from each other (P-value < 0.05) and from one (P-value < 0.05).

Financial burden

Table 3 provides detailed statistics in healthcare-related financial burden for all households, and for households whose members sought care and medical care.

Between 2004 and 2009, the financial burden of healthcare fell significantly for all groups but Q1. The national average decreased by 1.6pp (18%), from 8.7 to 7.1%. The largest reduction was observed in the capital, with a decrease of 4.4pp (62%), from 7.1 to 2.7%. Over the same period, the financial burden in rural areas decreased by 1.2pp (13%), from 9.1 to 7.9%. From 2009 to 2014, only a borderline increase of 0.5pp (6.9%) was observed for households in rural areas.

For households with individuals who sought care, the financial burden at national level decreased significantly in both 5-year periods. Between 2004 and 2014, the average financial burden fell by 3.4pp (18%), from 18.4 to 15.0%. The fall was significant for households from all areas between 2004 and 2009, but the only significant decrease between 2009 and 2014 was in rural areas.

Between 2004 and 2014, households that sought medical care also experienced a significant decrease in their financial burden of 5.6pp (26%), from 21.6 to 16.1%. The largest decrease was observed in the capital with a change of 6.4pp (65%), from 13.4 to 8.0%. Trends were similar to the ones observed for households that sought care.

In 2004, only households in rural areas had a significantly higher likelihood of financial burden, at a means ratio of 1.27. In 2009, means ratios for both urban and rural areas were significant, at 1.69 and 2.88, respectively. By 2014, means ratios were still significant and had increased to 2.00 for urban and 3.35 for rural residents.

The financial burden of households in urban and rural areas when seeking medical care was significantly higher in 2004. By 2009, means ratios were still significant and had increased. Between 2009 and 2014, means ratios had decreased but remained significant. Overall, between 2004 and 2014, means ratios increased from 1.30 to 1.43 in urban areas, and 1.76 and 2.18 in rural areas. Similar trends could be observed for households that sought care.

Between 2004 and 2009, the financial burden of care decreased significantly in all quintiles, irrespective of care seeking behaviour. Between 2009 and 2014, significant decreases occurred for Q1 to Q3 when seeking healthcare, and for Q1 to Q4 when seeking medical care.

Households in Q1 had significantly lower financial burden from 2004 to 2009, with means ratios of 0.69 in 2004 and 0.82 in 2009. By 2014, Q1 to Q4 had significantly lower financial burden. The inequality in financial burden for Q1 and Q2 did not differ significantly (P-value = 1), at 0.63 and 0.64, respectively. Q3 and Q4 means

Table 2. Self-reported illness and care seeking among individuals in 2004, 2009 and 2014, by place of residence and consumption quintile (mean; means ratio; year-to-year absolute difference)

		Mean			Means ratio			Difference[a] (absolute)	
		2004	2009	2014	2004	2009	2014	2004–09	2009–14
Self-reported ill									
Place of residence	capital	19.4%	10.1%	9.4%	1.00	1.00	1.00	−9.3%*	−0.7%
	urban	15.2%	13.2%	13.0%	0.78*	1.31*	1.38*	−2.0%*	−0.2%
	rural	18.2%	15.1%	15.5%	0.94**	1.50*	1.65*	−3.1%*	0.4%
Quintile	Q1	16.0%	13.2%	13.8%	0.85*	0.93	0.91**	−2.8%*	0.6%
	Q2	17.5%	14.0%	13.4%	0.93	0.99	0.89*	−3.5%*	−0.6%
	Q3	18.4%	15.1%	14.9%	0.98	1.06	0.99	−3.3%*	−0.2%
	Q4	19.2%	15.6%	15.2%	1.02	1.10*	1.01	−3.6%*	−0.4%
	Q5	18.8%	14.2%	15.1%	1.00	1.00	1.00	−4.6%*	0.9%
All		**18.0%**	**14.4%**	**14.5%**				**−3.6%***	**0.1%**
Seeking care when ill									
Place of residence	capital	96.2%	95.2%	97.3%	1.00	1.00	1.00	−1.0%	2.1%
	urban	91.2%	91.6%	98.4%	0.95*	0.96**	1.01	0.4%	6.8%*
	rural	89.6%	91.1%	98.1%	0.93*	0.96*	1.01	1.5%*	7.0%*
Quintile	Q1	81.6%	86.6%	97.1%	0.86*	0.92*	0.98*	5.0%*	10.5%*
	Q2	89.3%	89.2%	97.5%	0.94*	0.94*	0.99	−0.1%	8.3%*
	Q3	91.8%	92.5%	98.5%	0.97*	0.98	1.00	0.7%	6.0%*
	Q4	92.5%	93.3%	98.2%	0.98	0.99	0.99	0.8%	4.9%*
	Q5	94.6%	94.4%	98.7%	1.00	1.00	1.00	−0.2%	4.3%*
All		**90.3%**	**91.4%**	**98.0%**				**1.1%***	**6.6%***
Seeking medical care when ill									
Place of residence	capital	85.2%	91.4%	93.2%	1.00	1.00	1.00	6.2%*	1.8%
	urban	55.7%	73.6%	91.2%	0.65*	0.81*	0.98	17.9%*	17.6%*
	rural	48.2%	66.2%	83.4%	0.57*	0.72*	0.89*	18.0%*	17.2%*
Quintile	Q1	43.1%	58.3%	81.9%	0.64*	0.72*	0.90*	15.2%*	23.6%*
	Q2	45.8%	63.0%	79.8%	0.68*	0.78*	0.88*	17.2%*	16.8%*
	Q3	47.7%	68.0%	84.4%	0.71*	0.84*	0.93*	20.3%*	16.4%*
	Q4	54.9%	71.1%	86.5%	0.81*	0.88*	0.95*	16.2%*	15.4%*
	Q5	67.6%	80.7%	91.0%	1.00	1.00	1.00	13.1%*	10.3%*
All		**52.4%**	**68.6%**	**84.9%**				**16.2%***	**16.3%***

[a]Values reported as 0.0% are under 0.05%. *P-value < 0.05. **$0.05 < P$-value < 0.1.

ratios also did not differ significantly (P-value = 1), at 0.80 and 0.80. When combined, means ratios for Q1 to Q2 and Q3 to Q4 differed significantly from each other (P-value < 0.05) and from one (P-value < 0.05). Similar patterns and trends were found for households that sought care or medical care. Such patterns or trends were not observed for CTP, which is illustrated by quintile in Figure 1.

From 2004 to 2014, average household CTP nationally increased significantly by 93%, from Int'l.$207 to Int'l.$505 per month (Table 1). Over the same period, OOPE also increased significantly by 70%, from Int'l.$22.6 to Int'l.$48.7 per month (Table 1). By 2014, Q1 accounted for 4.0% of the cumulative OOPE in the country, and Q5 for 60.4%. The former changed significantly from 2004 (P-value < 0.05), increasing by 32.5%. Between 2004 and 2014, households in rural areas saw a significant increase (P-value < 0.05) in their share of cumulative OOPE, by 16.2pp (23.9%), from 67.8 to 84.0%. In the capital, the share decreased significantly (P-value < 0.05) by 13.1pp (65.8%), from 19.9 to 6.8%.

Catastrophic health expenditure

Figure 2 illustrates the trend and pattern in CHE among households according to healthcare seeking. Figure 3 illustrates the trend and pattern of CHE by quintile while Table 4 provides more details; namely the means, means ratios, and absolute and relative differences.

Between 2004 and 2009, incidence of CHE decreased significantly by 1.9pp (27%), from 7.1 to 5.2%. Significant decreases were observed for all places of residence. The reduction for the capital and urban areas was 3.3pp (66%) and 3.1pp (61%), respectively. Among households in rural areas, even with the highest incidence across areas of 7.5% in 2004, the decrease was smaller at 1.6pp (21%). There were no significant decreases after 2009.

Between 2004 and 2014, inequality increased for households in rural areas, which were significantly more likely to experience CHE. Over the period, means ratios increased from 1.49 to 4.03. No significant difference in the likelihood to experience CHE between households in the capital and in urban areas was found.

For households that sought care, the incidence of CHE at national level decreased significantly in both 5-year periods. Between 2004 and 2014, the mean value decreased by 5.0pp (33%), from 15.0 to 10.0%. The fall was significant across households in all places of residence between 2004 and 2009. However, only households in rural areas saw a significant decrease between 2009 and 2014.

Between 2004 and 2014, households that sought medical care experienced a significant decrease in incidence of CHE by 8.5pp

Table 3. Financial burden related to healthcare in 2004, 2009 and 2014, by place of residence and consumption quintile (mean; means ratio; and, year-to-year absolute and relative difference)

		Mean			Means ratio			Difference[a] (absolute; relative)			
		2004	2009	2014	2004	2009	2014	2004–09		2009–14	
All households											
Place of residence	capital	7.1%	2.7%	2.5%	1.00	1.00	1.00	−4.4%*	−62%	−0.2%	−8.1%
	urban	6.7%	4.6%	5.0%	0.93	1.69*	2.00*	−2.0%*	−31%	0.4%	9.0%
	rural	9.1%	7.9%	8.4%	1.27*	2.88*	3.35*	−1.2%*	−13%	0.5%**	6.9%
Quintile	Q1	6.5%	6.0%	6.0%	0.69*	0.82*	0.63*	−0.5%	−7.8%	−0.1%	−0.9%
	Q2	8.2%	6.8%	6.1%	0.86**	0.92	0.64*	−1.4%*	−17%	−0.7%	−10%
	Q3	9.0%	7.6%	7.6%	0.95	1.03	0.80*	−1.4%*	−16%	0.0%	−0.3%
	Q4	10.1%	7.7%	7.6%	1.06	1.04	0.80*	−2.4%*	−24%	−0.1%	−0.8%
	Q5	9.5%	7.4%	9.5%	1.00	1.00	1.00	−2.1%*	−22%	2.1%*	29%
All		**8.7%**	**7.1%**	**7.4%**				**−1.6%***	**−18%**	**0.3%**	**3.7%**
Households seeking care											
Place of residence	capital	13.2%	7.4%	7.9%	1.00	1.00	1.00	−5.8%*	−44%	0.5%	6.3%
	urban	15.4%	11.2%	11.1%	1.16	1.51*	1.41*	−4.2%*	−27%	−0.1%	−0.6%
	rural	19.3%	17.4%	16.1%	1.46*	2.34*	2.04*	−2.0%*	−10%	−1.3%*	−7.4%
Quintile	Q1	16.8%	15.1%	13.3%	0.91	0.93	0.71*	−1.7%**	−10%	−1.9%*	−12%
	Q2	17.8%	15.9%	13.0%	0.97	0.97	0.70*	−1.9%*	−11%	−2.9%*	−18%
	Q3	18.7%	16.8%	14.8%	1.02	1.03	0.80*	−1.9%*	−10%	−1.9%*	−12%
	Q4	19.9%	16.1%	14.9%	1.09	0.98	0.80*	−3.9%*	−19%	−1.2%	−7.5%
	Q5	18.4%	16.4%	18.6%	1.00	1.00	1.00	−2.0%	−11%	2.2%**	14%
All		**18.4%**	**16.1%**	**15.0%**				**−2.3%***	**−13%**	**−1.1%***	**−6.8%**
Households seeking medical care											
Place of residence	capital	13.4%	7.5%	8.0%	1.00	1.00	1.00	−5.9%*	−44%	0.5%	7.0%
	urban	17.4%	12.3%	11.5%	1.30*	1.64*	1.43*	−5.1%*	−29%	−0.8%	−6.4%
	rural	23.6%	19.8%	17.5%	1.76*	2.64*	2.18*	−3.8%*	−16%	−2.3%*	−12%
Quintile	Q1	19.5%	17.1%	14.2%	0.95	1.01	0.74*	−2.4%*	−12%	−2.9%*	−17%
	Q2	21.3%	18.3%	14.5%	1.04	1.08	0.76*	−3.0%*	−14%	−3.8%*	−21%
	Q3	22.4%	19.4%	16.1%	1.09	1.14	0.84*	−3.0%*	−13%	−3.3%*	−17%
	Q4	23.6%	17.9%	15.7%	1.15*	1.05	0.82*	−5.7%*	−24%	−2.2%*	−12%
	Q5	20.6%	17.0%	19.2%	1.00	1.00	1.00	−3.6%*	−17%	2.2%	13%
All		**21.6%**	**18.0%**	**16.1%**				**−3.7%***	**−17%**	**−1.9%***	**−10%**

[a]Values reported as 0.0% are under 0.05%. *P-value < 0.05. **0.05<P-value < 0.1.

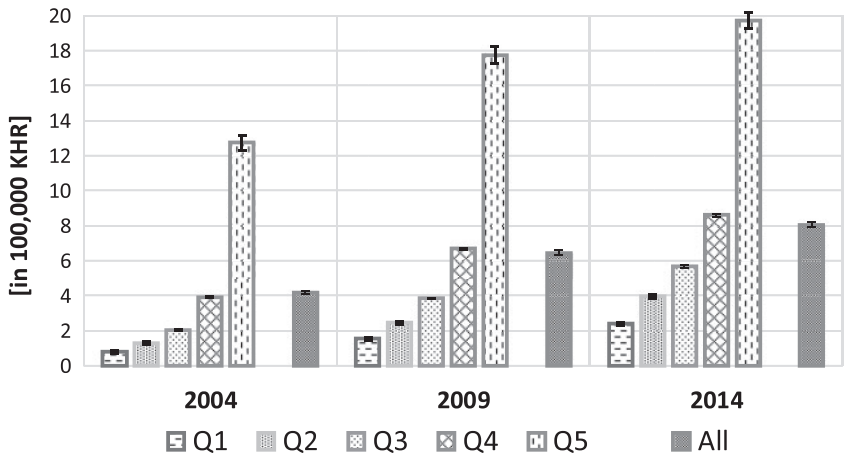

Figure 1. Capacity-to-pay among all households (in constant 2014 KHR) for 2004, 2009 and 2014, by consumption quintile and year (mean; 5% error bars).

(43%), from 19.6 to 11.1%. Among households residing in rural areas that sought medical care, incidence of CHE decreased significantly in each 5-year period. Between 2004 and 2014, the decrease was 9.7pp (44%), from 22.0 to 12.3%.

Between 2004 and 2009, the incidence of CHE decreased significantly for Q3 to Q5, irrespective of healthcare-seeking behaviour. Between 2009 and 2014, trends were less clear. Incidence significantly decreased for Q2. In Q5, it significantly increased by 2.4pp

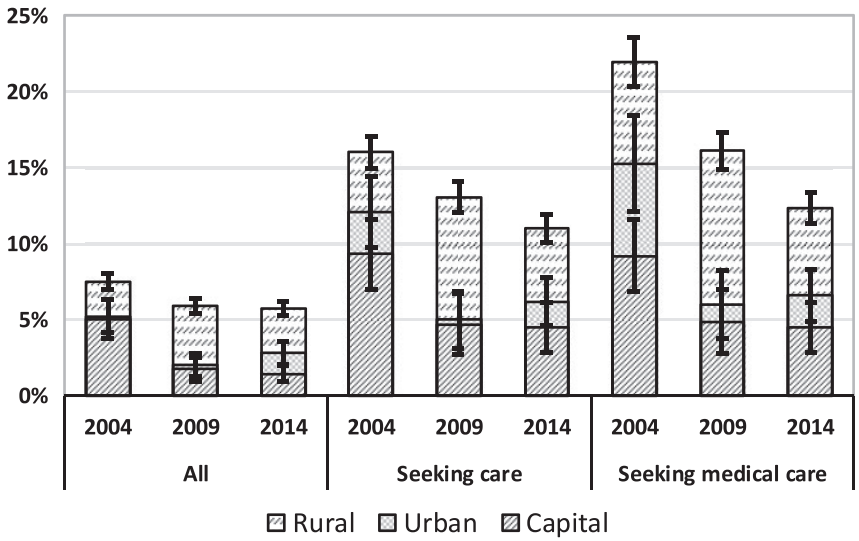

Figure 2. Incidence of catastrophic health expenditure for all households, households that sought care, and households that sought medical care for 2004, 2009 and 2014 by place of residence and year (mean; 5% error bars).

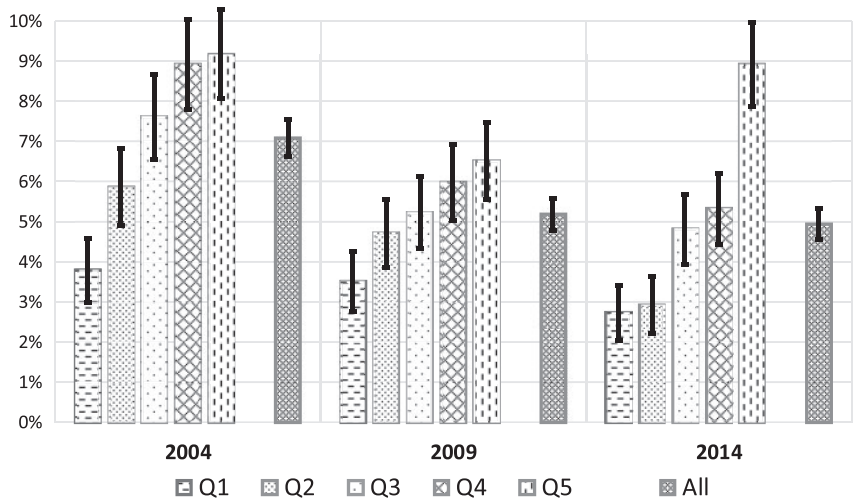

Figure 3. Incidence of catastrophic health expenditure among all households for 2004, 2009 and 2014, by consumption quintile and year (mean; 5% error bars).

(37%), from 6.5 to 8.9%. Households in Q1 and Q2 that sought medical care saw a significant decrease, and those in Q3 and Q4 a borderline decrease.

In 2004, households in Q1 that sought medical care were significantly less likely to experience CHE, with a means ratio of 0.71. In 2009, no significant inequality could be found across quintiles. By 2014, Q1 to Q4 had significantly lower likelihoods of CHE. Means ratios for Q1 and Q2 did not differ significantly (P-value = 1) at 0.39 and 0.41, respectively. Means ratios for Q3 and Q4 also did not differ significantly (P-value = 1) at 0.58 and 0.61. When combined, means ratios for Q1 to Q2 and Q3 to Q4 differed significantly from each other (P-value < 0.05) and from Q5 (P-value < 0.05). Similar patterns and trends were found for households that sought healthcare and medical care.

Impoverishment and poverty gap

Table 5 provides the trends and patterns of healthcare-related impoverishment.

Between 2004 and 2014, the incidence of healthcare-related impoverishment at national level decreased significantly by 1.7pp (54%), from 3.1 to 1.4%. From 2009 onwards, no healthcare-related impoverishment was reported in the capital. In 2014, only households in rural areas were significantly more likely to be impoverished.

Between 2004 and 2014, incidence of impoverishment among households that sought care decreased significantly by 3.7pp (56%), from 6.6 to 2.9%. In the same period, the incidence among households that sought medical care also decreased significantly by 4.2pp (57%), from 7.3 to 3.1%. Impoverishment was most common among households in rural areas that sought medical care, but decreased significantly by 5.3pp (60%), from 8.9 to 3.6%.

In 2004, all households in Q1 were already considered poor. Between 2009 and 2014, as the poverty headcount fell, impoverishment incidence in Q1 increased significantly by 3.0pp (93%), from 3.2 to 6.2%. By 2014, impoverishment incidence was 13.8 and 15.3% for Q1 households that sought care and medical care, respectively. Also, by 2014 impoverishment incidence among Q5 households did not differ significantly from zero.

Table 4. Catastrophic health expenditure incidence in 2004, 2009 and 2014, by place of residence and consumption quintile (mean; means ratio; year-to-year absolute and relative difference)

		Mean			Means ratio			Difference[a] (absolute; relative)			
		2004	2009	2014	2004	2009	2014	2004–09		2009–14	
All households											
Place of residence	capital	5.0%	1.7%	1.4%	1.00	1.00	1.00	−3.3%*	−66%	−0.3%	−17%
	urban	5.2%	2.1%	2.8%	1.04	1.19	1.96	−3.1%*	−61%	0.7%	33%
	rural	7.5%	5.9%	5.8%	1.49*	3.43*	4.03*	−1.6%*	−21%	−0.2%	−3.0%
Quintile	Q1	3.8%	3.5%	2.7%	0.41*	0.54*	0.30*	−0.3%	−7.4%	−0.8%	−22%
	Q2	5.9%	4.7%	2.9%	0.64*	0.72*	0.33*	−1.2%	−20%	−1.8%*	−38%
	Q3	7.6%	5.2%	4.8%	0.83	0.80	0.54*	−2.4%*	−31%	−0.4%	−8.1%
	Q4	8.9%	6.0%	5.3%	0.97	0.92	0.60*	−2.9%*	−33%	−0.7%	−11%
	Q5	9.2%	6.5%	8.9%	1.00	1.00	1.00	−2.7%*	−29%	2.4%*	37%
All		**7.1%**	**5.2%**	**4.9%**				**−1.9%***	**−27%**	**−0.2%**	**−4.8%**
Households seeking care											
Place of residence	capital	9.3%	4.7%	4.5%	1.00	1.00	1.00	−4.6%*	−50%	−0.2%	−4.6%
	urban	12.1%	5.0%	6.2%	1.30	1.06	1.39	−7.1%*	−59%	1.2%	25%
	rural	16.0%	13.1%	11.0%	1.72*	2.79*	2.46*	−2.9%*	−18%	−2.1%*	−16%
Quintile	Q1	9.7%	8.8%	6.0%	0.55*	0.61*	0.35*	−0.9%	−10%	−2.8%**	−31%
	Q2	12.7%	11.0%	6.2%	0.72*	0.76	0.36*	−1.7%	−13%	−4.8%*	−44%
	Q3	15.7%	11.5%	9.4%	0.89	0.80	0.54*	−4.2%*	−27%	−2.1%*	−19%
	Q4	17.7%	12.5%	10.4%	1.00	0.87	0.60*	−5.2%*	−29%	−2.1%	−17%
	Q5	17.7%	14.4%	17.4%	1.00	1.00	1.00	−3.3%**	−19%	3.0%	21%
All		**15.0%**	**11.7%**	**10.0%**				**−3.3%***	**−22%**	**−1.7%***	**−14%**
Households seeking medical care											
Place of residence	capital	9.2%	4.9%	4.5%	1.00	1.00	1.00	−4.3%*	−47%	−0.4%	−7.5
	urban	15.3%	6.0%	6.6%	1.66*	1.23	1.46	−9.3%*	−61%	0.6%	9.9%
	rural	22.0%	16.1%	12.3%	2.38*	3.31*	2.74*	−5.9%*	−27%	−3.8%*	−23%
Quintile	Q1	14.3%	11.7%	7.0%	0.71**	0.78	0.39*	−2.7%	−19%	−4.7%*	−40%
	Q2	17.6%	13.8%	7.4%	0.88	0.92	0.41*	−3.8%	−22%	−6.4%*	−46%
	Q3	20.6%	14.3%	10.4%	1.03	0.95	0.58*	−6.4%*	−31%	−3.9%**	−27%
	Q4	22.6%	15.0%	10.9%	1.13	1.00	0.61*	−7.6%*	−34%	−4.1%**	−27%
	Q5	20.1%	15.0%	18.0%	1.00	1.00	1.00	−5.1%*	−25%	3.0%	20%
All		**19.6%**	**14.1%**	**11.1%**				**−5.5%***	**−28%**	**−3.0%***	**−21%**

[a]Values reported as 0.0% are under 0.05%. *P-value<0.05. **$0.05<P$-value<0.1.

Table 6 provides poverty headcounts, impoverishment, normalized pre- and post-OOPE poverty gaps and impact. Data are stratified by healthcare seeking and place of residence only. Figure 4 illustrates the poverty impact of health expenditure on the poverty depth by place of residence across the study period. It shows the normalized poverty depth before and after accounting for OOPE.

The poverty headcount decreased significantly (P-value < 0.05) between 2004 and 2014, by 18.5pp (75%), from 24.6 to 6.1%. It was substantially higher for households in rural areas across all study years. By 2014, 7.3% of households in rural areas could be considered poor while the figure was 3.4% in urban areas. The poverty headcount in the capital was borderline equal to zero at 0.6%.

Between 2004 and 2014, the normalized poverty gap pre-OOPE narrowed significantly (P-value < 0.05) from 5.4 to 1.0%. The normalized poverty impact of OOPE also decreased significantly (P-value < 0.05) from 0.8 to 0.2%. In 2014, the figure was highest for households in rural that sought medical care at 0.6%.

Discussion

Health status

Substantial changes in self-reported illness were observed between 2004 and 2014. While in 2004, people outside the capital were least likely to report an illness, by 2009 they were significantly more likely to report. This trend continued until 2014, when rural residents were 65% more likely than capital residents to report an illness. This may be because capital residents benefitted from greater improvements in sanitation and nutrition than rural households, as suggested by Jacobs *et al.* (2016). However, Hoi *et al.* (2009), who studied changes in remaining life expectancy during rapid economic growth in Vietnam, ascribed such differences between rural and urban areas to income improvements rather than residence conditions.

By 2014, reporting of an illness was significantly less likely only for the population of Q2, and borderline for Q1. This counterintuitive result may be due to systematic reporting bias. Systematic bias in self-assessed health status has been attributed to demographic and socio-economic factors such as education and income, as shown by Bago d'Uva *et al.* (2008) in Indonesia, India and China, or by Black *et al.* (2017) in Australia. However, bias may be more likely for illnesses perceived as mild, or poorly understood ones such as hypertension (Johnston *et al.* 2009) or diabetes (Jacobs *et al.* 2017a), for which prevalence (Chhoun *et al.* 2017) and awareness among rural residents and the poor in Cambodia has increased (Jacobs *et al.* 2015).

If comparing across groups and interpreting trends in self-reported illness may be difficult, the value of the indicator in

Table 5. Incidence of impoverishment due to healthcare expenditure in 2004, 2009 and 2014, by place of residence and consumption quintile (mean; means ratio; year-to-year absolute and relative difference)

		Mean			Means ratio			Difference[a] (absolute; relative)			
		2004	2009	2014	2004	2009	2014	2004–09		2009–14	
All households											
Place of residence	capital	0.4%	–	0.0%‡	1.00	–	1.00	−0.4%*	−100%	0.0%	–
	urban	1.6%	0.5%	0.5%‡‡	4.33	1.00	10.78	−1.1%*	−69%	0.0%	2.0%
	rural	3.6%	2.7%	1.8%	9.41*	5.34*	37.04*	−0.9%*	−24%	−0.9%*	−34%
Quintile	Q1	–	3.2%	6.2%	–	11.33*	127.32*	3.2%*	–	3.0%*	93%
	Q2	10.6%	5.9%	0.4%	16.65*	20.82*	8.71	−4.6%*	−44%	−5.5%*	−93%
	Q3	2.5%	1.4%	0.3%	3.94*	5.03**	5.98	−1.1%*	−43%	−1.1%*	−80%
	Q4	1.8%	0.3%	0.2%	2.90	1.23	3.34	−1.5%*	−81%	−0.2%	−53%
	Q5	0.6%	0.3%	0.0%‡	1.00	1.00	1.00	−0.3%**	−55%	−0.2%	−83%
All		**3.1%**	**2.2%**	**1.4%**				**−0.9%***	**−28%**	**−0.8%***	**−36%**
Households seeking care											
Place of residence	Capital	0.7%	–	0.1%‡	1.00	–	1.00	−0.7%	−100%	0.1%	–
	Urban	3.8%	1.2%	1.1%‡‡	5.41**	1.00	7.62	−2.6%*	−68%	−0.1%	−6.9%
	Rural	7.6%	5.9%	3.4%	10.80*	4.85*	22.59*	−1.6%*	−21%	−2.6%*	−43%
Quintile	Q1	–	8.1%	13.8%	–	12.86*	145.24*	8.1%*	–	5.7%*	71%
	Q2	22.9%	13.8%	0.9%	18.65*	21.99*	9.47	−9.0%*	−39%	−12.9%*	−93%
	Q3	5.2%	3.1%	0.6%	4.20*	4.99**	5.98	−2.0%*	−39%	−2.6%*	−82%
	Q4	3.6%	0.7%	0.3%	2.98**	1.16	3.35	−2.9%*	−80%	−0.4%	−56%
	Q5	1.2%	0.6%	0.1%‡	1.00	1.00	1.00	−0.6%	−49%	−0.5%	−85%
All		**6.6%**	**5.1%**	**2.9%**				**−1.5%***	**−23%**	**−2.2%***	**−43%**
Households seeking medical care											
Place of residence	Capital	0.5%‡	–	–	1.00	–	–	−0.5%	−100%	–	–
	Urban	4.1%	1.5%	1.2%‡‡	7.58**	1.00	1.00	−2.6%*	−63%	−0.3%	−20%
	Rural	8.9%	6.8%	3.6%	16.29*	4.48*	3.00*	−2.1%*	−24%	−3.2%*	−47%
Quintile	Q1	–	9.1%	15.3%	–	13.03*	151.89*	9.1%*	–	6.1%*	67%
	Q2	26.5%	17.0%	1.1%	8.83*	24.20*	10.84	−9.5%*	−36%	−15.9%*	−94%
	Q3	7.3%	4.0%	0.6%	5.16*	5.71*	6.40	−3.3%*	−45%	−3.4%*	−84%
	Q4	4.9%	0.9%	0.3%	3.45*	1.30	3.46	−3.9%*	−81%	−0.6%	−62%
	Q5	1.4%	0.7%	0.1%‡	1.00	1.00	1.00	−0.7%	−50%	−0.6%	−86%
All		**7.3%**	**5.7%**	**3.1%**				**−1.6%***	**−22%**	**−2.6%***	**−46%**

[a]Values reported as 0.0% are under 0.05%. *P-value < 0.05. **$0.05 < P$-value < 0.1. ‡P-value > 0.1. ‡‡$0.05 < P$-value < 0.1.

assessing perceived wellbeing, and demand for care, should not be dismissed (Ir *et al.* 2010; Bourne 2009). Self-reported illness remains the only measure that can be linked to need, or demand, for healthcare from the current CSES data. If further evidence for policy making should be drawn from CSES, the inclusion of standard questionnaire modules on unmet need for healthcare (Allin and Masseria 2009; Thammatacharee *et al.* 2012) should be considered.

Healthcare and medical care seeking

Healthcare seeking when ill was almost 100% in 2014, and inequalities between localities had almost disappeared. Medical care seeking also increased considerably over time, especially in rural areas. However, residents of rural areas were still about 11% less likely to seek medical care when ill than their counterparts in the capital. A similar disproportion exists between Q1 and Q2 households when compared with Q5 households. Such patterns are not uncommon in low- and middle-income countries. In Bangladesh, rural households had more restricted access to allopathic health providers for appropriate management of childhood diarrhoea than urban dwellers (Larson *et al.* 2006). In China, Jin *et al.* (2015) found inequalities in access to healthcare due to less availability of higher level healthcare professionals and facilities in rural areas.

The main factor in the increase in healthcare utilization is likely improvements in available income, which conforms to findings from China (Liu *et al.* 1999) and Vietnam (Thoa *et al.* 2013). However, part of this increase may be due to factors not accounted for in our analysis. These could include increased availability of cheaper treatment options, or a reduction in direct transaction costs, such as transportation expenses.

The almost universal seeking of healthcare should still be interpreted with caution. Healthcare consumption, in quality and type, is unlikely to be comparable across the studied groups, as suggested by the differences in medical care seeking. Further, as for self-reported illness, it is not possible to assert if this increase in healthcare seeking compensated an actual need for medical care, or increased consumption of elective services. The observed increase may also result from an induced demand by the expansion in supply of health services, both private and public, or changes in behaviour of providers in rural areas.

Dual practice by medical providers, especially well-qualified practitioners, is widespread in South-East Asia, and was already considered ubiquitous in Cambodia in 2004 (Hipgrave and Hort 2014). In this situation, healthcare providers still have the ability to guide care-seeking pathways and expenditures by exploiting

Table 6. Impact of out-of-pocket expenditure for healthcare on poverty gap among all households in 2004, 2009 and 2014, by place of residence (mean)

		All[a]			Seeking care[a]			Seeking medical care[a]		
		2004	2009	2014	2004	2009	2014	2004	2009	2014
Poverty line per person equivalent per day	[nominal KHR]	2943	6596	8411						
	[constant 2014 KHR]	5426	7709	8411						
Average poverty threshold per person per day	[nominal KHR]	1542	3522	4617						
	[Int'l.$]	1.40	2.41	2.89						
Poverty headcounts pre-out-of-pocket expenditure	[% of all households]									
Place of residence	Capital	2.2%	0.6%	0.6%‡‡	1.1%‡‡	0.9%	0.4%‡	1.2%‡‡	0.9%	0.5%‡
	Urban	12.9%	6.8%	3.4%	9.4%	6.7%	2.3%	8.5%	4.7%	2.4%
	Rural	28.3%	20.7%	7.3%	24.4%	18.1%	6.1%	21.4%	16.2%	6.0%
All		**24.6%**	**17.5%**	**6.1%**	**20.8%**	**15.8%**	**5.3%**	**17.4%**	**13.7%**	**5.2%**
Impoverishment	[% of households]									
Place of residence	Capital	0.4%	–	0.0%‡	0.7%	–	0.1%‡	0.5%‡	–	–
	Urban	1.6%	0.5%	0.5%‡‡	3.8%	1.2%	1.1%‡‡	4.1%	1.5%	1.2%‡‡
	Rural	3.6%	2.7%	1.8%	7.6%	5.9%	3.4%	8.9%	6.8%	3.6%
All		**3.1%**	**2.2%**	**1.4%**	**6.6%**	**5.1%**	**2.9%**	**7.3%**	**5.7%**	**3.1%**
Normalized poverty gap pre-out-of-pocket expenditure	[% of poverty threshold]									
Place of residence	Capital	0.5%	0.1%‡	0.1%	0.2%‡	0.2%	0.1%‡	0.2%	0.2%	0.1%‡
	Urban	2.8%	1.0%	0.6%	1.6%	1.0%	0.5%	1.5%	0.6%	0.5%
	Rural	6.2%	4.1%	1.2%	5.1%	3.4%	1.0%	4.5%	3.1%	0.9%
All		**5.4%**	**3.4%**	**1.0%**	**4.3%**	**3.0%**	**0.8%**	**3.6%**	**2.6%**	**0.8%**
Normalized poverty gap post-out-of-pocket expenditure	[% of poverty threshold]									
Place of residence	Capital	0.5%	0.1%	0.1%	0.4%‡	0.2%	0.2%‡	0.4%‡	0.2%	0.1%‡‡
	Urban	3.1%	1.1%	0.7%	2.4%	1.3%	0.6%	2.3%	0.9%	0.6%
	Rural	7.1%	4.7%	1.4%	7.0%	4.9%	1.5%	6.8%	4.7%	1.5%
All		**6.2%**	**4.0%**	**1.2%**	**6.0%**	**4.2%**	**1.3%**	**5.5%**	**3.9%**	**1.3%**
Normalized poverty impact	[% of poverty threshold]									
Place of residence	Capital	0.1%	0.0%	0.0%‡‡	0.2%	0.1%	0.0%‡	0.2%	0.1%	0.0%‡
	Urban	0.3%	0.1%	0.1%	0.8%	0.3%	0.2%	0.8%	0.3%	0.2%
	Rural	0.9%	0.7%	0.3%	1.9%	1.4%	0.5%	2.3%	1.6%	0.6%
All		**0.8%**	**0.5%**	**0.2%**	**1.7%**	**1.2%**	**0.5%**	**1.9%**	**1.3%**	**0.5%**

[a]Values reported as 0.0% are under 0.05%. ‡P-value>0.1. ‡‡$0.05 < P$-value < 0.1.

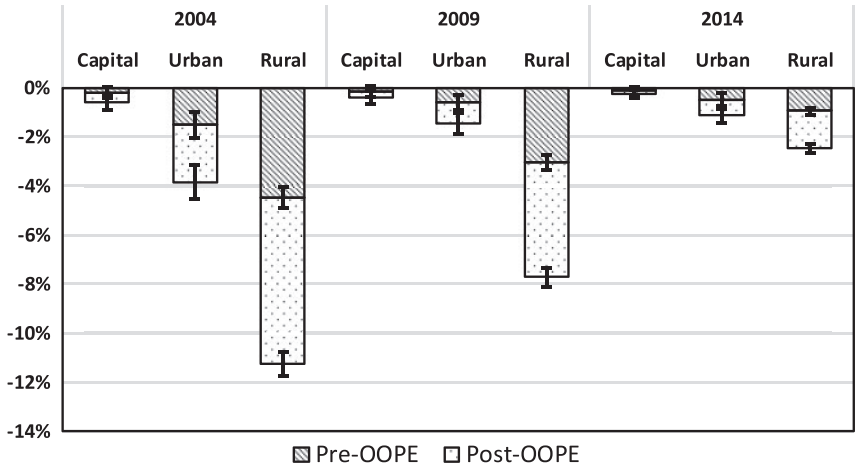

Figure 4. Normalized poverty gap before and after out-of-pocket expenditure (OOPE), among poor households for 2004, 2009 and 2014, by place of residence and year (mean; 5% error bars).

information asymmetries as well as their status in the public health system. Dalal *et al.* (2017) also asserted the increase in preference for private provision of healthcare across all socio-economic groups in Cambodia, based on data from the 2005 and 2010 Cambodian Demographic Health Survey (CDHS). In this data, by 2010 the majority of healthcare services were sought from private providers, mainly private pharmacies, compared with a quarter of all consultations in 2005. The results of the 2014 CDHS also found a similar pattern (Kosal *et al.* 2015). This predominant reliance on private providers is also observed among HEF beneficiaries despite their entitlement to free public healthcare (Ir *et al.* 2012). There are many reasons for this behaviour; mainly opportunity and transport costs, as well as uncertainties about entitlements and perceived quality of care (Jacobs *et al.* 2007; Noy *et al.* 2012; World Bank 2016b).

Financial burden and risk

The increase in utilization from 2004 came at a considerable increase in OOPE, which more than tripled in real terms by 2014. However, the increase in CTP was faster and compensated for the increase in OOPE, which resulted in an overall reduction of the financial burden of care seeking. Most notably, the financial burden for households that sought medical care fell substantially across all groups between 2004 and 2009. This reduction continued to benefit the entire population from 2009 to 2014; except for Q5 households, which saw their financial burden revert to 2004 levels.

CHE incidence fell by 30% in the study period. However, the significant reduction occurred between 2004 and 2009. The greatest reduction was observed for households in the capital, which had a decline of 72%, compared with a 24% decrease in rural areas. Approximately one in nine households in rural areas that sought care, and one in eight that sought medical care, experienced CHE in 2014. These figures are, however, skewed by the disproportionately high incidence of CHE among Q5 households.

Between 2004 and 2009 significant reductions in CHE occurred, but only in Q3 to Q5. The reduction was most pronounced for households that sought medical care. This suggests the increase in disposable income that reduced the financial burden for all households over the period was not sufficient to protect the poorest against CHE. However, significant reductions in CHE incidence among households that sought medical care were only observed between 2009 and 2014, and only for Q1 and Q2. It is not possible to assert if this reduction can be attributed to the significant reductions in financial burden of OOPE also observed over that period among households in Q1 and Q2. In fact, reductions in financial burden were also observed for Q3 and Q4 in that period.

While incidence of CHE decreased further between 2009 and 2014, inequality in the risk of CHE between households in the capital and rural areas increased. By 2014, there was no significant difference between households in the capital and urban areas in their likelihood of experiencing CHE. However, households living in rural areas were four times more likely to experience a CHE. Inequality in residential areas was less pronounced when households sought care or medical care, and even decreased between 2009 and 2014 due to the substantial decrease in CHE incidence in rural areas over this period. Still, households in rural areas were 2.74 times more likely than households in the capital to experience CHE when seeking medical care. Even after controlling for other variables, rural residency remained a strong predictor of CHE, as indicated by Jacobs *et al.* (2016). This is not uncommon; Van Minh *et al.* (2013) found similar results for Vietnam, and Rashad and Sharaf (2015) found similar results for the Middle East.

It may be argued that the observed increase in inequality in CHE incidence when comparing households that sought medical care in other quintiles to Q5 would be positive. Between 2009 and 2014, the increase is explained by the decrease in CHE incidence in Q1 to Q4 and the increase in Q5. However, this change is mainly due to the large reduction observed in Q1 to Q2, which fell by 44% over this period.

By 2014, CHE incidence was the highest among Q5 households. This is similar to findings from other countries such as the Philippines, Mongolia and Vietnam (Van Minh *et al.* 2013; Bredenkamp and Buisman 2016; Dorjdagva *et al.* 2016). O'Donnell *et al.* (2005) ascribe this phenomenon to the fact that rich patients seek more expensive care, which in turn increases total household consumption, used in most studies as a proxy for income and socio-economic quintile categorization (Wagstaff *et al.* 2018a). Such results are also to be expected from the use of a fixed threshold for CHE (Wagstaff *et al.* 2018a).

We assessed and tested for trends and inequalities of indicators essential to determine progress towards universal healthcare coverage as set for the Sustainable Development Goals. In particular, healthcare spending-related impoverishment and CHE. In two recent publications, Wagstaff *et al.* (2018a) and Wagstaff *et al.* (2018b) presented the global trends for these two indicators for over

120 countries for the period 2000–10. Upon verification, only data from the 2009 CSES were included in this global benchmarking. This enables us to examine our results in an international context. Even if the authors mainly reported CHE estimates using a much lower threshold of 10 and 25% of CTP, they also used a 40% non-food consumption threshold for comparison, similar to the methods used in our analysis. Using these thresholds, they estimated that CHE incidence had fallen in around half the countries surveyed. However, global CHE incidence actually increased significantly to 3.0% during the study period. The highest incidence of CHE, 3.9%, was found in Asia. Thus, the considerable reduction in CHE in Cambodia should be acknowledged even if, at 4.9%, it remains high compared with the rest of the world. The fact that care seeking more than doubles the proportion of households experiencing CHE justifies the attention of policymakers.

Impoverishment and poverty gap

By 2014, the poverty headcount in the capital was only borderline different from zero, even when applying the relatively low poverty thresholds used in our analysis (mean Intl'l$2.89 per person per day). Around 1.8% of households in rural areas were impoverished by healthcare-related expenses. The figure doubled when considering households seeking medical care.

In 2014, almost one in seven households in Q1 was pushed deeper into poverty when seeking medical care. The fact that healthcare-related impoverishment for households that sought medical care was high in Q1 illustrates how vulnerable near-poor people remain in Cambodia, as suggested by the World Bank (2016b). Furthermore, the significant and non-negligible impoverishment incidence among households in Q2 to Q4 suggests a need to extend the tax-funded social health protection system, in particular to Q2 households. This is further supported by the impact of OOPE on poverty depth; OOPE contributed to the 61% increase in poverty headcount and poverty depth among households in rural areas that sought medical care. O'Donnell *et al.* (2008) interpreted similar results observed in Vietnam in 1998 as an increase in the number of poor households rather than a deepening of the average poverty depth of already poor households. However, we found that households already considered poor before OOPE were pushed 28% further under the poverty line (results not shown). This showed how OOPE still contributed to trapping households into poverty.

Policy implications

Social health protection policies in Cambodia have focused on redirecting poor people towards public providers to receive free healthcare at the point of delivery, as these healthcare providers are the only ones liable to quality norms (Ensor *et al.* 2017). HEF coverage was gradually extended to the entire country at the same time as the number of potential beneficiaries was falling rapidly to 20.5% in 2011 (World Bank 2016b).

The lower tendency to seek medical care, coupled with a higher incidence of CHE and stronger poverty impact of OOPE in 2014, suggest that more public resources need to be devoted to increasing the quality of healthcare and degree of financial risk protection in rural areas, where 79% of the Cambodian population resides (National Institute of Statistics of Cambodia 2013). Additional investments to foster improved sanitation and nutrition should complement the strengthening of the health system (Jacobs *et al.* 2016). Of course, such allocation of resources should come with improved efficiencies.

Annear *et al.* (2011) proposed increasing both supply- and demand-side subsidies to reduce the risk of CHE and the financial burden of high-cost medical interventions. Cambodia has introduced several supply-side incentives, most notably pay-for-performance and contracting (Ensor *et al.* 2017). One such current initiative is the government financed midwifery incentive scheme, which provides financial incentives to public providers for institutional deliveries (Ir *et al.* 2015). This illustrates how strategic purchasing can address inequality and improve overall intermediary health outcomes. This last point is not trivial in our discussions, as HEFs may not be considered as implementing strategic purchasing, with the exception of small-scale, performance-based payment pilots (Jacobs *et al.* 2017b).

A major finding of our analysis is that the Cambodian population is progressively becoming segmented into three main socio-economic groups with regard to healthcare consumption. The differences between Q1 and Q2, and Q3 and Q4, are disappearing. HEF coverage could be expanded to encompass the poorest 40% of the population, as the two poorest quintiles do not significantly differ in their access to medical care, financial burden and incidence of CHE. However, evidence of the scheme's effectiveness on improving access to healthcare has been mixed.

Flores *et al.* (2013), using 2004, 2007, 2008 and 2009 CSES data, concluded that HEFs reduced OOPE for the poor but found no significant effect on healthcare-related debt or medical care seeking at public health providers. It should be noted that full country coverage by HEFs was only achieved by the end of 2015, and until that time its degree of financial risk protection among the poorest could not be fully assessed. We found a significant reduction in CHE when seeking medical care for the two lowest quintiles between 2009 and 2014, when 70% of public health facilities in the country were already covered. However, using the same dataset and logistic regression, Jacobs *et al.* (2016) did not find a protective effect of HEFs for CHE.

Nevertheless, as geographic inequalities are acute, alternatives or complementarities to the extension of inclusion criteria for HEF beneficiaries could be considered. The reliance on proxy means testing to identify households eligible for HEFs may be prone to exclusion and inclusion errors; such mechanisms are naturally imperfect, as underlined by Brown *et al.* (2016). Blanket geographical targeting of villages with the greatest need, instead of identifying households through proxy means testing, could be tested. Such an approach would need to consider how many resources could be freed from a targeting process based on means testing, although it would face the same political and technical challenges associated with removing user fees or allocating public subsidies (Meessen *et al.* 2011).

Conclusions

In summary, aggregate figures concerning financial risk protection for healthcare at the national level show a promising and positive picture, with tremendous achievements during the last decade. However, these figures mask a widening gap in financial risk protection between urban and rural populations, and highlight concerns for the situations of the poorest and most vulnerable populations.

More attention and investment should be devoted to the healthcare needs of the rural population, including provisions for cost of care, as well as improvements in social health protection mechanisms and sanitation. The increased socio-economic segmentation of the population concerning healthcare consumption, CHE and impoverishment incidence suggest a need to reconsider current policies

regarding the approach to social health protection for the poorest 40% of the population.

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